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INTERNATIONAL DRINKING WATER SUPPLY AND
SANITATION DECADE

Proceedings of the Interregional Seminar on
Women and the International Drinking Water
Supply and Sanitation Decade

Cairo, 12 - 16 March 1984

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Interregional Seminar
on
Women and the International Drinking
Water Supply and Sanitation Decade

FOREWORD

Global recognition of the urgency to provide adequate water supply and sanitation presented the International Research and Training Institute for the Advancement of Women (INSTRAW) with a unique and challenging task. As part of its efforts towards the effective mobilization and integration of women in development, INSTRAW organized the Interregional Seminar on Women and the International Drinking Water Supply and Sanitation Decade (IDWSSD), in Cairo, March 1984. The immediate purpose of the seminar was to solicit the views of experts, with a national and regional perspective, on the problems involved in improving water supply and sanitation, particularly as they relate to women and the solutions which were found or envisaged.

From the very extensive information that emerged from the seminar, it was realized that the crucial role of women in water supply and sanitation has only recently begun to be understood and acknowledged. However, evidence showed overwhelmingly that by including women in planning, design, operation and maintenance, water supply and sanitation projects could achieve their objectives more efficiently and with greater rates of success.

For INSTRAW, the seminar provided the opportunity to exchange views on the significance and need for women to be involved in water supply and sanitation. The Institute undertook an extensive search for literature on the subject that encompassed all regions and probed into activities around the globe. Together, this represented a major step for the Institute in achieving its ultimate objective in convening the seminar - namely, to devise a strategy for providing a coherent and flexible training programme to enhance the role of women in water supply and sanitation.

As a follow up to the Seminar, INSTRAW, jointly with the International Labour Office/Turin Centre, produced two prototype, multi-media training packages on Women, Water Supply and Sanitation. Using a modular approach, these comprehensive and innovative packages follow an action-oriented training methodology aimed at two major target groups: development planners and women's organizations. The first training package, designed for: senior officials from ministries of education, health, planning, public affairs and social welfare, officials of national development agencies; and representatives of non-governmental organizations, consists of a five-day training seminar covering the following areas:

- 1) Introduction of the IDWSSD and INSTRAW;
- 2) Participation of women in planning WSS projects;
- 3) Involvement of women in choice of technology and implementation of WSS projects;
- 4) Role of women in education and training activities;
- 5) Evaluation of WSS projects.

The second package, designed for leaders and senior officials of women's organizations at national, regional and international levels, is organized as a 10-day training seminar and covers the following:

- 1) Introduction of the IDWSSD and INSTRAW;
- 2) Participation of women in planning WSS projects;
- 3) Communication/information support for WSS projects and programmes;
- 4) Women's activities in health/hygiene education in WSS projects and programmes;
- 5) The role of women as participants and beneficiaries in the choice of technology and training for WSS projects;
- 6) Women's activities in the operational stage of WSS projects;
- 7) Evaluation procedures for WSS projects.

Both packages include notes for presentation, key-issue checklists, additional training materials, evaluation questionnaires, pedagogical schemes, lesson plans, materials for lecturers, references and bibliographies. All modules are supported with audio-visual material and pamphlets.

While the modules do highlight individual situations and instances in Africa, Asia, and Latin America and the Caribbean, cross-cultural flexibility was stressed, and the packages can be modified and adapted, therefore, to the needs of local trainers in different regions. Field testing of the packages will take place in 1987.

We wish to express our grateful appreciation to the Government of the Arab Republic of Egypt for hosting the Interregional Seminar on Women and the IDWSSD, in Cairo, March 1984. We would also like to thank the co-operating agencies and bodies of the United Nations system for their contributions, as well as the INSTRAW staff members who worked steadfastly to make this publication possible.

Part One

REPORT OF THE INTERREGIONAL SEMINAR ON
WOMEN AND THE INTERNATIONAL DRINKING
WATER SUPPLY AND SANITATION DECADE

INTRODUCTION

The International Research and Training Institute for the Advancement of Women, one of the outcomes of the United Nations Decade for Women, is mandated to promote through research, training and information the advancement of women. Its activities in those areas are geared towards the full integration of women into the socio-economic development process.

Among the pressing problems facing many developing countries is that of water supply and sanitation. The General Assembly of the United Nations, by its resolution 35/18 of 10 November 1980, proclaimed the period 1981-1990 the International Drinking Water Supply and Sanitation Decade, with the aim of providing safe drinking water and adequate sanitation facilities for all by the year 1990, if possible.

The Board of Trustees of the International Research and Training Institute for the Advancement of Women, at its third session in 1983, approved the long-term commitment of the Institute to the objectives of the International Drinking Water Supply and the Sanitation Decade and recommended the organization of a seminar on women and the Decade (see E/1983/31, para. 3).

In pursuance of that recommendation, the Institute organized the Interregional Seminar on Women and the International Drinking Water Supply and Sanitation Decade. The Government of Egypt acted as host to the Seminar, which was held at Cairo from 12 to 16 March 1984.

The objective of the Seminar was to identify the problems encountered in the various areas related to drinking water supply and sanitation-socio-economic, health and sanitation, and scientific and technological - and to seek possible solutions to those problems on the basis of the successful experiences of various countries and regions. Experts representing the main areas of concern participated, namely, social scientists, medical doctors and health specialists, and engineers and scientists.

I. ORGANIZATIONAL MATTERS OF THE SEMINAR

The Interregional Seminar on Women and the International Drinking Water Supply and Sanitation Decade was held at Cairo from 12 to 16 March 1984. The Seminar conducted its work in plenary meetings and in three specialized panels. Seven plenary meetings and nine panel meetings were held.

The Seminar was opened by the Director of the International Research and Training Institute for the Advancement of Women, Mrs. Dunja Pastizzi-Ferencic. The Under-Secretary-General for International Economic and Social Affairs, Mr. Shuaib Uthman Yolah, sent a message in which he thanked the Government and people of Egypt for acting as hosts to the Seminar. He emphasized the interdependence of the various development problems, and referred particularly to the Institute's contribution to the international search for solutions that would enable women to contribute more effectively to development efforts.

At the opening meeting, statements were made by the President of the Egyptian Academy of Scientific Research and Technology, Ibrahim Badran; the Minister of State for Housing, Urbanization and Land Reclamation, Hassaballah Al Kafrawi; the Minister of Agriculture, Youssef Wali; the Chairman of the State Information Service, Mamdouh El-Beltaoui; and the Minister for Information, Safwat El-Sherif.

Sixty participants from various regions attended the Seminar in their personal capacity. A number of United Nations bodies were represented, as were international donor agencies, non-governmental organizations and other international organizations. A complete list of participants is given in part one, annex I.

The following persons were elected as officers: President: Fatma El-Gohary (Egypt); Vice-Presidents: Marie-Thérèse Abela (France) and Martha Olga García (Dominican Republic); Rapporteur: Banoo Coyaji (India).

The participants adopted the following agenda:

1. Opening of the Seminar
2. Election of officers
3. Adoption of the agenda
4. Identification of the problems in water supply and sanitation as they relate to women in the areas of:
 - (a) Socio-economic development;
 - (b) Health and sanitation;
 - (c) Science and technology.
5. Measures aimed at solving the problems and enhancing the role of women in the activities of the International Drinking Water Supply and Sanitation Decade, proposals for action at the national, regional and international levels.
6. Adoption of the report of the Seminar.

The documents for the Seminar consisted of 31 papers dealing with the issues of water supply and sanitation from various perspectives. A list of papers is given in part one, annex II.

II. SEMINAR RECOMMENDATIONS

Bearing in mind the discussion that took place during the plenary meetings, and the work of the three panels, the participants in the Seminar unanimously adopted the following conceptual framework and recommendations on the role of women in water supply and sanitation in the areas of socio-economic development, health and sanitation, and science and technology.

Introduction

When deciding on national development priorities, one of the primary criteria should be the extent to which a particular scheme benefits women and secures their participation.

Special effort should be made to provide information, technical assistance and logistics support to self-help projects serving communities most in need of improved water and sanitation, particularly dispersed rural populations and isolated groups, as they collectively account for a very large number of people who are often overlooked in water supply, sanitation and health programmes.

Special efforts should be made at national, regional and local levels to promote the provision of water supply, sanitation and environmental health education as a public responsibility in which all are involved.

A well-directed health education programme for the community at large is necessary to make people aware of the relationship between unsanitary habits, disease and nutrition. This should not only form a part of the educational system and informal, functional adult education, but should also be disseminated by all the media. Only then will there be a change of attitude and the necessary change in behaviour.

Self-evaluation is considered an effective tool in education. Therefore, women and communities should be encouraged to evaluate their own progress in water supply and sanitation activities in order to improve their role in this field. The education of a community after the formal completion of a project should be continued by establishing a community follow-up system.

Most countries in the world have endorsed the Global Strategy for Health for All by the Year 2000, adopted by the World Health Assembly and endorsed by the United Nations General Assembly (resolution 36/43), through a primary health care approach with the full involvement of the population. A critical input of primary health care is an adequate supply of safe water and basic sanitation. The objectives of the International Drinking Water Supply and Sanitation Decade, if achieved, will affect the quality of life of all people - men, women and children. Women would, however, be affected most, since they are the main haulers and users of water, as well as managers of human waste.

Water supply should be adequate in amount. This will relieve women somewhat of their impossible workload, which may involve as much as six hours or more a day carrying water from a distant source.

Basic sanitation is very important to health, since infective agents of most water-borne and associated diseases are spread by the contamination of water with human waste. Unless adequate measures are taken for the treatment and disposal of waste water, it could increase the occurrence of disease among people who come into contact with it.

When a national policy statement acknowledges the major role of women as managers of water and human waste, it needs to be accompanied by statements of support for improving that role, and by recommended strategies encouraging flexibility and local co-ordination in the planning process. The road is then paved for programmes of local awareness, learning and action.

Two major constraints in providing adequate water supply and basic sanitation are, insufficient allocation of resources and lack of measures to ensure that water supply and sanitation facilities are properly used and maintained. Agreement among decision makers at the national level and of donors to allocate needed resources will reflect their understanding of the importance of the problem and the need to provide such basic amenities.

Decision-makers can minimize these constraints by viewing them as challenges and by actively participating with the primary users of community water supply and sanitation systems, namely, the women of the community. The allocation of resources for water and sanitation projects and their supporting programmes would be considered a significant investment not only in terms of improved health and living conditions but also in regard to the productive capacity of the community members.

Together with the men and women of the community receiving improvements through activities related to the Decade, decision makers at the central levels can reasonably expect provision of these basic amenities to increase life expectancy, diminish debilitating diseases, and reduce lost working hours, thus increasing the productivity of workers and enhancing the economic condition of both people and country.

International efforts can increase awareness in this respect since diseases associated with water and waste are not confined within national boundaries. It is necessary that women be encouraged, educated and assisted to take their rightful and proper place in policy-making bodies at all levels, as the primary managers of water and human waste.

A. Socio-economic development

A primary focus of procedures for planning and implementing development programmes, particularly for the improvement of water supply and sanitation, should be to motivate and mobilize community members, men and women alike, to be involved as partners in the process, not merely as recipients. Mass campaigning involving both sexes, for the mobilization of the people at large, should be promoted with the help of able organizers to motivate active community participation.

It is desirable for each sector working at the community level to

encourage such involvement in improving household and community water supply and sanitation within the context of an integrated development programme.

Community participation can be increased by co-ordinating training and work programmes with those persons at the community and more central levels who are responsible for water supply, sanitation improvements, and environmental health education activities. Better yet is when agricultural extension workers, social workers, and schoolteachers provide environmental health information through their programmes of work at the community level. This information reinforces the learning process provided by health sector personnel and by water and sanitation specialists.

In the context of the national development process, Governments should develop policies that integrate water and sanitation development programmes with other community development activities relevant to women.

Learning experience, both formal and informal, focusing on management and skill competency training, should be created through education programmes that provide opportunities for men and women to develop their potential and skills in making decisions for the improvement of their living conditions.

The existing social and economic expectations and the allocation and management of locally available resources constitute the background against which women's participation in activities for the Decade are set. These expectations influence women's behaviour and should be assessed in terms of their impact on the ability of women to participate in improving household and community water supply and sanitation. Women should exercise an important role in this regard.

The community in general, particularly women, should participate in the planning, implementation and evaluation of their community's environmental health education and service programmes.

Planners of water supply and sanitation projects should adopt a dialogue or two-way communication approach and provide opportunities for community members to practice their planning role, define their present situation, choose among technological alternatives to improve their situation, determine methods of implementation, and suggest forms of community contributions.

Policy makers and planners should make special efforts to involve women in water supply and sanitation policy formulation and planning. To this end, steps should be taken to integrate national non-governmental organizations representing women in the policy-making and planning processes.

Efforts should be made to raise awareness among community members, men and women, of the implications, benefits and costs to the community of different project options in order to prepare them to choose among technological alternatives to improve their situation and also to help them feel that they are instrumental in the planning and selection of the system used.

In development projects, particularly those involving international assistance, special efforts should be made, during the initial stage of project formulation and design, to represent the interests and needs of the communities to be served. Bilateral and multilateral donors are therefore used to encourage the involvement of men and women at the community level in the project proposal and the preparatory stage of projects.

Appropriate information on the role women have played and are currently performing in development activities should be provided. This would help to improve the public attitude regarding women's image, specifically, their image and role as active contributors and managers of improvements in water supply and sanitation. It would also show their overriding concern with the well-being of their families and the environmental health conditions in their communities.

Initiation of projects from the grass-roots level, that is , from the local people themselves, should be encouraged and supported.

Supplying homes in urban areas with adequate water, waste treatment and disposal is impeded by excessive cost. Individuals with low income and limited financial reserves cannot absorb or significantly contribute to the cost of extending water and waste disposal services to their dwellings. The extension of credit or other financial assistance, including organized fund-raising campaigns to ensure adequacy of home water supplies and of domestic sanitation, should therefore be considered.

Similarly, the financial requirements for providing water and waste management systems to rural communities may require assistance provisions through the extension of loans or grants, or a portion of the income from income generating activities which also serve to increase the availability of productive work opportunities in the rural area.

Whether in urban or rural areas, a governing agency is needed to effectively manage the terms of the various types of financial support required to meet the goals of the Decade. It would be most desirable to organize this locally in the rural area. This may also prove to be effective in the urban context as well. The capacity of a private community, neighbourhood groups, or local financial institutions to assume this responsibility should be examined on a case-by-case basis, and women should be involved in the investigation.

While objective and independent evaluation is viewed as an integral part of the project activity addressing both process and outcome, it is the evaluation of the involvement of women in the work of the Decade and the contribution made by women to improvements in water supply and sanitation which should be the focus of evaluation. Evaluation should be based on both the quantitative and qualitative aspects of the projects, with emphasis on the qualitative aspects. The evaluation criteria serve the work best when they are decided jointly with the participants, because the activity of defining evaluation criteria becomes a part of the learning process for the participants. Moreover, it sets up a working relationship based on mutual respect.

B. Health and sanitation

As a means of integrating women in water supply and sanitation activities the preparation and experimentation of pilot activities for sanitary education on the development and conservation of water supply systems, sewage disposal and food hygiene should be emphasized. Pilot projects in primary education on health and sanitation in rural areas should also be developed, by employing women.

To guarantee water quality in accordance with approved standards, particularly in small and medium-sized communities, a sanitary survey of the operational conditions of the public water supply systems should be made and adequate preventive and corrective measures should be proposed.

Sanitation activities should be conducted by qualified technicians. In this respect, the person in charge of water treatment plants can be a woman who has been properly trained.

Women should be trained as users and managers of sanitation services* in the following areas:

- (a) Adequate utilization and care of latrines by the family members, particularly children;
- (b) Proper disposal of faeces, washing hands after defecating and before preparing or touching food;
- (c) Adequate recovery of waste water and excreta;
- (d) Adequate maintenance of sewage systems by means of supervised services and daily conservation and repair operations;
- (e) Inspection of domestic, regional and municipal systems: contacting local authorities in charge of the public services, as well as training other community members and the family itself.

At the planning level

The following methods should be used in order to fully involve those responsible for development programmes:

- (a) Exposure to new disciplines in sociological studies;
- (b) Living for periods of time in the communities where studies and work are being carried out, thus identifying suitable methods of approval based on first-hand experience and knowledge;

* A recent example is the programme developed by the Companhia de Saneamento de Minas Gerais, in Brazil, which has been co-ordinated by women under a community development project. A new method of sanitary education is being introduced in schools and the pupils are being taught how to take care of their bodies and health and how to identify community problems in the field of sanitation, contributing to the reduction of infant mortality.

(c) Community consultation being made a necessary component in planning projects.

Political leadership should be provided to inform:

(a) How capital investments remain unused owing to failure to involve beneficiaries in planning;

(b) How capital investments have depreciated over a very short period of time owing to the fact that people's participation was not considered at an early stage;

(c) How major capital investments were spent needlessly in situations where local consultants as well as local materials could have been used.

The preparation of a policy paper on the approaches to planning, approved by the Government, is important so that officials will be obliged to consult beneficiaries at the planning stage. Equally important is identifying the need in a community through consultation with both men and women, thereby promoting greater involvement of women, as well as identifying suitable methods to ease the drudgery associated with women's tasks, making them more appropriate for sharing by men. In this manner, the status of women will be somewhat enhanced and they will have more time to participate in planning.

Planning methods that require only a minimum in literacy levels, that is, simplified counting and measuring methods, should be adopted.

Suitable associations for women to meet their needs in various sectors should be identified, supported or established and this process should be developed further in planning activities and programmes in the water supply and sanitation area.

Health education should be included as an integral part of all water supply and sanitation programmes as noted and prescribed at the International Conference on Primary Health Care.

At the implementation stage

Each contract should be divided into three components: labour, materials and equipment: contributions under each component should be discussed and arranged with the community before any contract is awarded to a private contractor.

Political leadership should be induced to take the lead in obtaining community participation and joining the community in support of their work.

Suitable voluntary organizations to assist in the implementation of objectives, activities and programmes should be identified and supported.

Community meetings should be initiated to obtain contributions from people of available means, to meet the expenses incurred in the organization of voluntary work. In cases where beneficiaries are too poor, suitable arrangements to provide assistance should be made.

Suitable women to be trained as caretakers and health volunteers, to organize training workshops, etc., should be selected.

At the evaluation stage

Appropriate evaluation designs and tools should be prepared, taking into consideration the literacy standards, social structures, and other case-specific matters.

Voluntary women's organizations should be trained in the use of evaluation methods and more emphasis placed on the collection of suitable qualitative data.

C. Science and technology

Communication/information/dialogue

Provision should be made for:

(a) Finding out about local needs through participatory research and continuing consultation at the community level, especially with women, not just formal leaders;

(b) Sharing the results of this research and communication with the communities and making these results an integral part of planning, implementation, evaluation and training for activities for the Decade at the local, national and global levels;

(c) Providing a learning situation in which the community members, especially women, can familiarize themselves with the various technologies and become aware of the cost and value of alternatives for solving their defined needs in water supply and sanitation through public hearings, with women participating in groups and as individuals.

Choice of technology

Research should be carried out to adapt existing technologies and develop new and appropriate technologies to satisfy short-term and long-term needs as defined by women, which can influence acceptance and use of improved water and sanitation systems.

It is very important to make water palatable and visually acceptable so that people are encouraged to use it. Excessive iron and manganese should be reduced or removed for clarity and taste. Treatment to achieve clarity and to reduce the constituents which make water unpalatable needs to be regarded as a highly desirable and essential part of providing safe water which is acceptable for community consumption.

The priority to be assigned to treatment for palatability in any particular case must depend upon an assessment of women's reaction to the water provided, and to the alternatives proposed.

Priority should be given to appropriate waste collection, water treatment, disposal and/or re-use techniques which can be easily managed by women and without sacrificing health and environmental aspects.

In the design and application of community accepted technologies, women's needs and their physical condition, such as pregnancy and physical capacity, should be taken into account. Women's views and opinions are critical in this regard, especially regarding the choice of technology and site selection.

Role of women in management

The contribution of women as members of the community to alternative tasks related to the implementation and management of water supply and sanitation projects should be publicly recognized within the framework of agreement between the community and the responsible authority.

Facilities should be provided for women to visit the sites of water supply projects and be introduced to the general technical and economic aspects, with orientation and preliminary training on their future role as users and managers of water supply and sanitation resources and services.

National policy and programmes should acknowledge women as managers of water and waste.

Women should be trained to maintain community and household facilities and, at the village level, to care for and do preventive maintenance of water supply and sanitary facilities.

An accessible inspection system should be established where women can report breakdowns and faults promptly, if they are unable to repair on the spot.

Women should be encouraged to raise the necessary funds to cover the construction, operation and maintenance costs of community water supply and sanitation systems.

Women, village-based workers, should be trained to encourage other women to overcome cultural and traditional barriers against the use of new facilities, and to learn to use the facilities correctly; and to organize women to keep the pump and latrine surroundings clean, utilize run-away water, practise hygienic storage of water, personal hygiene, etc.

D. General

Training and promotion

The training of women in regional health and development plans should be promoted and supported by means of the following activities:

(a) Organization and conduct of experiments of pilot activities for sanitary education, water and food hygiene, the development and conservation

of water supply systems, and the proper and safe disposal of sewage and solid wastes;

(b) Development of pilot projects in primary education on health and sanitation in rural areas by employing women;

(c) Training of women in rural and urban areas to enable them to participate in the planning and application of projects involving water supply and sanitation;

(d) Technical training of women to carry out operational, maintenance, and repair services of water supply and sanitation systems, so that they can fully participate in the operation of these facilities and ensure quality control;

(e) In order to support training efforts a programme for the training of trainers, including women, should be planned and carried out;

(f) In planning training programmes for women, special requirements such as child care, location and scheduling should be taken into account;

(g) Outreach training programmes and mobile training units should be developed to support local training needs and efforts.

Well-formulated mass media programmes concerning the role of women should be emphasized; they should focus on the following issues:

(a) Awareness of the relationship between unhygienic practices and disease;

(b) Avoiding water waste and emphasizing water conservation and re-use;

(c) Avoiding contamination of water;

(d) Appropriate and safe disposal of wastes;

(e) Primary health care.

National Governments should consider developing radio programmes directed at the village level, stressing the importance of adequate water supply and sanitation facilities and the role women play in development.

Demonstrations and other experiences, as well as audiovisual and other learning materials, should be developed, reviewed and disseminated among the community training programmes.

Rural men and women should be consulted and invited to participate in the choice of learning experiences and materials developed, in order to ensure their effectiveness in the learning process.

Evaluation and assessment

The evaluation and assessment of water supply and sanitation projects

should, apart from the usual considerations of technology, place emphasis on women as the main beneficiaries. Women have an important evaluation role. They should be involved in the design and evaluation process at all stages for feed-back. Evaluation should be made regarding:

- (a) The impact of projects on women and families;
- (b) The impact of women's participation on the project, including women's opinion on:
 - (i) Reduction of the drudgery and physical effort endured by women before the construction of the works;
 - (ii) Increase in the leisure and income-generating activities of women;
 - (iii) Improvement in the health status of women and the community;
 - (iv) Satisfaction with women's integration in water supply and sanitation programmes;
 - (v) Performance of the women involved in the construction, operation and maintenance of the works.

Co-ordination between national organizations

The multisectoral nature of water and sanitation activities involving women requires appropriate co-ordination among the national institutions and authorities involved in water, health, sanitation, agricultural and rural development programmes, as well as bodies in charge of education and training.

Appropriate co-ordinating bodies at the national level, such as steering committees or project managing committees, should be made instrumental in the co-ordination between responsible ministries.

When established, the national committee for the Decade should pay particular attention to the role of women.

National machineries for the advancement of women should assist and be consulted for securing pragmatic action at the national level.

The co-ordination with regional or local authorities, such as health and adult education in their activities in relation to women should be promoted.

Local community organizations should be identified and the role of women should be promoted in the planning and implementation process of water supply and sanitation programmes and projects within the recognized social framework of the community.

Global

Maximum efforts should be made at the international, global, regional and subregional levels to secure the incorporation of issues relevant to

women into water-and sanitation-related activities. These issues should become integral parts of the on-going and future work of the existing institutions active in the field.

Governments, both regional and subregional, as well as global institutions, should incorporate specific reference to women when discussing achievements and impediments relevant to the improvement of water and sanitation, particularly in developing countries.

Global, regional and subregional campaigns should be carried out in both developed and developing countries in order to create and raise public awareness of the problems facing women in the field of water and sanitation. In this respect, the most modern information and communication technology should be used for awareness-raising campaigns, and for training the population in general and women in particular.

Manuals should be prepared and advisory services carried out, aimed at those responsible for decision-making in the water and sanitation field and referring to the need to involve women in water and sanitation, and leading to more integrated development approaches.

The International Research and Training Institute for the Advancement of Women and other concerned agencies should be assisted in the task of ensuring that existing knowledge on the role and situation of women related to water and sanitation will be compiled in a more systematic manner and widely disseminated.

National, regional and global information exchange programmes on water supply and sanitation - such as, at the national/regional level, the Pan-American Network of Information and Documentation on Sanitary Engineering and Environmental Sciences (REPIDISCA) for Latin America and the Environmental Sanitation Information Centre (ENSIC) for south-east Asia; and, at the national/global level, The Programme for Exchange and Transfer of Information on Community Water Supply and Sanitation (POETRI) - should include issues relating to women's involvement as a specific topic of their exchange work.

Agents at the global level to be incorporated in the promotion of women's participation are:

The Steering Committee for Co-operative Action to support the International Drinking Water Supply and Sanitation Decade
National water and sanitation authorities
Technical associations and federations
Public information media
National and international women's associations
Women's development groups, to assist in securing pragmatic action and disseminating information.

Bilateral donors

Bilateral donors and other funding agencies should include in their requirements for funding project, criteria which would lead to consultations with women before projects are initiated.

Requests for proposals issued by donors and aid programmes should include the requirement of addressing women's issues and their active participation. This ensures that bidders will respond to and address women's water supply and sanitation needs.

Bilateral and multilateral donor agencies and organizations should give priority to activities which are beneficial to women and their families, and should contribute to the promotion of long-term perspectives, securing adequate financial means to meet women's needs and ensure their participation well beyond the Decade.

In consultation with national Governments, donor agencies should consider allocating a firm percentage of their available funds for the promotion and support of women's participation in water supply and sanitation activities, including research and training.

Care should be taken to avoid women's participation from simply becoming a catch-phrase by programming funds from bilateral agencies into well-defined and researched women's activities which will have positive and long-lasting effects, not only in water supply and sanitation projects but also on the status of women in general.

III. SEMINAR DISCUSSION

A. Identification of the problems in water supply and sanitation as they relate to women

The Chief of Research and Training of the International Research and Training Institute for the Advancement of Women introduced item 4 of the agenda, stating that the purpose of the Seminar was to discuss the multifaceted problems of drinking water supply and sanitation as they related to women, with the aim of finding solutions in order to ensure that women's role and needs would be taken into consideration at all levels of the design and implementation of water supply and sanitation projects. She stated that the traditional women's role in many developing societies - water carrier, supplier, user and manager - made it necessary to include a women's component in any such project.

Like all development problems, the issue of water supply and sanitation was multidimensional. The problem lay not only within the socio-economic sphere but also in the technical, scientific, health and sanitation and environment spheres. Moreover, all those areas being interconnected, a problem existing in one influenced the evolution and outcome of the other.

She indicated that the seriousness of the problems involved in the area of water supply and sanitation was alarming, and that the demand for such services was growing tremendously. The financial resources required to face the problems were very great. Other pertinent questions were how to manage complex development problems with all the multiplicity of issues involved? Who determined what priorities? How could co-ordination among the various parties concerned be achieved? So far, there were no clear-cut answers.

From the available literature, however, including the papers submitted for the Seminar, the following areas of approach emerged.

(a) The importance of community participation at all levels, including the grass-roots level;

(b) Raising awareness and sensitization of public opinion to the problems;

(c) Training, particularly in the area of equipment maintenance and primary health care;

(d) Education, whether formal or informal, and life-long education;

(e) Appropriate choice of technology, working in harmony with the developing society;

(f) Importance of planning of activities involved in water supply and sanitation and connected with the overall planning process; methods of management co-ordination, implementation and follow-up have to be derived.

The consultant to the Institute introduced the overview paper, which contained a brief description of the world situation in the area of water supply and sanitation as it related to women, including legislative mandates. The importance of finding methods and strategies which would afford women the same opportunities as men to participate actively in the development process was stressed. The paper also described the objectives and programme of activities of the Institute, and included a general discussion of the topics to be considered at the Seminar.

In the preparation of the paper, the existing literature had been reviewed, including documents relating to the World Conference of the International Women's Year, held at Mexico City from 19 June to 2 July 1975; HABITAT, United Nations Conference on Human Settlements, held at Vancouver from 31 May to 11 June 1976; the United Nations Water Conference, held at Mar del Plata from 14 to 25 March 1977; the International Conference on Primary Health Care, held at Alma-Ata from 6 to 12 September 1978; and the World Conference of the United Nations Decade for Women: Equality, Development and Peace, held at Copenhagen from 14 to 30 July 1980.

Literature surveyed outside the United Nations included publication issued by many organizations and institutions, such as the American Water Works Association, Earthscan, the International Association on Water Pollution Research, the International Reference Centre for Community Water Supply and Sanitation, the International Water Supply Association, the Pan-American Centre for Sanitary Engineering and Environmental Sciences (CEPIS), the Pan-American Health Organization, the Society for Applied Anthropology and the Water and Sanitation for Health Project (WASH).

Situation in the regions

The representatives of the regional commissions that participated in the Seminar reported on the situation with regard to water supply and

sanitation in their regions. The commissions had also contributed papers for the Seminar. The following paragraphs are based on the statements made by the representatives and the papers submitted.

Asia and the Pacific

The Economic and Social Commission for Asia and the Pacific (ESCAP) reported that community participation and the development of realistic training programmes, adapted to the needs of a target group, were required to improve the water supply and sanitation situation in the ESCAP region.

There were a number of island countries, as well as land-locked countries, in the region, where procurement of material and equipment involved high costs and considerable delays caused by transport bottlenecks.

Latin America and the Caribbean

The Economic Commission for Latin America and the Caribbean (ECLAC) reported that at the beginning of the International Drinking Water Supply and Sanitation Decade it had been suggested that Governments should place emphasis on providing service to the unserved low-income rural and urban-fringe population. Unfortunately, in Latin America as a whole, the expansion of services planned for the Decade would leave at least two thirds as many rural women and children without clean water and adequate sanitation in 1990 as in 1980 and the number of urban women and children without adequate sanitation would hardly change. It was only in the provision of drinking water in urban areas that a significant reduction in the numbers without service was planned.

It was puzzling, at least on the surface, that the provision of clean water and sanitation to the rural and urban poor had not become a more central part of the programmes for the Decade in most of the countries of the region. The provision of service in rural areas used known and relatively simple technology, well within the technical capability of all the countries of the region. The explanation could not be sought in the direct opposition of any particular interest group, nor in the lack of the appreciation of the benefits to be obtained, nor in any change in the level of external assistance. The explanation appeared to be in a particular combination of internal and external factors which had influenced policy towards the Decade in Latin America.

The internal influences of most significance appeared to be the strong urban bias of water supply and sanitation institutions in the countries of the region, coupled with an absence of specific institutions for rural water supply and sanitation. In general, this had led to the adoption of what could be described as high technology solutions to the provisions of water and sanitation, with a strong emphasis on efficiency.

Externally, the urban focus had been encouraged and even led by a strong emphasis on sector policies, directed towards the development of water supply and sewage systems so managed as to generate revenues in sufficient quantities to cover both operating and maintenance cost and to finance new

capital investments. Those concerns had overshadowed activities of international organizations directed towards rural problems.

A means must be found to redress the balance so as to breathe new life into the Decade and make it possible to extend water supply and sanitation to the most neglected people in the region. It was suggested that there perhaps was where women's organizations, both national and international, could direct their efforts. Strong advocacy was required for the establishment of water supply and sanitation institutions concerned with solutions suitable for the country dweller, hand pumps and latrines or other forms of individual or small group arrangements. Without an appropriate institutional framework it could not be anticipated that any change would be achieved in the present focus of water supply and sanitation policies.

Africa

The Economic Commission for Africa (ECA) reported that the countries in the African region, like all developing countries, were suffering from the impact of the global economic recession, the growing cost of manufactured goods, high interest rates and the escalating price of oil. That situation, coupled with the paucity of funds from domestic sources, had impeded their capability for implementing the larger water supply projects. Moreover, maintenance and operation of the water supply and sanitation systems had suffered greatly, owing to the lack of funding.

The representative of the World Health Organization (WHO) reported that the development of adequate manpower was one of the most urgent tasks facing the countries in Africa in the preparation of plans for the Decade's activities. There was an extreme and urgent need in 42 countries (91 per cent) to develop manpower. This would require staffing studies and training programmes of sector personnel at all levels.

From the perspective of the ECA region the topic under consideration involved two problems: water supply and sanitation, on the one hand, and the involvement of women in the development process on the other.

Western Asia

The Economic Commission for Western Asia (ECWA) reported that the problems of that region with regard to water supply and sanitation were the following: water engineers faced the dilemma of high population growth; an accelerated rate of urbanization; lack of water resources affecting 30 per cent of the population; inadequate knowledge of water potential; insufficient local capacity for sector construction and installation work, including the provision of certain materials; lack of basic data and basic planning, such as water resource master plan and sectorial plans; lack of adequate information systems; lack of co-ordination of activities among authorities; lack of national standards on basic data collection; and difficulty in adjusting water tariffs to reflect rising costs and to achieve balance between cost and revenues.

Policies had mostly given priority to the expansion and restoration of the urban water supply systems, preferably in the capital cities, which were severely affected by high population densities and high population growth rates, due partly to emigration from rural areas. In most of the capitals, a modern sewage system with treatment plants was in the planning or construction stage.

By the early 1980s, well over 90 per cent of the urban and over 50 per cent of the rural population in the ECWA region had been supplied with safe water. According to the available information and considering the programmes in hand, it appeared that the goals of the Decade could be achieved in nearly all urban areas of the region, although special attention should be given to the requirements of rural areas.

Efforts were being made in all countries to set up closed distribution systems between the place of extraction and the consumer. Efforts were also being exerted by water authorities to provide enough safe water with adequate service pressure at any time. Such systems were operating in all ECWA countries, but they were mainly located in cities and did not always serve the whole city area.

There were 40 Decade projects in the region, many of them oriented towards sociological factors and public awareness in order to bring to the attention of the people the merits of a safe water supply. As a result, some villagers had taken upon themselves to share collective water costs so as to have safe water near their homes.

It was stated that in the ECWA region the water supply, although functioning at a slow rate, was quite satisfactory. On the other hand, sanitation was completely neglected in rural areas, owing to several factors.

Perceptions were deemed determinant of the designs and types of water supply equipment utilized, as well as the sanitation practices. An example was given of Egyptian villages where water provided by standpipes was perceived as good since it was provided by the Government. On the other hand, villagers were hesitant to use chlorinated water for cooking as they found it tasted bad.

B. Socio-economic development

1. Community participation

The discussion focused on the importance of women's participation as the main beneficiaries of water supply and sanitation projects. The consensus was that women's participation in activities relating to the International Drinking Water Supply and Sanitation Decade was essential.

Women were perceived as already active participants in those activities and could not possibly be expected to participate more. The Seminar should correct the false impression that what was needed was to involve women further. The need was rather to make women's participation more effective, easier, and more productive, by taking into account women's needs and requirements at all levels of the planning, design and implementation of

water supply and sanitation projects. The challenge was to alleviate women's burden as the main carriers, users and managers of water in view of all the existing financial, socio-economic and technological constraints.

The main concerns in community participation were the people, their culture, their behaviour and their values; the design of the treatment plants or the parameters of the quality of water were of secondary consideration. The emphasis should be on the social and anthropological aspects. Information on people's perceptions, beliefs and attitudes concerning both quantity and quality was important before planning any water system. The evaluation process should involve the members of the community, men and women alike, in order to ensure the success of the methods used.

The involvement of the community at the planning stage, starting with the choice of water source, allowed local beliefs to be taken into account. An example given was a case where people in a rural area refrained from drinking from a certain well, believing that the water contained the spirits of their ancestors. In another case, the males of a community filled a well with stones, on the grounds that the nearness of the water source allowed the females too much time to spend conspiring against their husbands. There was also a case where the women did not appreciate a water supply located in an open and exposed field, since other supply points located under shade trees afforded them some comfort. These and many other aspects generally ignored are vital to the success of water supply projects and can be successfully worked out through consultation with the community to be served.

Community participation need not focus on material and labour contribution alone, but should also be oriented towards giving the community a sense of ownership and responsibility for the installations. The community should feel that the water supply systems are there because they desire them and not because they are an outside imposition. It follows that it is in their own interest to attend to the proper use and maintenance of the facilities. People from villages, districts and provinces should therefore be involved in the planning, construction, operation and maintenance of water supply and sanitation installations.

The problem women face and the role they play in development activities, including the provision of water supply and sanitation, concern the society as a whole and not women alone, and the question of how to involve women in the area of water supply and sanitation cannot be separated from its social context. In many developing countries, social values are not conducive to an acceptance of the changing role of women, for example, their taking part in the planning and managing of water supply projects.

For women to participate more effectively in this area, they need to be made more aware of the important role they play. It was stressed that men should also be made aware of the need to alleviate women's burden as the main carriers and users of water, and that the awareness of both men and women should be raised, starting at the grass-roots level.

The reason why women need to be involved in water supply and sanitation projects should be made clear, and their problems tackled by means of

methodological approaches dealing with their dual role as water suppliers and water consumers.

It was recognized that women are not a homogeneous group, and that women in developing countries and women in developed countries play quite different roles with regard to water supply. Women are everywhere consumers; in the developing countries, however, women and children are the main labour source in water supply, whereas in the developed countries water supply is no longer a labour-oriented problem.

Similarly, while men and women have the same role in regard to water consumption, their roles diverge in relation to its supply in the developing countries.

Also discussed were differences between urban and rural areas, where the nature of the problems is not the same. The main problems in rural areas relate to the availability of water resources and the potability of water. In urban areas, water is available but the problem is how to dispose of it after it has been used, that is, a health and sanitation problem. The need for training both urban and rural women so as to involve them in activities such as the planning and maintenance of health education programmes was emphasized. It was stressed that training should be at the local rather than the national level, so that greater numbers of women could participate.

In a number of countries, a high degree of community participation was perceived to be the result of high literacy rates, which indicated that education and training were necessary to achieve a more effective participation of women in water supply and sanitation projects at all levels.

2. Institutional framework

Deficiencies in the institutional and policy-making frameworks were considered among the major constraints facing developing countries. In some countries there was no appropriate institutional framework to plan, programme, implement and monitor activities for the Decade, while in others there was duplication and overlapping of authority among the institutions.

A number of mechanisms were examined in order to determine the institutional framework most conducive to integrating women into development in general and, specially, to devise a more effective solution to the problems that women confront in water supply and sanitation. In that respect, it was stated that although the special machineries on the role and the status of women which had been established in many countries had undertaken many successful activities, they ran the risk of isolating women's needs from national development priorities. Women's issues needed to be treated as an integral part of all socio-economic and cultural development activities and programmes.

The Sri Lankan administrative set-up at the village level was presented as a possible model for an institutional framework providing for a sectoral integration of women's issues. It was stated that since village councils in Sri Lanka included the presidents of all voluntary organizations, by

including both women's groups and groups concerned with water supply and sanitation, women had been able to participate in the planning of water supply and sanitation activities, such as site selection, health and management.

The creation of national machineries and national action committees, with clear terms of reference and the necessary authority and resources, was believed to help in alleviating organization and co-ordination problems.

In that regard, it was felt that women's organizations should be instituted at the national level with the common objective of advancing the socio-economic progress of their country in an integrated manner and with the full support of Governments. Such a centralized approach would avoid the danger of the mushrooming of women's organizations which competed against each other and often worked in an ad hoc and disorganized manner with no common objectives, ultimately resulting in a weakening of their potential capacity.

Women were seen as the target group to focus on, for the active participation of that large group, comprising the majority of users of domestic water supply, could add a useful dimension to the Decade. That group formed a huge potential force which, with training, would facilitate the completion of the various activities required for the provision of water supply systems.

The overall discussion of socio-economic development indicated that that area covered a wide range of issues, including institutional problems, development criteria, per capita consumption of water, and overall demand in a particular community. The socio-economic factors needed to be clearly identified by social scientists to facilitate the task of the technician in finding a common denominator, level of technology, etc.

C. Health and sanitation

The participants considered that, since women's role in water consumption was decisive in both developed and developing countries, and in both traditional and modern families, the proper attitude of women towards safe water and sanitation was a prerequisite for an effective health care policy. Women as mothers were most likely to influence the family in health and sanitation matters.

The effective participation of women was needed, for example, to eradicate the water-borne diseases that are common in tropical and sub-tropical regions. Women were perceived as being the group most vulnerable to such diseases, which, according to WHO statistics, make up 80 per cent of all diseases in developing countries, because as water carriers in many societies, and in their domestic functions, they are constantly in contact with water which is often polluted. It had also been shown that water-borne diseases were a major cause of infant deaths, and accounted for 15 per cent of all hospital deaths. On any given day when a survey is conducted, at least 16 per cent of children under 5 are found to have diarrhoea, and

around 5 million children in the world die every year from diseases carried by water.

The high incidence of disease resulting from poor environmental conditions in Sri Lanka was mentioned. Under the government health care system, the emphasis had been placed on curative rather than preventive medicine, as a result of which the mortality rate had declined dramatically from 10.4 to 6.1 per cent, between 1952 and 1981, while the diarrhoeal disease morbidity rate had remained practically constant.

The physical exertion required - often of women and children - in carrying water from distance sources is also a health problem. It has been estimated that the energy used in fetching water amounts, on the average, to 9 per cent of the total caloric intake, and can be as high as 15 to 27 per cent. The reduction of under-nutrition is thus one of the benefits of water supply programmes.

It was stated that the provision of adequate water as near the house as possible would free some of the women's time for possible involvement in the preventive aspects of health and development activities. It would allow women to attend maternal and child health clinics, where they could learn about conditions associated with child-bearing and pregnancy, and where immunizations were carried out and risk factors identified.

The severe environmental problems caused by arsenic were discussed. Considerable health problems related to drinking water containing high concentrations of arsenic had been observed in regions of Chile and Taiwan. Peripheral vascular disease in the form of Raynaud's syndrome was common in Chile, and peripheral vascular disorders with gangrene (blackfoot disease) was common in Taiwan.

Pollution or contamination of water supplies could be caused by neglect of the simple task of periodically cleaning water storage tanks and pump wells, and regular maintenance of the pump. Cleaning of the drainage ditch, to keep dirty water from backing up and contaminating the well water, was also important, as was keeping the vicinity of the well clean and sanitary.

It was noted that there are two main categories of health hazard: those caused by biological agents and those caused by chemical pollution.

In regard to the problems of water contamination by chemical wastes, misuse, etc. many diseases were attributed to the use of pesticides, and that was considered a major problem in developed countries.

The large expansion of modern industry had created a new source of pollution uncontrolled, untreated industrial wastes. The implications of such massive pollution for the health of a nation were extremely serious. It was mentioned that, as an outcome of modernization, the extension of irrigation had created suitable breeding grounds for disease carriers, including the mosquito that spreads the fatal disease of Japanese encephalitis, for example, in India.

Environmentalists are currently concerned by the negative effects caused

by toxic chemicals used to control the transmission of water-borne diseases. There was widespread agreement among the participants that rickets caused by cadmium pollution, called "itai-itai", had appeared in Japan.

A synergistic interrelationship between under-nutrition and infections in unsanitary environments was mentioned. Under-nutrition increases susceptibility to infection and infections aggravate malnutrition by further reducing the intake and absorption of food. Such malnourishment coupled with infection was the cause of a high incidence of low birth weights in India.

It was stated that improvements in practices of excreta disposal were crucial for raising public health levels. Inadequate facilities for excreta disposal reduced the potential benefits of safe water supply by transmitting pathogens from infected to healthy persons. Over 50 types of infection can be transmitted from a diseased to a healthy person by various direct or indirect routes involving excreta.

Pathogenic organisms discharged by persons harbouring intestinal parasites or suffering from infectious diseases, or excreted by carriers, are always potentially present in domestic sewage and render it dangerous. Therefore, to prevent pollution of water bodies, domestic sewage must be subjected to treatment before its discharge.

The participants were informed that in the ECLA region current policies had both improved and increased the access of the population to protected potable water and sanitation. This was particularly true in the urban areas and, in some countries, in rural villages. The most eloquent proof, perhaps, of the importance of water supply and sanitation was the reduction in the occurrence of diarrhoea among young children, which had considerably lessened the number of deaths.

A recent study in Chile, for example, had confirmed the connection between water supply and the occurrence of diarrhoea in young children, showing four times the rate of visits to rural clinics for this reason in villages without water supply. It was true that diarrhoea remained the major cause of death among children under 12 months of age and that infant death rates were still much higher in most countries of the region than in Europe or North America.

The high infant mortality rate in Latin America was probably the most serious consequence of the lack of proper sanitary facilities which affected a large part of the population, but adults also suffered from water-borne and water related diseases.

It was pointed out that in the ECWA region the sanitation sector was not usually assigned the same importance as the domestic water supply. Generally speaking, sanitation was neglected in the rural areas, mostly because sanitation was given very low priority by the rural population, and because basic health education, public awareness and the proper institutional framework were lacking in some countries.

D. Science and technology

Discussion in the area of science and technology centred on the fact that, to ease women's burden as the main water carriers in developing countries, realistic and appropriate technologies which took into account the cultural and social specificity of the target group, as well as their financial constraints had to be developed.

Simple and appropriate technology would not only free the women from having to walk long distances in search of water, carrying a water jug on her head, but also contribute to changing the roles of women and men with regard to labour distribution within the household.

Interim solutions to the problems of water supply could be found by using simple, even rudimentary water supply methods, such as were used even in the most advanced countries. Simple technology, using local materials, for the provision of adequate water supplies in developing countries was deemed essential in view of its low cost, and the possibilities it provided for a greater and more effective involvement of women. An example would be the use of a cart or an animal. Another simple method, although applicable only in areas with rainfall throughout the year, was the use of rain-water collected in large pans and kept in storage tanks at the household level. The advantage of that method was its cost effectiveness, for it did not require any elaborate planning, government intervention, allocation of financial resources, or special maintenance. It made use of locally available materials and could be built with skills already available locally or that women could easily master.

An advantage of introducing simple technology was that women would have a greater involvement than in the case of advanced technology. It would also increase the potential for self-reliance of the community, since high technology financed by foreign aid risked termination once the aid was withdrawn. Moreover, management and maintenance costs of simple technologies would be within the range of the community's financial capabilities.

The representative of the United Nations Development Programme (UNDP) said that the Programme was currently engaged in women's projects for developing appropriate technologies. One concerned sanitation (a pit latrine) in Zimbabwe; another, low-cost village maintenance of hand pumps; the third, resource recovery and the use of biogas.

When deciding on the site of a water system it was important to be far from a contaminated area; people might believe, falsely, that a hand pump system was free of contamination.

Regarding the belief that hydraulics and water engineers seldom gave due attention to the inclusion of a women's component in water supply projects, it was stated that the complexity of the problem in the ECWA region, for example, made the task very difficult for the engineers.

E. Proposals for action at the national,
regional and international levels

The account of the discussion of agenda item 5 which follows should be read in conjunction with the recommendations (sect.II).

The participants emphasized action-oriented proposals. The view was expressed that political will, a prerequisite for the effective involvement of women in water supply and sanitation activities, could be translated into action through a national plan.

A plan of action to provide water supply and sanitation services would require financial resources, from either local or international sources. They should be spent on priority areas, particularly for the under-served population. The national plan should make provision for intersectorial co-ordination and appropriate technology.

To enable women to participate in the activities proposed in a plan of action, provision must be made for women to take part in high-level decision-making. The establishment of separate ministries for women or the formulation of separate projects created the danger of isolating women's issues. A women's component needed to be introduced into the governmental institutional framework for water supply and sanitation, as well as into all ongoing and future water supply and sanitation projects.

A number of participants supported the active participation of non-governmental organizations in promoting women's involvement in water supply and sanitation projects. The institutional structures of non-governmental organizations were advantageously flexible, allowing for experimentation and bringing more immediate results from water supply and sanitation projects for the target group, particularly when the non-governmental organization was clearly recognized and acknowledged by the national Government.

Greater communication between non-governmental organizations should be established so that the Government could benefit from the experiences of non-governmental organizations in the water supply and sanitation area.

Reference was made to the success of Japan in the installation of water supply and sanitation systems. In 1955 only 37.7 per cent of the population was served with water supply and sanitation systems; the current percentage was 97.2. According to the statistics of the Ministry of Labour, before the introduction of water supply and sanitation systems, a woman in Japan spent almost two hours a day carrying water and walked 18,000 km. in her lifetime to fetch water.

At present, women in Japan were still very active in water supply and sanitation systems through their membership in voluntary organizations in rural communities, where they organize systematic savings towards a water works fund.

The representative of UNDP introduced UNDP project INT/83/003, entitled "Promotion and support for women's participation in the International Drinking Water Supply and Sanitation Decade" activities, which had been prepared in accordance with the strategy for enhancing women's participation in those activities approved by the Steering Committee for Co-operative Action to support the Decade. The project was presented as a possible format for the solution of water supply and sanitation problems as they relate to women.

The primary aim of the project was to influence decision makers to integrate women's needs and requirements into sectorial projects. The strategy was not to undertake a separate women's project, but rather to build into an existing project in the water sector so that the women's issue became an integrated part of the decision-making process. The project also included an income-generating component.

High illiteracy rates among women were considered to represent constraints to their participation in the policy and planning stages of water supply and sanitation projects. The view was however expressed that water was too crucial to women's survival, and illiterate women constituted too great a majority, for illiteracy to be an obstacle to their participation.

The training component used as a method to increase the participation of women in water supply and sanitation activities should take into account women's multiple roles. For example, the scheduling of seminars, workshops and other training activities for women should accommodate those multiple roles, so as to facilitate participation.

The observation was made that duplication existed in ongoing research and in water supply and sanitation projects as they relate to women, and that an effort should be made to co-ordinate the activities of the United Nations organizations. The Institute, as a catalyst concerned with all aspects of women's lives, should take a leading role in such co-ordination, and disseminate collected information and data in that regard.

The need to undertake action at the country level was emphasized. Data concerning successful projects should be collected, showing the positive outcome resulting from the participation of women in water and sanitation projects.

Both men and women should actively address issues of water supply and sanitation, for it was not solely a women's issue. Men's involvement was of particular importance, most decision makers in water supply and sanitation projects being male.

It was further suggested that a possible way to involve women in water supply and sanitation projects and activities was to consult them regarding water supply equipment, site selection, sanitary facilities and types of technology.

A training component for women should be built into the design of the water supply and sanitation project. Such participation of women should be considered at the top policy planning levels.

The need to establish legal mechanisms for the participation of women at all levels of decision-making, from village councils to national Governments, was emphasized.

In terms of bilateral and multilateral assistance in the areas of improved water supply and sanitation, a request was made for more information to be provided to women in developed countries on the problems that confront women in developing countries. The current limited assistance in that field was deemed to be due not only to the lack of political will but also to the lack of awareness of the existing realities.

In order to make women agents of change in health areas, it was necessary to train women as birth attendants and health workers.

Annex I

LIST OF PARTICIPANTS

A. Experts

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B. Organizations represented

United Nations bodies and organizations

United Nations Development Programme
United Nations Environment Programme
Economic and Social Commission for Asia and the Pacific
Economic Commission for Latin America and the Caribbean
Economic Commission for Africa
Economic Commission for Western Asia

Board of Trustees of the International Research and Training Institute
for the Advancement of Women

United Nations Children's Fund

World Health Organization

Donor agencies

Canadian International Development Agency
Danish Agency for International Development
Norwegian Agency for International Development
United States Agency for International Development

Other organizations

CARE
Catholic Relief Services
Hanns-Seidel-Stiftung
International Reference Centre for Community Water Supply and Sanitation ✓

C. Observers

Government of Finland

D. Secretariat of the International Research and Training Institute
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Annex II

LIST OF PAPERS SUBMITTED TO THE SEMINAR

Mohammed Abou Zeid	The River Nile and its impact on Egyptian Agriculture
María Helena de Andrade Orth	The role of women in water supply, waste disposal and solid waste management
Changjie Chen	The role of Women in the IDWSSD* in China
Banco Coyaji	The Indian dilemma
Economic Commission for Africa	The drinking water supply situation in Africa and the role of women
Economic Commission for Asia and the Pacific	Women's participation in the IDWSSD, note by the ESCAP secretariat
Economic Commission for Latin American and the Caribbean	Women and the IDWSSD in Latin America
Economic Commission for Western Asia	IDWSSD and women in the ECWA region
Egyptian Academy of Scientific Research and Technology	The Egyptian concept
Ahmed Amin El-Gamal	A pilot training programme: women and the IDWSSD
Ahmed Fouad El-Gohary	Women and the IDWSSD: water supply and sanitation in Egypt
Fatma Abd El-Hamed El-Gohary	Women and the IDWSSD: health and environmental aspects
Essam El-Hinnawi	Women and the IDWSSD: perceptions and attitudes
Mary Elmendorf	Pertinent research: generalizations and linkages drawn from a preliminary review of the literature on women in water and sanitation
Sayed El Wardani	Women and the IDWSSD: focus on technical systems and training

* International Drinking Water Supply and Sanitation Decade.

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| R.H.P. Fernando | Women and the IDWSSD: Sri Lanka |
| Jonathan Fletcher | Women and the IDWSSD: a donor country perspective |
| Eddah Gachukia | The problem of water supply and sanitation and the role of women in Kenya in tackling this problem |
| Martha Olga Garía | Environmental sanitation and drinking water supply in the Dominican Republic |
| Elvia Jaramillo de Guzmán | L'eau potable des rivieres de la Republique du Panama |
| Mette Jørstad | The IDWSSD: a mediation of inconsistencies |
| Fatma H. Mrisho | Water, health and women in the United Republic of Tanzania |
| Olatokunbo A. Ogbe | Women and the IDWSSD |
| Carole Onorato | Water supply and sanitation in California, U.S.A. |
| Abou Zeid Rageh | Infrastructure for formal and informal housing sectors in Egypt |
| Zeinab M. Shahin | Women, water supply and sanitation: socio-cultural and economic aspects |
| Titi Sumbung | The role of women in water supply and sanitation: Indonesia |
| Aicha Traore | L'eau et la femme dans les communautes rurales de la Haute-Volta (Burkina Faso) |
| United Republic of Tanzania,
Prime Minister's Office, and
International Reference Centre
for Community Water Supply and
Sanitation | Water, sanitation and village health: a community organization and participation approach in the United Republic of Tanzania. |
| Ryutaro Yatsu | A report from Japan on women and the IDWSSD |
| Ahmed Abdel Hamid Youssef | Water in ancient Egypt |

Part Two

BACKGROUND PAPERS

I. GENERAL OVERVIEW

Women and the International Drinking Water
Supply and Sanitation Decade

United Nations International Research and Training Institute for the
Advancement of Women (INSTRAW)

Introduction

Perception of the interdependence of various development problems is sharpened by the grave crisis the world is facing today. Many of these problems, particularly in developing countries, have reached crisis proportions generating even more complex situations. The inability of many of these countries to respond adequately to the constantly increasing demand for basic infrastructure - electricity, transportation, water, etc. - is a case in point. The current crisis also renders questionable the validity of certain economic tenets and development methodologies, while gaining acceptance for the concept of people and their well-being as the central objective of development. As concern grows, the focus is increasingly on issues facing major populations: poverty, illiteracy, drought, adequacy of food supply, access to health and sanitation facilities, and safe drinking water.

The population component in the current debate highlights the importance of the development of human resources and the need for popular participation in the development process. As greater attention is paid to the different sectors of population, the topic of 'women and development' emerges as a salient point at all levels of debate - national, regional and international. Consideration of women's issues outside the traditional social welfare context compels acceptance of the idea that women must be integrated as active participants and beneficiaries of development.

Access to adequate supplies of water, the very basis for human survival, is one of the most critical problems facing many societies today. About half the world's population does not have reasonable access to safe water supply and lacks hygienic waste-disposal facilities. World Health Organization (WHO) data indicate that more than 2,000 million people in the developing countries do not have access to adequate supplies of safe drinking water. Some 70 per cent of those not served, or approximately three out of five persons live in rural areas. Three out of every four persons in these countries do not have access to any type of sanitary facility, neither pit nor bucket latrine. Of those people living in the urban areas, approximately 75 per cent receive some form of safe drinking water, either through house connections or stand-pipes. But only to 29 per cent of those living in rural communities is clean water readily accessible. With regard to sanitation, 53 per cent of the combined urban population of developing countries receive adequate services, while only 13 per cent of the rural people are served.

To combat this problem, the United Nations General Assembly during its thirty-fifth session proclaimed the period 1981-1990 as the International Drinking Water Supply and Sanitation Decade, with the aim to provide universal access to safe drinking water and adequate sanitation by the year 1990. The magnitude of the task calls for changes in the methods of delivery

of water and for new approaches both in national strategies and in international support.

The Decade represents an important first stage in the Global Strategy for Health for All by the Year 2000. An increase in the quality and quantity of water supply, will help reduce the incidence of many diseases among the people most at risk. Improved sanitation and better hygiene can have a significant beneficial effect on health and yield high returns on investments in water supply projects. To attain its proposed objective, the Decade would have to provide water and sanitation services to about three billion people in developing countries - allowing for the prospective increase in the population by 1990 - as well as upgrade the already existing water supply and waste disposal systems.

Technical and financial problems aside, there are a number of related social and economic issues which should be taken into consideration in all water-related activities. Of particular significance is the need for the involvement of the population in these projects, and especially the participation of women. This point is derived from strong legislative mandates adopted by the international community, and concrete action by the United Nations system in support of co-operative activities among developing countries within the policy framework of collective self-reliance.

For speculating on how to meet these needed improvements in water supply and sanitation, and how to realize the associated health benefits, one is immediately confronted by the issue of women's roles in traditional society. Their water and sanitation-related roles are but a subset of these larger considerations and the health constraints arising from them but a function. Since women usually determine the appropriate and hygienic use of water, efforts should be made to include and recruit them at all levels of the design and implementation of water supply and sanitation projects.

Interregional Seminar on Women and the International Drinking Water Supply and Sanitation Decade

In efforts to realize the objectives of the Decade, the International Research and Training Institute for the Advancement of Women organized the Interregional Seminar on the Role of Women and the International Drinking Water Supply and Sanitation Decade, hosted by the Government of Egypt and held from 12-16 March 1984 in Cairo. This Seminar is a major step in a concerted world-wide endeavour to chart a new course and to end the separation of the sexes in matters of health and sanitation, education, opportunity and economic priorities.

The objective of the Seminar was to identify the problems encountered in the various areas related to drinking water supply and sanitation - socio-economic, health and sanitation, and science and technology - and to seek possible solutions to those problems on the basis of the successful experiences of various countries and regions. A tripartite participation scheme was set up to draw upon the expertise of social scientists, medical doctors and health specialists, and engineers and scientists.

Sixty participants from various regions attended the Seminar in their personal capacity. A number of United Nations bodies were represented, as were international donor agencies, non-governmental organizations and other international organizations. Representatives of foreign Embassies in Cairo, local organizations, associations, agencies, and the media attended as observers.

Legislative History

It is estimated that over 50 per cent of the world's population are women. In traditional societies women are the primary drawers, carriers and users of domestic water supply. Women also form a large part of the work force in many countries and constitute a substantial economic resource. But the labour contributions of women to the economies of their countries go largely unreported. Despite the participation and important economic role of women in society, their status is often disadvantaged and understated.

In recognition of the seriousness and vital importance of these issues, the United Nations proclaimed the year 1975 as the International Women's Year, calling for intensified action to ensure the full integration of women into the international co-operation process on the basis of equal rights, opportunities and responsibilities with men. The 1975 World Conference of the International Women's Year in Mexico City called attention to the desperate plight of women in developing countries. At the Conference, women from all over the world articulated their needs for simple technologies to relieve work-days which sometimes lasted 16 hours. They also recognized the need for education and training of women to enable them to improve their economic opportunities and to undertake activities previously unavailable to them.

Following this Conference, the 1976 United Nations Conference on Human Settlements (HABITAT) in Vancouver, Canada, which stated as a goal "fresh water for all by 1990", became the first international forum to enunciate the need for a global approach to safe water supply and adequate sanitation for all urban and rural communities.

The United Nations Water Conference in Mar del Plata, Argentina, in 1977, reaffirmed the HABITAT objective, calling upon each country to establish specific targets, and recommended that the period 1981-1990 be designated as the International Drinking Water Supply and Sanitation Decade. The goal was further endorsed by the International Conference on Primary Health Care in Alma-Ata, the Soviet Union, in 1978, sponsored by WHO and the United Nations Children's Fund (UNICEF). The Conference recognized that safe water and basic sanitation were both essential to achieve primary health care. It spelt out a new two-part strategy to be pursued during the Decade which would involve more "relevant" health care and place more emphasis on preventive health services in an overall context of social and economic development.

First specific mention of the significant impact a successful Decade could have on women and their roles - and conversely women on the success of the Decade - was made at the World Conference of the United Nations Decade for Women, based on the themes of Equality, Development and Peace, held in

Copenhagen in July 1980. The Conference adopted a strong resolution that specifically mandates "Member States and the United Nations agencies including specialized agencies, to promote full participation of women in planning, implementation and in the application of technology for water supply projects" (resolution 25, entitled International Drinking Water Supply and Sanitation Decade).

The Decade was formally launched at a special one-day session of the United Nations General Assembly in November 1980. General Assembly resolution 35/18 would have member countries assume a commitment to bring about a substantial improvement in the standard and level of services in drinking water supply and sanitation by the year 1990, bearing in mind resolution 25 of the United Nations Decade for Women.

To begin this commitment, a Steering Committee for co-operative action was established comprised of relevant United Nations specialized agencies and organizations. The objectives of the Steering Committee are to put into operation mechanisms designed to help match projects with external sources of funds, exchange technical information between countries, shape global plans for human resources development, advise on project formulation and investment planning and assemble comparable data for progress reporting and public information on the Decade as a whole.

Programme of Work of the International Research
and Training Institute for the Advancement of
Women (INSTRAW)

The work programme of the International Research and Training Institute for the Advancement of Women is based on its mandate to act as a catalyst and undertake an advocacy role to promote programmes concerning women and development. The Institute's programmes are carried out in close co-operation with other bodies and institutions within and outside the United Nations system.

The Institute's programme is oriented towards the effective mobilization and integration of women in development and the idea that people must become subjects rather than objects of development. In compliance with the decisions of the Institute's Board of Trustees, its research and training activities are action oriented rather than being exclusively academic. The primary objective of the programme is to ensure that sustained attention is given to the integration of women in the formulation and implementation of such development activities as programmes in food strategies and prevention of post-harvest food losses, water supply and sanitation projects, development of new and renewable sources of energy, and industrial development. The Board of Trustees of the Institute approved its long-term commitment to the objectives of the International Drinking Water supply and Sanitation Decade.

The "undeniable link" of women to water supply and sanitation was stressed at the ninth session of the Steering Committee for Co-operative Action which co-ordinates the work of the United Nations system with governments in planning and implementing Decade activities. At the session, the International

Research and Training Institute for the Advancement of Women proposed the creation of an Inter-Agency Task Force to focus on issues of relevance to women in improving water supply and sanitation. The Committee endorsed the proposal and acknowledge the important role women can play in implementing Decade objectives.

At its tenth session, the Steering Committee accepted the Institute as a member, recognizing it as a United Nations body specializing in research, training and information activities to enhance the role of women in the development process and as in a position to provide valuable assistance in attaining the objectives of the Decade.

The Inter-Agency task Force on Women and the IDWSSD comprises representatives of the Food and Agriculture Organization (FAO), the International Labour Organization (ILO), the Department of International Economic and Social Affairs (DIESA), the Department of Technical Co-operation for Development (TCD), the United Nations Development Programme (UNDP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Children's Fund (UNICEF), the World Health Organization (WHO), the World Bank, and INSTRAW. INSTRAW and UNICEF jointly assume responsibility for secretariat functions.

To fulfill the targets of the Decade, the Task Force has developed guidelines for national and international action which are embodied in a document entitled Strategies for Enhancing Women's Participation in Water Supply and Sanitation Activities. This document was endorsed by the Steering Committee for Co-operative Action. Member agencies of the Task Force have embarked on other programmes and projects to meet the objectives of the Decade. In addition to these formal forums of the Inter-Agency Task Force on Women and the IDWSSD, there is an effective on-going co-operative effort among United Nations specialized agencies and organizations to implement Decade projects and programmes.

The Role of Women and the Problems of Water Supply and Sanitation

Socio-Economic Development

The cost of providing water to a household is surprisingly high in terms of man-hour productivity. It is estimated that over a billion people in developing countries, half of whom are women, lack safe drinking water and sanitation facilities. Since women are the traditional water carriers in many societies, the time consumed in this primary activity prevents the pursuit of other more productive activities. Women have barely enough time to take care of themselves, their children and their home. Also, to carry such heavy weight tires a woman's body and may cause damage to her spine. Hard work, poor nutrition and high exposure to infection all combine to constantly threaten women's chances of survival. Moreover, it is quite customary for girls to be kept home from school to help carry water, thus depriving them of valuable time in school. This lack of emphasis on education is a major factor perpetuating women's low socio-economic status.

In addition, the cost, time wasted and energy expended in this drudgery is tremendous and hardly leaves room to perform the numerous other chores and functions demanded of women.

In Wayen, Upper Volta, mothers walk daily for two or three hours to stagnant water holes on the river 12 kilometers away and return with 25 kilos of water on their heads. According to the World Health Organization, the trip burns up 600 calories a day, one third their average food intake. Childcare suffers, the milk of mothers dries up and babies are starved in the womb.

By virtue of their domestic functions, in constant touch with water which is often polluted, women are particularly vulnerable to water-related diseases which, according to statistics account for 80 per cent of all diseases in the developing world.

Health and Sanitation

The Global Strategy for Health for All by the Year 2,000 conceives of primary health care at the grassroots level. Emphasis is on community-based health care with the full involvement of community members and the articulation of the health care system with the traditional or informal systems. An essential element of primary health care is an adequate supply of safe water and basic sanitation. Stressing preventive care, primary health care is inter-sectoral in nature and includes such areas as education, agriculture and public works.

Women often make up the majority of primary health care workers, especially at the community level. They should therefore be trained in the health aspects of water and sanitation to make their role more effective and to ensure that water-sanitation-health messages are learned together. A linkup with such related projects as the elimination of sources of water contamination, safe storage of drinking water, sanitary disposal of animal excreta, control of water pollution, safe sewer systems and control of diarrhoeal disease could be achieved at the same time.

Besides being relentless killers - causing 15 million children under the age of five alone to die each year - water-borne diseases often cripple the work force in developing countries. Improving water supply and sanitation would therefore have wide-ranging health, social and economic implications for the lives of people in developing countries. Accrued benefits would include reduced mortality and morbidity rates and the release of women and children from the drudgery of carrying water over long distances; but the foremost benefit anticipated would be in improved health. It is unfortunate that the resources allocated to water and sanitation allow only limited improvements for a small sector of the population and that a difficult choice must be made about the type of project that will yield the greater health benefits.

According to the World Health Organization, as much as 80 per cent of all diseases in the world can be attributed to inadequate water supply or sanitation. The illnesses include such water-borne diseases as typhoid,

cholera, dysentery, gastroenteritis (diarrhoea) and hepatitis. They are spread by drinking, or washing food, utensils, hands or face in contaminated water. Such practice also causes infections of the skin and eyes; trachoma, scabies, yaws, leprosy, conjunctivitis, skin sepsis and ulcers. All of these diseases are related to deficiencies in water supply for personal hygiene. Other water-based diseases - so-called because the vector is an invertebrate aquatic organism - are schistosomiasis (bilharzia), carried by snails, and guinea worm, hosted by the small crustacean cyclops. Also included are diseases caused by water-breeding vectors. The mosquito is responsible for malaria and yellow fever, and the black fly causes river blindness (onchocerciasis). Finally, there are infectious diseases, such as hookworm, which are primarily caused by deficiencies in sanitation.

Women who are constantly exposed to a great many of these pathogens, play a key role in the transmission of infectious diseases and are at an increased risk of disease themselves. The health constraints linked to inadequate water supply and deficient sanitation impinge in particular on the multiple roles rural women in developing countries are expected to play. Women also encounter unique health requirements during pregnancy and lactation. Thus, considerations of relevance to women that relate to improved water supply must include the issue of nutritional status, food supply, personal time and energy expenditure in addition to those of increased exposure to health hazards and the transmission of infectious diseases.

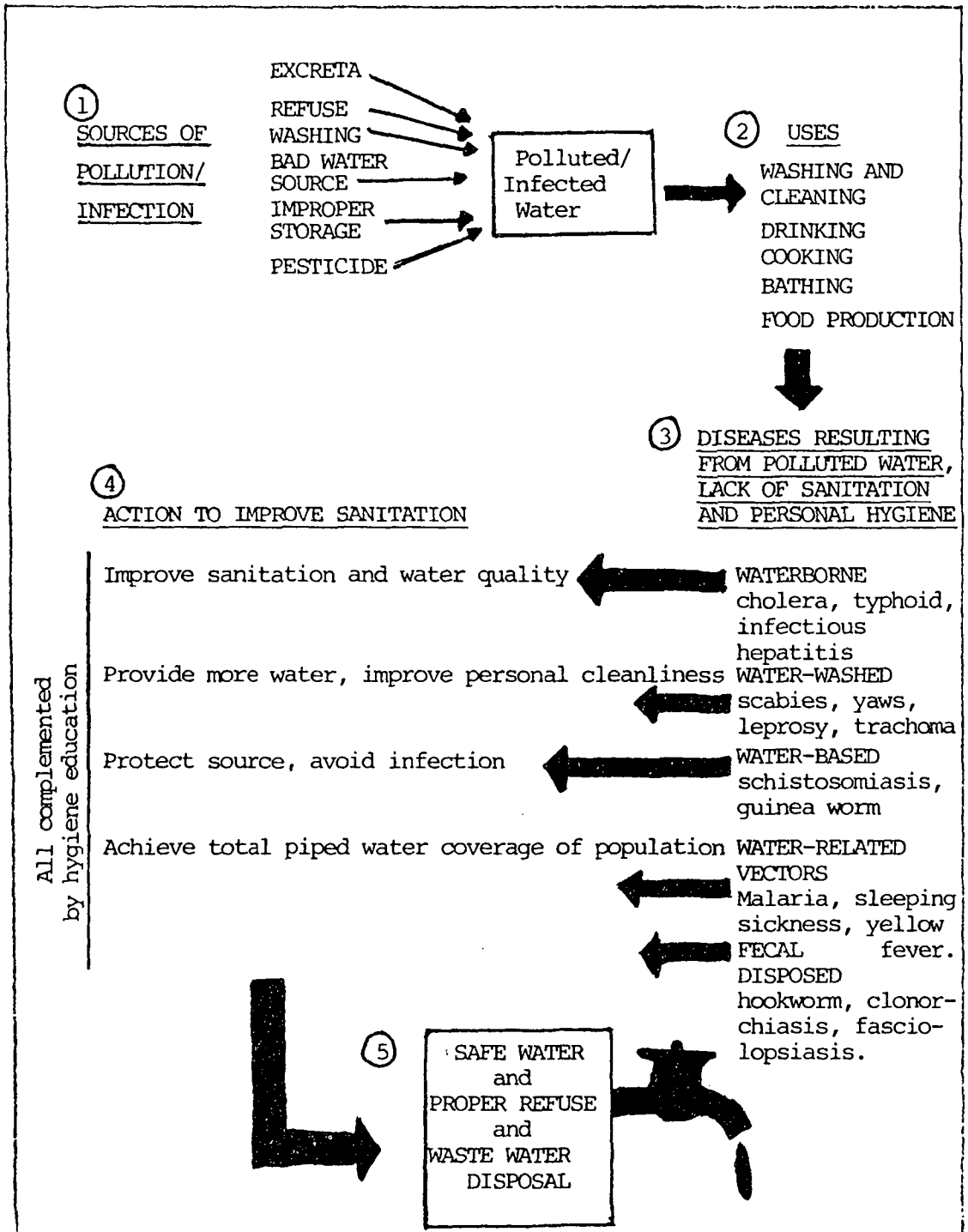
It is interesting to note that even when a community obtains safe drinking water, water-related diseases may persist. While clean water is a necessary pre-condition for improving health in developing countries, conditions are unlikely to improve if only water is provided. To achieve a significant impact on health, this measure must be combined with sanitary disposal of excreta and education in hygiene (see Figure).

The World Health Organization reports, for example, that studies reveal that proxy construction in Costa Rica assisted in lowering the death rate from diarrhoea and enteritis between 1942 and 1954 by 50 per cent. Improved water supply and toilet facilities in a Philippine community cut cholera incidence by about 70 per cent. In Bangladesh, despite provision of clean water through tubewell installation, the incidence of cholera and diarrhoea did not decrease until a personal hygiene education programme was initiated.

Science and Technology

Since independence, developing countries have been attempting to increase their share of total world industrial production. In several countries this has meant the establishment of medium-scale industries which are highly water intensive. The experience of such countries such as India, the United Republic of Tanzania and Mexico points to greater industrial water use with increasing industrialization and a consequent increase in the contribution of industry to the gross national product. Policies of industrialization in the developing countries are related not only to questions of technology but also to such socio-economic areas as the preference for labour-intensive methods and for employment generating programmes.

Paths to safe water and sanitation



A distinction must be made between the technical and social aspects of the Decade objectives. The technical aspect pertains to infrastructure development, technology transfer, and technical assistance. The social aspect covers the socio-economic impact derived from the use of a safe and ample supply of water, or the advancement of primary health care through improved practices in personal and household hygiene, and the prevention of water-related diseases.

In water supply projects emphasis is placed on the available systems and on the use of self-help and voluntary labour whenever possible to keep the investments required as low as possible. The choice of technology should be appropriate to women's needs, and careful consideration should be given to the impact of technology on the participation of women. Special measures are also required to upgrade women's qualifications to handle new technologies.

The cost of technology can be kept low by using local resources and traditional methods in the production, construction, installation and maintenance of systems by the community. Failure to consult with those affected by water and sanitation projects may lead to unnecessary higher costs as well as to inappropriate technological choices.

Three main aspects of technical appropriateness should be considered:

(1) Health and sanitary appropriateness - adaptation to prevailing health patterns in order to achieve national health benefits;

(2) Functional appropriateness - fitness of the equipment from the point of view of design and performance as related to local attitudes, behaviour and bio-technological factors, and its relevance to the objective of providing adequate quantities of water year-round;

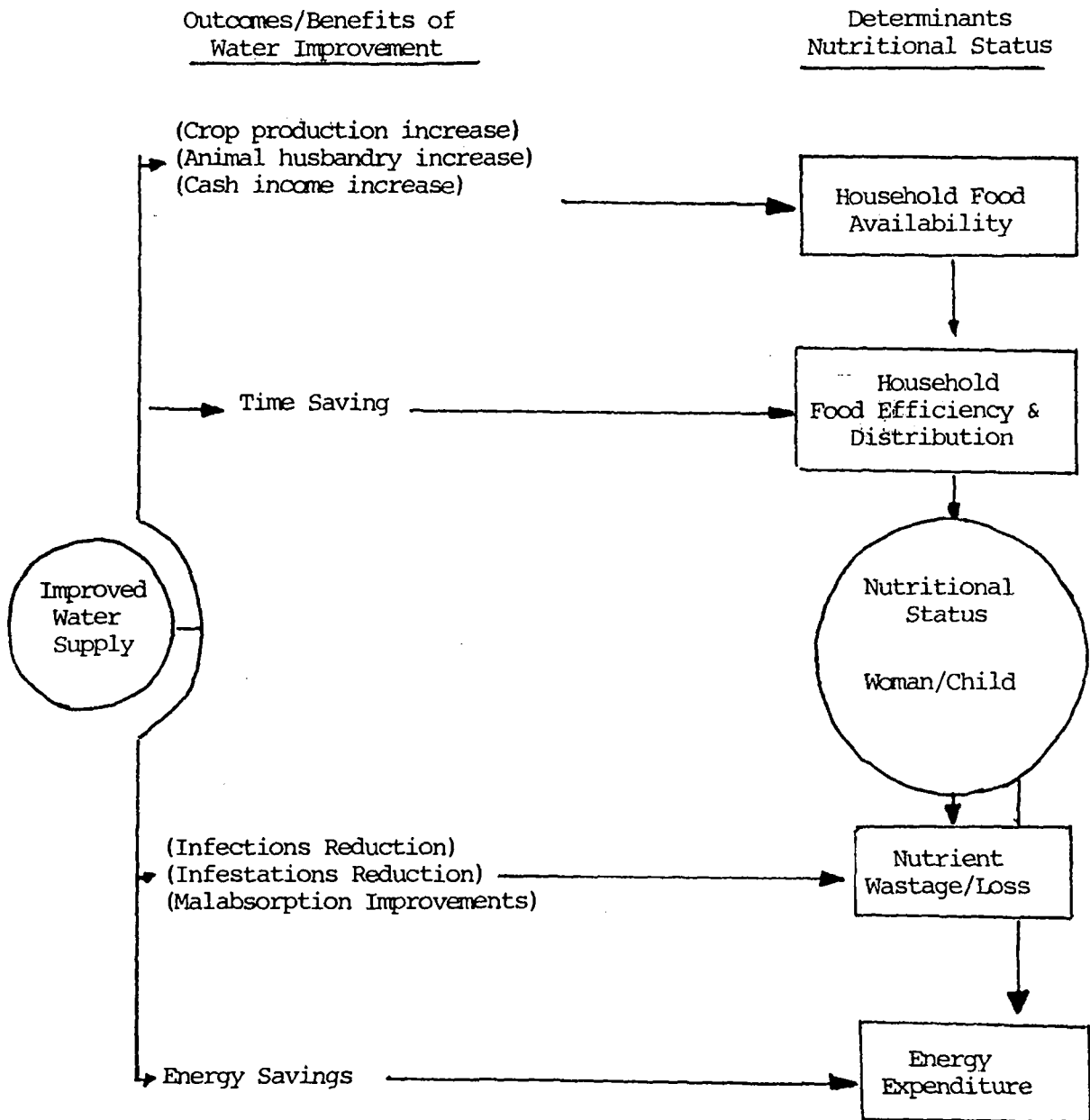
(3) Environmental appropriateness - fitness of the facilities to operate in the physical environment of the region concerned, and avoidance of adverse effects of such operation on the environment. Adequate attention should be given to drainage, which is often neglected.

Meeting the goals of the Decade will be an enormous task, requiring the participation of all groups - non-governmental organizations, business, industry, and the media - at all levels - local, national and international. The incorporation of women into the activities of the Decade is only one area of many in which efforts are being made to integrate women into the mainstream of development.

It is the Institute's hope that the findings and recommendations of the Seminar, the exchange of experience and expertise in the area of water supply and sanitation management, will serve as points of reference in the attempt to meet the goals and objectives of the International Drinking Water Supply and Sanitation Decade. INSTRAW's integrated interdisciplinary approach as demonstrated by the structure and programme of the Seminar is a step towards achieving this aim.

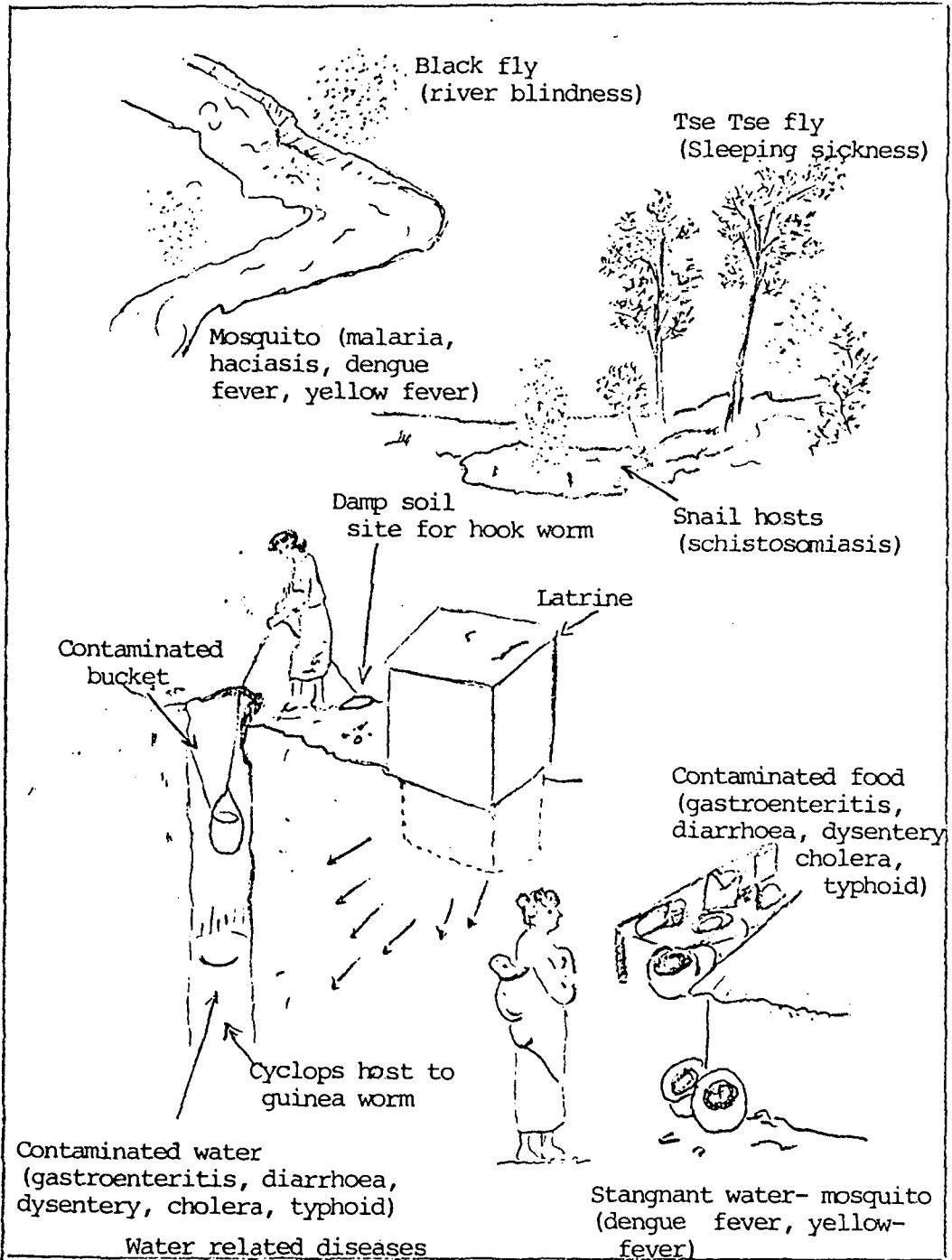
The accelerated development and orderly administration of water resources constitute a key factor in efforts to improve the economic and social conditions of mankind, especially in the developing countries. The task would be much simpler if it were realized that women and men have an equal stake in the future and that they therefore have a joint responsibility for determining that future.

Figure I



Source: Chen. L. "Evaluating the Health Benefits of Improved Water Supply Through Assessment of Nutritional Status in Developing Countries", Unpublished paper. Harvard School of Public Health, 1980.

Figure II



Source: O'Kelly, Elizabeth. Water and Sanitation for All. London Associated Country Women of the World. 1982.

Annex Table I

Mechanisms of Water-Related Disease Transmission and Control Strategies

Mechanisms	Illustrative Diseases	Control Strategies - Involve Women
I. Water-borne	cholera typhoid hepatitis	Improve water quality Prevent casual use of other unimproved sources
II. Water-washed	shigellosis scabies ascariasis	Improve water quantity Improve water accessibility Improve personal hygiene Provide information and instruction
III. Water-based	schistosomiasis guinea worm	Decrease need for water contact Control population of aquatic host Improve quality Protect access to water source
IV. Water-related	malaria onchocerciasis sleeping sickness	Improve surface water management Destroy breeding sites Decrease need to visit breeding sites Improve water storage

Adapted from Bradley (1974 and Feacham (1975).

Source: Chen, L, "Evaluating the Health Benefits of Improved Water Supply through Assessment of Nutritional Status in Developing Countries"; Unpublished paper. Harvard School of Public Health, 1980.

II. PAPERS OF PARTICIPANTS *

* The views expressed in the papers of the participants are the sole responsibility of the authors and do not necessarily coincide with those of INSTRAW.

A. The drinking water supply situation in Africa
and the role of women

United Nations *

Background

Recommendation C.12 of Habitat: United Nations Conference on Human Settlements, held in Vancouver, Canada in 1976, called upon Governments to adopt programmes with realistic standards for quality and quantity of water supply, to provide water for urban and rural areas by 1990, if possible, and to adopt and accelerate programmes for the sanitary disposal of excreta and waste water in urban and rural areas.

In 1977, the United Nations Water Conference recommended that governments reaffirm their commitments made at Habitat and that to achieve the Habitat objectives nations should prepare specific plans and programmes by 1980. It also recommended that the period 1981-1990 be designated the International Drinking Water Supply and Sanitation Decade and be devoted to the implementation of national plans for water supply and sanitation in accordance with the plan of action contained in Resolution II of the Mar del Plata Action Plan for the integrated development of water resources.

The Mar del Plata Action Plan called upon countries to set targets, to establish suitable standards and to prepare specific projects. Countries were expected to request assistance from international organizations.

In pursuance of General Assembly resolution 34/191 of 18 December 1979, it was decided to hold a special one-day meeting to formally launch the International Drinking Water Supply and Sanitation Decade. General Assembly resolution 35/18 proclaimed the period 1981-1990 as the International Drinking Water Supply and Sanitation Decade. It is envisaged that Member States will take all appropriate steps to achieve the targets for the decade and realize substantial improvement in the standards and levels of service in drinking water supply and sanitation by 1990.

Introduction

Water resources development, including water supply, has multi-sectoral interdependence with other development sectors. The area of water supply and sanitation has a significant impact on the life of every man, woman and child. Safe water supply and sanitary disposal of wastes are essential components of primary health care and provide the basis for economic and social advancement, including food production, education and industrial development. There is, in fact, no single measure that can improve the economic and social progress of a community as much as better health resulting from the provision of ample and safe water supply and sanitary services. To mention just a few of the direct benefits: the demand on scarce health services is reduced; increased labour productivity leads to improved yields; the release of women from the drudgery of carrying water over long distances permits them to engage in other productive tasks; and

* ECA

the high level of infant and child mortality and morbidity attributable to lack of sanitation is averted. It is in cognizance of this fact that the decade urged governments and support agencies to accelerate their programmes of the provision of water supply and basic sanitary facilities, paying special attention to the rural and urban underserved populations

The decade has the formidable objective of seeking to provide a large segment of the world's population with safe water and sanitation in the time frame 1981-1990. It has also provided a stimulus towards increased efforts by all concerned. In the spirit of the decade, many governments and bilateral and international organizations have mobilized resources to improve coverage of the population. However, the situation remains critical despite these efforts. The lack of progress warrants an evaluation and, if needed, reorientation of programmes and strategies so as to achieve better results over the remaining part of the decade.

Progress and prospects for Drinking Water Supply and Sanitation Decade

Situation in 1970

A 1970 survey by the World Health Organization of 88 developing countries, covering a population of 1,627 million people, pointed out that 77 per cent of the population surveyed did not have adequate community water supply services and that in rural areas only 12 per cent of the population had piped water supply. In order to achieve the goals of the second United Nations Development Decade in 90 developing countries where the rural population coverage was only 25 per cent, the estimated investment was \$US 13.2 billion.

Thirty-six countries in Africa participated in the WHO survey. The total African population covered by the survey was 280 million, of which 70 million were urban and 210 million were rural population. Of those, according to the survey, an urban population of 51 million (73 per cent) and a rural population of 41 million (19 per cent) had reasonable access to safe water.

Situation in Africa on the eve of the launching of the IDWSSD (1981-1990)

The Secretary-General's report to the General Assembly, Doc. A/35/341 of 5 September 1980, entitled "Regional reviews of activities pertaining to the International Drinking Water Supply and Sanitation Decade", presents the regional perspective in Africa, Europe, Latin America, Asia and the Pacific and Western Asia. The presentation was based on national reports received in response to the Secretary General's note verbale of 2 November 1979, and supplemented by other source materials available to the regional economic commissions. For the sake of brevity, only a summary will be given of the African region.

The report covers 26 countries in Africa with a total population of 209.8 million of which 59.8 million (28.5 per cent) are urban populations and 150.1 million (71.5 per cent) are rural populations. Out of a total urban population, 72.8 per cent is served with potable water, whereas for

rural areas this service is available to only 24.2 per cent of the population. Of the 26 countries, six have water supplies serving less than 10 per cent of the rural population, 14 countries serve 10 to 30 per cent, three countries achieved 60, 64 and 95 per cent coverage, while the remaining three did not provide quantitative figures.

The overall picture shows that in the urban sector, the water supply situation is little changed from 1970, while in the rural sector there is only a modest improvement and the picture is quite grim.

The situation regarding sanitary facilities is poor. Rural sanitation is conspicuous by a very low level or lack of service in most countries. In fact, it appears that this sector is not given serious consideration.

The report noted that only a few countries of the region had adopted targets for the decade and that national plans and programmes for water supply and sanitation covering the whole decade had not yet been formulated. It further noted that some countries leaned heavily on external finance for their water supply and sanitation programmes, to the extent of 70 per cent in the case of four countries covered by the report.

Level of coverage and projected targets in 1980 ^{1/}

The data in table 1, extracted from the report of the Secretary-General on the current situation and prospects of the Decade, submitted to the General Assembly at its thirty-fifth session (A/35/367), present a global and regional picture of the coverage of water supply and sanitation services in 1980 all developing countries. In respect of water supply, the data show that approximately 75 per cent of the combined urban population of all developing countries had access to some form of safe drinking water, either through house connections or standposts, as opposed to only 29 per cent of the rural population, with a weighted average of 43 per cent for the entire population. In respect of sanitation, 53 per cent of the urban population of developing countries but only 13 per cent of the population in rural areas had adequate services, with a weighted average of 25 per cent. This implies that, as of 1980, approximately three out of every five persons in developing countries did not have access to safe drinking water. The situation with respect to sanitation is even worse, with only about one in four persons in these countries having any kind of sanitation facility, including the pit latrine.

The report by the United Nations Environment Programme (UNEP) on the world environment, 1972-1982, noted that, although there were some improvements in the water supply situation in some parts of the world, there had been a worldwide increase in the number of people with no access to safe water and sanitation facilities. If past trends in population growth were to continue, there would be increasing difficulty in meeting their requirements for drinking water and sanitation.

According to the information provided by governments in connection with the launching of the Decade, the targets for water supply range from 50 to 100 per cent coverage and generally service by house connections is preferred to standposts. For rural water supply, the range is the same, although the non-piped or simple-piped systems are preferred. Except for

some more developed regions, where the rural population density is high, the targets for urban sanitation range from 25 to 100 per cent coverage. Rural sanitation lags behind, and only occasionally is a coverage higher than 50 per cent proposed. In a few cases, the target set is as low as 10 per cent.

The breakdown in table 1 demonstrates some variation from region to region.

Table 1 Service coverage in developing countries, global and regional, 1980 a/

Countries and regions	Population (millions)	Water Supply Millions Percentage	Population covered		
			Sanitation		
			Millions	Percentage	
All developing countries					
Urban	701	526	75	366	52
Rural	1,617	469	29	213	13
Total	2,318	995	43	579	25
Africa (ECA members)					
Urban	105	85	81	59	56
Rural	330	83	25	50	15
Total	435	168	39	109	25
Europe (ECE members)					
Urban	44	38	87	22	50
Rural	50	29	58	20	40
Total	94	67	71	42	45
Latin America (ECLAC members)					
Urban	227	170	75	123	54
Rural	141	32	23	32	23
Total	368	202	55	155	42
Western Asia (ECWA members)					
Urban	23.4	20	87	16	70
Rural	24.6	8	33	5	20
Total	48	28	58	21	44
Asia and the Pacific (ESCAP members)					
Urban	304	213	70	152	50
Rural	1,056	317	30	106	10
Total	1,360	530	39	258	19

Source: Report of the Secretary-General on the current situation and prospects of the IDWSSD (A/35/367), tables 1-3.

a/ The figures do not include China, and include only countries qualifying for technical assistance under UNDP procedures.

According to the regional reviews of activities pertaining to the Decade, contained in the report of the Secretary-General submitted to the General Assembly at its thirty-fifth session (A/35/341 and Add.1), the situation in the Africa region in 1980 shows an estimated 81 per cent of the urban population and about 25 per cent of the rural population with access to a safe water supply, as noted above. The corresponding statistics for sanitation reveal that 56 per cent of the urban population and about 12 per cent of the rural inhabitants are provided with adequate waste disposal facilities.

Although the total number of people served has increased dramatically in recent years, the increase is matched by population growth. Thus the number of people lacking service has remained more or less constant in recent years. For Africa as a whole, some 343 million people are still without adequate water supply; and within the decade of the eighties, the population of Africa will increase by some 183 million people. This means that 526 million additional people require access to water supply by 1990, with 365 million of these, or two thirds, in rural areas. Comparable figures for sanitation indicate that 571 million people would have to be provided with proper sanitation, of which 375 million would be rural residents.

Implication of financial resources on the Decade

The dimensions of the investment required for the Decade

In 1980, it was estimated that if the goal of providing clean drinking water and sanitation facilities to all by the year 1990 were to be met, an additional 2.5 billion people would have to receive water and/or sanitation services during the Decade, including some 250 million for whom service would have to be improved. Assuming that 100 per cent of the rural population were to get water and sanitation facilities by 1990, and a percentage of the urban population no less than the 1975 percentage were to get house connections, WHO and the World Bank, in their report to the Water Conference, estimated that \$185 billion (or \$12 billion per year) would be required for construction costs during the 15-year period 1975-1990.

A subsequent study by the World Bank^{2/} pointed out that the above figures were a gross underestimation of the financing needs. Assuming a complete urban and rural coverage, with the urban population served at commonly accepted levels of house connection for water and sewerage, and the rural population at a lower standard, the World Bank study estimated the total cost, adjusted from a 1978 to a 1980 base, at more than \$800 billion during the Decade for capital costs alone, not including maintenance, operation and replacement costs. The study indicated that the total cost could be cut by about 50 per cent, to \$400 billion, by the choice of suitable low-cost technologies for urban and rural areas and by the adoption of a wider mix of services. Thus, attainment of the objectives of the Decade presupposes an annual rate of investment on the order of \$40-80 billion during the course of the Decade.

On the basis of rough estimates, it is calculated that the per capita investment costs for constructing urban water supply facilities with house connections range from \$60 in Asian and the Pacific to \$200 in Africa, \$132 in Latin America and \$460 in Western Asia. The urban sewerage costs range from

\$130 in Asia to \$720 in Western Asia. Clearly, these costs are beyond the ability of the intended beneficiaries to pay, since some one billion of the unserved population have per capita income of less than \$250 per year, and more than half of these have an income below \$125 per year.

If a mixed level of services and low-cost technologies were adopted in urban settings, standposts could be constructed at about one half the cost of house connections. Similarly, on a per capita basis, the construction of sanitation facilities, such as septic tanks or pour-flush latrines, is less costly than the construction of urban sewerage. It is also realized that the construction costs of water supply and sanitation facilities are considerably less in rural settings. Thus, a given level of investment outlay could result in a greater number of people receiving services in rural areas. By assigning a high priority to the improvement of health through excreta disposal programmes, developing countries could accomplish a significant reduction in the transmission of excreta-related diseases. This health objective could be fully achieved by the construction of sanitation facilities using low cost technologies.

Trends in the mobilization of resources

The anticipated annual investment for drinking water supply and sanitation in the developing countries during the national planning periods covering the early part of the Decade, is some \$US 5 billion. \$US 0.5 billion for 13 countries in Africa, \$US 1.1 billion for 16 countries in Asia, \$US 2.7 billion for Latin America as a whole, and \$US 1.2 billion for 5 countries in Western Asia, of which 70 per cent is for water supply and 30 per cent for sanitation.

When extrapolated to all countries and augmented by external funding, the estimated total investment during the first years of the Decade may amount to about \$US 10 billion per year. By comparison, investment in 1978 was on the order of \$US 8.8 billion. Further scanty data provided by countries indicate that the allocations for drinking water supply and sanitation projects vary from less than 1 to about 5 per cent for most of the developing countries.

Problems and constraints facing African countries ^{3/}

Natural

Africa has the largest percentage of arid and semi-arid areas of all the continents. Eighty per cent of the land area in the Sahel is arid, with acute problems of water supply and distribution. In a country like Algeria, more than 20 per cent of the population lives in arid, semi-arid and mountainous regions which causes special problems in providing and distributing water supplies. Over vast regions, there are no water sources and where available they require at least partial treatment to make them potable. In a country like Burundi, the relief is highly varied, dominated by high hills and low valleys. Ninety-five per cent of the population lives in dispersed rural habitations, and communities with more than 40 households are very rare. Moreover, people build their houses in the highlands. These social and geographic conditions pose special problems in the preparation of plans and projects for water supply and sanitation.

There are a number of island countries in Africa - Madagascar, Mauritius, Cape Verde, Sao Tome and Principe, Seychelles, Comoros, etc. In Cape Verde, the rocky subsoil poses special problems for water supply and sanitation. Madagascar lists uneven population density and inadequate distribution of resources between desert, sub-desert and mountainous areas among constraints posed by nature.

Several countries in Africa are landlocked - Burundi, Chad, Mali, Niger, Rwanda, Uganda, Lesotho, Botswana, Central African Republic, etc. Procurement of material and equipment involve considerable delays, caused by transport bottlenecks, in addition to high costs.

Financial

Like all developing countries, the countries in Africa are suffering from the impact of global economic recession, growing production costs, high interest rates and the escalating price of oil. This situation, coupled with the paucity of allocation of funds from domestic sources, impedes their capability to implement the larger water supply projects. Several countries report serious financial constraints, not only for investment but also for the preparation of sector plans and projects. A WHO study in 1980 reported that 87 per cent of the countries were in need of some form of technical and capital assistance. Sixty per cent of the countries reported serious problems with inadequate revenues for internal cash generation. Related to financial deficiency were problems concerning the proper operation and maintenance of existing facilities, many of which had fallen into disuse. Frequent service interruption, a symptom of inadequate operation and maintenance, was a common feature in rural Africa.

Socio-economic

Uneven distribution of population and differences in socio-economic structure work against economic investments. Data on water tariff rates and the ability of people to pay for them are not readily available. In Congo, for example, there are underpopulated zones of marginal economic activity and overpopulated zones where most of the economic activity of the country originates. This uneven distribution of population and economic activity makes it very difficult to provide adequate water and sanitation in the areas of sparse population and low economic yield.

Manpower

WHO identifies the development of adequate manpower as one of the most urgent tasks facing the countries in Africa in the preparation of plans for Decade activities. There was an extreme and urgent need in 42 country (91 per cent) to develop manpower. This would require staffing studies and training programmes of sector personnel at all levels, especially in the sub-professional, technical and skilled worker categories.

Technological

Chad reports insufficiency of equipment, the rapid pollution of ground water, the non-existence of facilities for water treatment and the lack of

technical know-how. Madagascar reports dominance of imported technology, difficulties in the adaptation of such technology to national needs, inadequate research on appropriate technology and a preference for capital intensive technologies over those which are relatively more labour intensive among the technical constraints impeding further development of the water and sanitation.

Legislative

Absence of a water code, and too little or too much legislation are listed among other constraints. In some cases, it is reported that the existing legislation is outdated in form as well as in substance.

Institutional

Deficiencies in the institutional and policy making frameworks are among the major constraints. Some countries lack an appropriate institutional framework to plan, programme, implement and monitor activities for the Decade, while in others there is duplication and overlap of institutional authority.

Twenty-three countries expressed the need for reorganization and eighteen countries for better coordination among the agencies in the sector, as outlined in a WHO study (ECA/NRD/WR/80/1/15.6.80). The creation of national action committees, with clear terms of reference and the necessary authority and resources, is believed to be able to help in alleviating the problems of coordination.

Project for financing

A perusal of the programmes for the Decade of countries in Africa confirmed the general lack of viable projects, common to all developing countries. The situation, therefore, calls for the formulation of realistic programmes. If the planned targets are to be achieved, urgent attention must be given to the preparation of plans, programmes and projects now.

Technological options in drinking water supply in Africa

For purposes of this paper, the term "appropriate technology" is used to refer to technologies adopted to solve a given set of problems under certain conditions in a particular country, at present or in the foreseeable future. It may be defined as a method or technique adopted to provide a socially and environmentally acceptable standard of service or quality of product. From this standpoint, desalination in the North African coastal area is seen as an appropriate technology, although it uses a non-conventional water source. Similarly, recycling of water for various uses is quite appropriate in certain countries in the context of scarcity of water.

The development of community water supply usually relies on main water sources - surface water in rivers, streams and springs, and ground water. Current knowledge of these sources is far from complete. In fact, an ongoing Eca cartographic inventory of relevant surveys indicates a number of serious gaps in current knowledge. It makes the fact apparent that groundwater sources

are untapped in some places, while they are over-exploited in others.

In rural areas of Africa, water supply points are developed from various sources depending on water source availability, the size of the community to be served and the financial resources. The sources may be rivers, springs, drilled boreholes, shallow hand-dug wells, ponds, earth dams or embankments and roof catchments. The general practice is to use local labour in the application of labour-intensive technology in the construction of hand-dug wells, spring development and the building of small earth dams. Capital intensive technology is employed in the construction of large capacity ponds/dams (5,000 to 10,000 cubic metres), water galleries (known as water yards in the Sudan), deep wells and treatment plants. Often, depending on type of system and local conditions, mixed technologies are adopted.

In general, different types and makes of equipment and machinery, such as drilling rigs and heavy earth-moving equipment, are used. Water lifting devices, consisting of diesel-, electric-, wind- and solar-powered pumps, handpumps and "bucket-pulley-rope" systems, are installed depending on local conditions. Construction materials are composed of a mix of those produced locally as well as imported items. These materials include stone, sand, cement, lime, pipes, fittings, valves, bentonite, chemicals, steel products and PVC pipes. While some programmes in water supply have been successful by adopting one type of technology or another, there are many that have failed.

To improve the success rate and to solve national problems in the field of water resources development without undue dependence on important technology or raw materials, build up of the technological capacity within the countries in Africa must be considered. Self reliance is the watchword in all the countries of the region. The experience gained in the construction of some major dams, such as Aswan, Kariba, Kainji, Volta, Owen Falls, Tana, and many other projects, has resulted, at least to some extent, in the acquisition of technological capacity for planning, designing, constructing, maintaining and operating large multipurpose projects. There are instances - in Algeria, Egypt, Sudan and Nigeria - where major undertakings are accomplished by African engineers. The difficulty in this sphere is that technological capacity is not evenly distributed over the region. There are many countries in which lack of personnel, and institutional weakness in basic infrastructure leave no alternative but to seek external aid to solve some of the pressing problems, such as the provision of drinking water.

Nevertheless, efforts are being made in many African countries to hasten the development of local technology and use of local experience and raw material.

The Zambian Department of Water Affairs is a case in point. Manufacture of handpumps starts in various provincial workshops, utilizing cheap and locally available material. Most of the component parts are cut and assembled from ordinary galvanized iron piping, steel or marble ball valves, leather washers and bronze foot valves. Although some difficulties and disadvantages have been noted, the pump has proved successful.

In Malawi, not only are the handpumps for boreholes manufactured locally, at considerably lower cost than imported hadpumps (at 1983) prices the handpumps cost approximately \$US 120), but a simple handpump for shallow dug-wells is also manufactured in a government workshop. Considerable use is made of locally-produced PVC borehold casing and slotted screen.

In Ethiopia, handpumps are developed capable of raising water from boreholes 100 meters deep, using an imported pump cylinder unit with rods, superstructure and piping made from locally available materials.

Ghana also has a project for developing durable handpumps. In addition, since it has been found that 31 per cent of the borehole water in Ghana contains iron far in excess of maximum permissible limits, there is a project to develop iron removal plants, using local materials. The plants are easy to operate for the rural population.

With regard to the manufacture of construction materials from local sources, projects for increasing the manufacture of cement and steel are underway in many countries. After their completion, a considerable degree of self-reliance will be realized in the matter of these vital construction materials. Steel and PVC pipes and asbestos cement pipes are manufactured in Zambia. Fuel lubricants, bitumen and petroleum products are locally produced in countries such as Nigeria.

Often the maintenance of imported equipment becomes a problem in view of the need for continuous import of spare parts. Action should be considered therefore for: greater standardization of equipment among possible suppliers; and the promotion of the manufacture of spare parts. In due course, this would lead to the manufacture of an increasing number of types of equipment in the countries of the region.

Involvement of beneficiaries

An evaluation of the progress and prospects in drinking water supply and sanitation over the past 15 years, from 1970 to 1980, shows a very grim picture of the past and very little hope for any significant progress with the timeframe of the decade. An attempt has also been made at a cursory review of some of the major parameters hampering progress to a smaller or larger degree. Quite a few of these have a global dimension.

In some countries in Africa, a significant reduction in the execution of new water supply projects has been compounded further by the failure of schemes due to lack of proper operation and maintenance facilities. Consequently, low-income communities, particularly those in peripheral or urban fringe areas, and the rural segment of the population, must remain without proper service facilities and continue to depend on unhygienic and polluted water sources. In such areas, carrying water from distances exceed 5 kilometres, day-in and day-out, for years and a lifetime, becomes the order of the day for many unfortunate women and children. It is, therefore, a matter of great concern to all to improve conditions in rural areas. Community involvement and public participation might be seen as a way to uphold the momentum and to assist in solving this deplorable situation in Africa.

Efforts have been made by governments to involve communities in water supply programmes. Past trends indicate that while there were some cases where programmes implemented through mass mobilization have yielded successful results, there are many other where such efforts failed mainly because the organizers themselves had limited technical and administrative capabilities or, in other instances, political support was lacking.

Mass campaigning for the mobilization of the people at large should be promoted, should involve both sexes, and should have the help of able organizers. Community participation need not focus on material and labour contribution alone, but should also be oriented towards making the community feel a sense of ownership and responsibility for the projects. The community should feel that the water supply system is there because its members desire it and not that it is an imposition from outside. It follows that it is in their own interest to attend to the proper use and maintenance of the facilities. People from villages, districts and provinces should therefore be involved in the planning, construction, operation and maintenance of water supply and sanitary installations. This endeavour should not remain a mere slogan, but should develop into a national movement in which all sections of the community have a role to play. This broad-based character of community participation should be reflected in the various committees in both the national and regional levels.

The involvement of the community at the planning stage, starting with the choice of source, helps in taking account of local beliefs relating to the use of certain sources. For example, in one case rural people refrained from drinking water from a well because they believed that the water constituted the spirits of their ancestors. Another case in point is that of the males of a community who filled a water well with stones on the ground that the nearness of the source allowed the females a lot of time to spend contriving against their husbands. In another case women did not appreciate the supply location on an open and exposed field when other supply points located under shade trees afford them some comfort. These and many other aspects generally ignored could be vital to the success of a water supply project and could be worked out intelligently through consultation with the community to be served.

Involvement of the community in water supply projects and the training of grassroot-level technicians have proven successful in projects and have helped in reducing investment costs by about 40 to 50 per cent. In addition, experience indicates that public participation provides the basis for the promotion of health care and mass education with respect to proper water use and storage practices, as well as the areas of management, personal hygiene and human waste disposal.

Women and promotion of the Decade

The tasks of fetching the family's water, gathering firewood, grinding grain, and looking after the health and welfare of the family are almost exclusively the responsibility of women in rural parts of Africa. Women assume these duties due to their biological role as wives and mothers that calls upon them to attend to family nutrition and child care responsibilities.

In nomadic areas, women are also burdened with the added task of dismantling and setting up of temporary huts.

Women in rural areas are trapped in the routine of fetching water from distances of from 3 to 6 kilometres. A disproportionate part of the day is spent in obtaining water for the family. Regardless of the amount of water needed, the travel distance, the time required per trip and the carrying capacity all determine the family's actual daily supply. Health implications and depletion of the woman's energy, keeping them from other activities, in some areas reduced by 50 per cent, make the issue of crucial concern. The role of women - the group most directly concerned - in matters of water supply should be taken into account by the planners and designers of water supply schemes. It should be realized that identifying and defining the needs of women would promote more effective public participation and community involvement which in turn would better the success rate in water supply schemes.

Women's great contribution to socio-economic development should be acknowledged by society as a whole and means of enhancing their productivity and effectiveness in constructing and operating water supply systems be sought. Women should be encouraged to become motivators, and their integration in the development of water supply systems should be given impetus. Wherever feasible and appropriate, their participation should be promoted in the planning, designing, construction, maintenance, repair and financing of water and sanitation facilities. They should be mobilized as agents of change concerning the proper use of water and sanitation for improved health. For women to assume these additional tasks requires the development of mutual understanding and respect between family members. This effort should not be seen as a competition between men and women but rather should develop harmoniously towards the objective of reliable water supply systems to benefit the society as a whole.

It is necessary to recognize that in the past schemes failed, partly because women were not integrated into the development process and had not been consulted. Hence, efforts should now be made to enable them to participate fully in order to achieve better success. Such an effort, however, raises complex questions requiring careful approach to safeguard traditional attitudes, customs, practices, myths and laws to avoid confrontation between the social orders of a community. The effort should be carried out cautiously in different environments so that participation of women may develop into a coherent programme of action through a step-by-step process.

Towards this end, it would be desirable to launch well-prepared education programmes to increase the awareness of the people, to eliminate the discriminatory and negative attitudes of men and to redress the concept of inequality of women. It is also necessary to organize training programmes for men and women alike to enable them to take care of minor maintenance and to handle the operation of their water system. The success which results from efficient and reliable projects could act as a catalyst for development, especially if significant complementary efforts in other socio-economic sectors take place at the same time.

Implementation of water supply projects would reduce the hardships of

women and liberate them from time consuming, long treks to collect water. Closer sources of potable water in some localities through involvement of the community, and particularly that of women, could mean that children, particularly girls, are free to attend school. In other localities the "saved time" could be used for such beneficial and income-raising projects as poultry production, soap-making, pottery making, production of food crops, etc.

For effective involvement of women and for their integration as promoters of drinking water programmes in rural areas, governments, UN system agencies, bilateral organizations, NGOs and other institutions and individuals active in water supply and sanitation, should seriously consider ways and means to ascertain their interest and potential collaboration. It is necessary for national programme managers and international staff to reorient existing water programmes or development elements related to women so that the effort in mobilizing women as a key human resource can be fully utilized to protect, maintain and properly operate water supply systems.

There are the examples of projects in Senegal, Upper Volta, Malawi, the Philippines and in which women's participation in water supply resulted in benefitting the society at large.

Dodota water supply project in Ethiopia

The Dodota water supply project is a project undertaken in Dodota district of Arssi province in Ethiopia, following the signing of an agreement between the Swedish International Development Agency (SIDA) and the Revolutionary Ethiopian Women's Association (REWA). The Swedish contribution to the project is SEK 3,610,000 (\$US 454,100).* To match this fund from SIDA, the Arssi Rural Development Unit (ARDU), the local communities and REWA have made contributions in cash, kind and staff salaries. An additional SEK 858,825 (\$US 108,000) is now needed from SIDA to offset the deficiency due to currency devaluation and to enable the completion of the project.

The Dodota project is to provide water to the whole of Dodota district with gravity water supply by developing the high-yielding Fursa I and II springs south of Huruta. Village sites of 48 peasant associations have been selected for routing the pipes, and 74 kilometres of the pipeline routes are already surveyed. The current project, in phase I, consists of: spring development; construction of the main pipeline (3-5 km) from springs to Huruta, and a reservoir at Huruta town with a capacity of 100 cubic metres; Huruta distribution line; fountain construction and women's training programme. All works under this phase have been completed and the inauguration of the Huruta Water Supply took place on 29 January, 1984. Phase II includes construction of three reservoirs of 25 cubic metres capacity, another masonry reservoir with 100 cubic metres capacity and a main pipeline between Huruta and Dera towns. Under this phase, three reservoirs of 25 cubic metres capacity have been constructed, and work has begun on the large capacity reservoir. Seventy-five per cent of fountain works are completed. So far, the project is progressing ahead of schedule. When phases I and II are fully implemented, it will be possible to provide safe water to the projected 1995 population, which is expected to reach 56,000 people.

*Based on exchange rates in November 1983, 1 \$US = 7.95 SEK.

A third phase for the provision of feeder and branch lines in Dodota area is envisaged as a continuation of the current project. ARDU has prepared detailed designs, specifications and cost estimates, but funds have not been secured. A formal request has been submitted to SIDA for financing and REWA is awaiting the response.

The Dodota project is the responsibility of women, with the Revolutionary Ethiopia Women's Association as the client and the Arssi Rural Development Unit as the implementing body. The project is guided by a steering committee with representation from the Arssi Regional Administration, the National Revolutionary Development Campaign and the Central Planning Supreme Council, the Revolutionary Ethiopian Women's Association, the Ethiopian Water Resources and Sewerage Authority and the Arssi Rural Development Unit.

In order to enable the women of the area to play an active role in the planning, execution, operation and maintenance of the water supply system, special training programmes in various fields are included as a component part of the project. About 100 local REWA representatives have already been trained, 40 of these in maintenance and operation, 31 in management and administration and 29 in simple accounting. In addition, all women are also given basic training courses in home economics. Sixty of the trainees are already employed in building the reservoirs. Those trained in management are working as motivators and co-ordinators of the local people for participation in development activities. It is expected that all the trainees will participate in integrated rural development activities, such as pipe-laying, biogas production, tree plan, horticulture, weaving and other income-generating projects.

The participation of women is a salient feature which justifies designation of the Dodota project as a women's project. Over 1500 women have so far been involved in the project through REWA, Revolutionary Ethiopia Youth Association (REYA) and the peasant associations in the project area. It may not yet be time to assess the benefits accruing from the project. The impact of the water supply project, along with activities that would develop because of water availability, will be evaluated in future. However, it is clear at this stage that enough significant inputs have been made by women to demonstrate their eagerness and enthusiasm. The progress so far made on the project is quite encouraging since the first two phases are expected to be completed about half a year ahead of schedule, i.e. by the end of June 1984.

Life improvement aspects in Dodota

It is realized that supplying water does not by itself improve the mode of living of the population in Dodota. There are many other problems in the area, such as lack of fuel, lack of construction materials for housing, malnutrition and heavy domestic work. ARDU has organized a "Dodota community life improving team" to bring about an improvement in life style of the community. The team is working on improved designs and on finding proper construction materials for the peasants' quarters. Some work on the construction of houses using locally available materials is already underway. This endeavour is intended on one hand to improve the peasant quarters, while

on the other it is concerned with minimizing the demand on wood for cooking and house construction. As a parallel step, action is being taken on biogas production for fuel and light at 12 different locations. Currently, two biogas plants are installed and are providing service to farmers and producers associations in two locations. This, together with the use of alternative construction materials, is expected to reduce the demand on scarce wood. It is also proposed to rehabilitate existing ponds, to construct new ones for cattle watering and to introduce small-scale irrigation and fish production in the locality. Similar action is being initiated to promote local industries (weaving and donkey-cart making), in line with the needs and aspirations of the people, through the use of locally available materials. These efforts are being advanced with the support of technical expertise in the specific sectors, including sociologists, and the involvement of women who are motivated by local women agents.

Training programmes will be carried out in the areas of health and sanitation and on methods of growing vegetables with small-scale irrigation and the use of manure. Demonstrations will also be held for women on meal preparation as a means of fighting malnutrition. In addition, the women are being introduced to innovations, such as biogas production, weaving and horticulture.

Dodota is a pilot project encompassing multi-sectoral development aspects for improving the living condition of the people through the active involvement and participation of women. The project has been well-planned and consequently has advanced quite satisfactorily. Women are drawn into the water supply programme right from the planning stage to the construction stage, and participate in the operation and maintenance of the system. They are also active participants in the whole rural development programme. Proper organization of the community and the incorporation of an adequate training component have resulted in a positive impact on the success of the project. Further, the project distinctly shows that women, as the group most affected by lack of water, work with great zeal to obtain a reliable water supply.

Recommendations

1. As the group most directly concerned by problems of domestic water supplies, and in line with the thinking that participation of women and women's organizations will dramatically improve the drinking water supply situation in rural areas, steps should be taken to involve women at all levels of decision making as well as in the planning, implementation, operation and maintenance processes.
2. Women's organizations should be instituted at the national level with the common objective of advancing the socio-economic progress of their country, under centralized guidance and with the full support of governments. Such a centralized approach would avoid the pitfall of mushrooming of women's organizations which compete against each other and work in an ad-hoc and disorganized manner with no common objective, ultimately resulting in weakening their potential.
3. The national women's organization should be supported by all national

and international organizations in a country, in regard to promoting political, economic, social and cultural development. These national organizations should have branch organizations at village and district levels, all of whom would work under the umbrella and guidance of the national women's organization with the common goal of:

- (a) Working towards enabling women to acquire their basic human rights.
- (b) Raising the consciousness and cultural standards of women in order to liberate them from economic and social dependence on men through training in skills and the provision of opportunities to make them more productive in those areas where their skills are particularly appropriate.
- (c) Preparing women to occupy their appropriate position in society and to actively participate in productive social activities by creating appropriate working conditions.

4. A distinction needs to be made in treating the subject of involvement of women in development. The attempt should be made to focus on the basic problems prevailing in the rural areas of developing countries rather than on the diffuse aims of feminist or women's movements. Means should be devised of integrating women to work side by side with men to solve common problems, enabling them to live at a standard compatible with human dignity. The objective should not be understood as a means of developing a counterforce to confront male society. In fact, in mobilizing women in development programmes, including water supply projects, it is necessary to guard against taking drastic steps that disturb traditional cultures, laws and social practices so as to avoid social disorder. The approach should be worked out in a step-by-step process which gradually involves and integrates women in development schemes.

5. To attain the acceptance of society for the full participation of women in the development of water supply schemes, it is necessary to raise the awareness of the public through education programmes which, among other things, should highlight the advantages of involving women in the programmes. Toward this end, it is necessary to launch training programmes for the public at large and carry out mass campaigning to obtain the support of the community in question.

6. To bring about the effective involvement and participation of women in water supply projects in rural areas, governments, UN system organizations, bilateral organizations, NGOs and other institutions and individuals active in the area of water supply and sanitation should, at the outset, take into consideration the views of women. It is also necessary for national programme managers to reorient existing programmes to mobilize women as a key human resource in regard to construction, operation and maintenance of water supply and sanitation facilities.

Notes

- 1/ Water Resources: Progress in the Implementation of the Mar del Plata Action Plan (E/C.7/1983/11).
- 2/ Water Supply and Waste Disposal. Poverty and Basic Needs Series, (Washington,
- 3/ Problems and Needs of Africa in Community Water Supply and Sanitation. (ST/ECA/NRD/WR/81/2), ECA publication.

B. The problem of water supply and sanitation
and the role of women in Kenya in tackling
this problem

Eddah Gachukia*

Women and Water

In Kenya, as in many other third world countries, clean piped water to the home has yet to become a reality. Women continue to bear the great burden of providing water for domestic use.

This is in addition to their central roles, both within the home and family, as home-makers, providers of food, cooks, nutritionists, nurses, child rearers and educators and outside the home, as farmers in food and cash-crop production, petty traders and crucial participants in community projects. In Kenya, community projects are organized through "harambee" (a Swahili term meaning to "pull together" to achieve a common goal) and in the rural areas, depend, to a great extent, on the efforts of women who form the majority of the population.

Through the harambee effort many schools, day care centres, maternity and health centres, cattle dips, social welfare centres and water projects have been initiated and completed by rural communities, assisted in varying degrees by the government and by non-governmental agencies operating in the country.

Water supply

The task of fetching water from river or well has from time immemorial been assigned to women and children in most parts of Kenya. The most common means used by women to carry water are either a water pot placed on the head, or a water barrel - a container which holds about two to four gallons of water depending on the strength of the carrier - normally placed on the back and strapped to head, or shoulders and chest. Gourds of varying size are also employed in some areas, but these are less durable.

Some parts of the country have ample supplies of water from rivers, springs, wells and lakes, Traditionally, in such areas women and children will spend only one or two hours of their day fetching enough water for drinking and for other domestic use. As the family becomes more aware of body hygiene and the value of cleanliness in the home, more and more water is needed to meet the needs arising from such awareness. Proportionally, more time of the working day, usually early morning and late afternoon, is therefore expended fetching water for domestic use.

In other marginal and dry areas of Kenya, water sources are scarce, and women are known to spend more than half their day performing just one task of fetching water. In extreme cases, women leave at dawn to queue at the water source and because of the long distance they have to travel they do not get home until late evening. The water they bring home is precious and clearly cannot be used for such luxuries as bathing or washing clothes; it must be sparingly rationed for drinking and cooking. Out of

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necessity therefore, bodily hygiene takes a low priority.

Physical strain

Because of the physical features of the land and the location of the water source, fetching water can place a major physical strain on women and children. Often, this will involve travelling down steep hills to the water source, then climbing back up the same hill with the now heavy load of precious water on the back. The choice before the woman is a cruel one - either to make two trips up this steep hill or overload oneself and make only one. Either way, the task takes energy, effort and time. Her other crucial schedules are adversely affected, and the woman's health, her productive capacity and ability to perform well in other fields are greatly hampered.

The immense strides made by the Kenya Government in providing near universal primary education (more than 98 per cent of Kenya children are now enrolled in primary schools) also means that mothers are now "deprived" of the services and help of their children during the week days. The traditional norm, whereby mothers could count on the contribution of children in their everyday labours, no longer applies. It is one of those dilemmas of development where a jump forward in one aspect, desirable though it is, has an adverse effect on another aspect of community life. Hence the eternal question - how to plan and achieve balanced development.

It is well known that water-borne diseases are a common source of ill health in Kenya as in many other third world countries. The scarcity of water especially during the dry season, forces the population to utilize water that is dirty and unsafe for human consumption or for domestic use. When people have to economize on water, as indicated above, the level of common hygiene also drops resulting in unhealthy living conditions the consequences of which we need not enumerate here.

These are some of the major factors that led to the birth of the UNICEF/NGO Water for Health Programme - "Harambee Ya Wanawake kwa Afya", initiated by Kenya women in 1977 under the auspices of the National Council of Women of Kenya (N.C.W.K.).* In seminars and workshops held to mark the 1975 International Women's Year, one of the priority areas identified by grass roots and national representation alike, was the need for provision of clean water nearer the home. This was seen as one way to revolutionize the lives of rural women, not only making them better mothers but also more effective participants in national development. It would lighten their daily burden as well as allow them more time for other development activities and, hopefully, even leisure, unknown to many African rural mothers.

The UNICEF/NGO Water for Health Programme in Kenya incorporates the major non-governmental agencies led by women's organizations. UNICEF acts as the co-ordinator of assistance outside Kenya. This paper attempts to describe how the programme tackled the problem of water supply and sanitation and approached the role of women within the context of health, appropriate technology and socio-economic development.

* The National Council of Women of Kenya is an umbrella organization with which over thirty national women's organizations are affiliated.

The UNICEF/NGO Water for Health Programme in Kenya

It is not surprising that the problem of water supply emerged as a top priority for rural women since they are the ones to trek long distances to fetch water. As the saying goes, "It is the wearer of the shoe who knows where it pinches most".

From inception, the programme was conceived in an integrated manner, combining water activities with sanitation, health, water-related economic activities and appropriate technology. Taking advantage of past experience in other programmes, this approach sought to look at the overall welfare of the community rather than at isolated needs, however pressing.

The programme was also seen as a significant attempt to bring together the efforts of major non-governmental organizations operating in the country, pooling their resources to meet a highly desirable goal, not only in the lives of women but also in the life of the community as a whole.

The broad objectives of the Water for Health programme were:

- (a) To assist in raising funds from local and international sources for water and water-related activities;
- (b) To support the efforts of the Government in its stated goal of providing safe piped water for all by the year 2000 by mobilizing NGOs and local communities to take appropriate action;
- (c) To assist families to use water as a tool for solving health problems within their environment;
- (d) To provide water and to promote health through integrated efforts and so avoid duplication and wastage of resources, manpower and time;
- (e) To relate to relevant government ministries (notably Water, Agriculture, Health, Education, Housing and Social Services, Co-operative Development and the Office of the President) and NGOs dealing with water and health projects through consultations and joint undertakings in order to avoid duplication of activities and efforts, while at the same time fostering co-operation and collaboration;
- (f) To establish a pilot project in each of the seven Kenyan provinces. The project would be a learning experience and serve as a model from which other projects would spring;
- (g) To promote, research, training and the development of appropriate water-related technology;
- (h) With UNICEF participation, to share the benefits of the experiences gained from this project with other countries within the region;

The specific objectives of the programme varied according to local needs for each project:

- (a) To assist in the completion of community water projects, especially those initiated by women's groups, thereby saving time so that women can spend more of their time in developmental activities;
- (b) To mobilize interest in initiation of water projects in communities where none existed;
- (c) To assist in the improvement of water sources with regard to quality and quantity;
- (d) To promote the use of safe water by providing clean water storage containers and tanks;

(e) To hold demonstration and educational programmes for women on practical hygiene, improvement of diet and on maintenance of clean and healthy environments;

(f) To hold educational and workshop programmes on maternal and child health, and on family planning;

(g) To mobilize and co-ordinate the activities of NGOs engaged in programmes relating to water and health at the grass-roots level so that community goals can be achieved sooner;

(h) To improve the quality of local leadership, thereby helping women to become self-reliant in their efforts to initiate desirable changes in their lives and status and in the overall welfare of their families.

Health education

With specific reference to the teaching of health education relating to water and health, the following objectives were identified:

(a) To develop stable and self-reliant individuals, families and communities with an assured sense of social responsibility;

(b) To develop a community whose members observe desirable personal and communal health habits and use the health facilities and services provided for their health improvement;

(c) To build a well-informed community capable of identifying its health problems with a sense of responsibility for planning solutions to problems.1/

Acknowledging the fact that trained health personnel were too few to carry out the massive task of educating the population, especially in rural areas, other groups were identified who could be called upon to supplement the efforts of doctors, public health officers and nurses in performing this role. Among these were:

- Administration officers in all branches of the Government;
- School teachers;
- Home economists;
- Social workers from all government ministries;
- Youth groups, e.g. Y-teens, 4K clubs, Girl Guides;
- Church groups;
- Family planning field educators;
- Mass media at national and regional levels.

Achievements

The programme was evaluated on a constant basis since its inception (the latest evaluation was carried out in 1983). Such evaluation reveals that:

(a) Since 1977, a total of 82 community water projects all over the country have been supported by this programme to varying degree.

The assistance given ensured the completion of community water projects, thus facilitating the provision of water to communal water points, health centres, clinics and schools. The form of assistance ranged from provision of water pipes, storage tanks and water jars, to improvement of water sources - springs, wells, dams and boreholes.

(b) In those areas where domestic water was made available, the following improvements in community life have been noted:

- (i) Health centres and clinics have been initiated, completed or equiped and staffed. Mobile clinics have been introduced in needy areas;
- (ii) The health education component of the programme has frequently resulted in increased immunization, the construction of pit latrines and their use, greater appreciation of prenatal and postnatal services, and family planning;
- (iii) A number of women's groups now run demonstration farms where they practise what they learned at seminars and workshops regarding improved food quality and quantity. New crops, especially vegetables that grow easily when water is available, have been introduced, and these are consumed at home, and the surplus is sold;
- (iv) There is marked improvement in the awareness of good nutrition whose demands mothers now feel capable of achieving;
- (v) There is increased breeding of quality domestic animals and birds - cows, sheep, goats, poultry, rabbits and bees. Many of these breeding programmes derive from economically women's self-help activities that provide supplementary family income and diet.

Where cattle are reared, cattle dips have been introduced;

- (vi) Community participation in decision making and project implementation has been greatly enhanced.

The role of women, their status in this participation is now clearly evident. More women are enabled to become members of women's groups, participating fully in literacy, social and economic activities. With the availability of water, diversification in women's groups activities has become evident. Groups that used to concentrate on handicrafts now add such activities as the keeping of grade cows, poultry and the establishment of proper kitchen gardens, activities dependent on easily available water.

- (vii) An important link exists between this programme and the National Council of Women of Kenya's major environment programme - widely known as the "Green Belt Movement". Under this programme, communities are encouraged to plant fuel wood and establish green belts on both public and private land. Any group planting a belt of over 1000 (one thousand) tree seedlings is entitled to a water tank of 1000 gallon capacity and the salary of one person (with emphasis on employment of the disabled and the aged) to take care of the seedlings for two years;
- (viii) Leadership training has had a real impact on the development of local leadership, especially among women. Successful economic projects by women reduce their dependence on men. Women gradually come to be seen as crucial partners in the provision of basic family needs;
- (ix) Water jar demonstration units have been set-up, with technical and advisory staff being provided to train local people in the construction of water jars. The "jiko" - an energy saving, portable cooking brazier - has been introduced and popularized. Improvement in food storage and processing has also been observed.

The unique nature of this programme revolves around the co-operation

between various local communities, NGOs, government ministries and international agencies; the focus on marginal communities, both rural and urban; and the fact that all its projects emanate from the stated basic needs of the local community. WPH funds are only used to stimulate interest or open up bottlenecks hindering progress in community projects. The success of each project is, however, dependently almost entirely on the motivation and interest, leadership, awareness and participational capacity of each local community.

Conclusion

It would be improper to paint a rosy picture of this pilot and experimental programme. Indeed, the entire question has been greatly hampered by the lack of funds needed to stimulate interest, create awareness through workshops, seminars, mass media and other means, and to overcome a variety of bottlenecks that delay or discourage community projects. Although the co-ordinator/director has taken full advantage of knowledgeable personnel and technical support available from government and voluntary agencies, a number of projects suffer when such personnel is not readily available. Self-reliance in terms of crucial technical back-up becomes absolutely essential, especially when dealing with remote rural areas.

The UNICEF/NGO Water for Health Programme nevertheless remains an outstanding example of what "harambee", stretched beyond local communities to embrace voluntary agencies, government and international organizations, can achieve in meeting the most basic human needs and in achieving integrated and balanced development. It is a major contribution to the stated goal of the National Government in its efforts to supply clean piped water and provide primary health care for all by the year 2000.

What is even more important, the project has proved that one item - water - seen and treated in its entirety as it affects the total life of a community, can be a most effective vehicle or agent for development.

Notes

1/ Kiereine, E.M.*, "Water and Health". A general working paper on maintenance, education and provision of water prepared for guiding the work of the UNICEF/NGO Steering Committee, 1976.

* Mrs. E.M. Kiereine, M.B.S., was the chairman of the National Nurses Association of Kenya and is current president of the International Council of Nurses.

ANNEX

UNICEF/NGO Water for Health Programme

Participating agencies in Kenya.

A. Government of Kenya

- Office of the President
- Ministry of Water Development
- Ministry of Health
- Ministry of Culture and Social Services - Women's Bureau,
Department of Adult Education
- Ministry of Agriculture and Livestock Development
- Ministry of Energy and Regional Development
- Ministry of Education
- Ministry of Local Government
- Ministry of Information and Broadcasting
- Ministry of Co-operative Development
- The Kenya National Council of Social Services.

B. Non-Governmental Organizations

- (a) The National Council of Women of Kenya, original co-ordinator
 - (i) Women's organization affiliated with the N.C.W.K. at that time were:
 - (1) Maendeleo Ya Wanawake Organization
 - (2) Kenya National Nurses Association
 - (3) Young Women's Christian Association
 - (4) Kenya National Council of Catholic Women
 - (5) Kenya Association of University Women
 - (6) Kenya Women's Society
 - (7) P.C.E.A. Woman
 - (8) The Church of the Province of Kenya Mothers Union (branches)
 - (9) Kenya Women's Inter-Zionist Organization
 - (10) Salvation Army (Women's Wing)
 - (11) Ismailia Women's Association
 - (12) Zonta Club of Nairobi
 - (13) East Africa Women's Association
 - (14) Kenya Home Economists Organization
 - (15) Muslim Women's Association
 - (16) Kenya Association of Social Workers
 - (17) Kenya Consumers Organization
 - (18) American Women's Association
 - (19) Nairobi Business and Professional Women's Club
 - (20) Machakos Home Makers
 - (21) Methodist Women's Association
 - (22) The Kenya Red Cross
 - (23) Dorcas Society
 - (24) Kawadegu Women Welfare Association
 - (25) Women's Corona Society
 - (26) Inner Wheel Club
 - (27) Bukhayo Women's Association
 - (28) Ikinu Home Industries

- (29) Rabai Women's Association
- (30) Kenya Association of Secretaries
- (31) Nyeri Women's Association
- (32) Kenya Girl Guides
- (33) Visa Oshwal Youth League Women's Wing

(b) Other major supporters of the UNICEF/NGO Programme since 1977 are:

- Kenya Freedom from Hunger Council
- CARE Kenya
- Family Planning Association of Kenya
- Breastfeeding Information Association of Kenya
- National Christian Council of Kenya

International Agencies that provided funds for the programme include:

- UNICEF
- International Planned Parenthood Federation
- Partnership for Productivity
- MATCH - Canada
- International organizations with which Kenya Women's Organizations are affiliated, notably:
 - The Associated Country Women of the World
 - Zonta International

C. Water, health and women in the United Republic of Tanzania.

Fatma H. Mrisho*

The following is basic information on Tanzania on the East Coast of Africa:

(a) The country has a population of 20 million. Of this population 13.8 per cent is urban based while the remaining majority (86.2 per cent) lives in rural areas with farming as the main occupation. Agriculture contributes up to 50 per cent of the gross domestic product;

(b) Life expectancy at birth for females is 46 years, while that for males is a year or two less;

(c) Infant mortality rate is 130 per 1000 live births;

(d) Crude death rate is 17.7 per 1000 population;

(e) The percentage of children who die before attaining their 5th birthday is 22.3 per cent

(f) Total fertility rate is 6.3 live births for a woman during her reproductive period.

Table 1. Literacy status in Tanzania (percentage)

<u>Region</u>	<u>Males</u>			<u>Females</u>		
	Rural	Urban	Total	Rural	Urban	Total
Mainland	61.3	83.9	64.9	35.4	59.3	38.6

It has been noted that general health status and fertility rates correlate with education status: for example, the fertility rate of women with secondary education is about 50 per cent lower than the fertility rate of women with no formal education.

Occupational status

As stated earlier, agriculture is the main occupation and contributes 50 per cent of the gross domestic product (GDP). A sector comparison with other countries is given in Table 2.

Table 2. Agriculture as percentage of gross domestic product (GDP)

<u>Country</u>	<u>GDP (percentage)</u>
Tanzania	50
Japan	0.1
Sweden	3.6
Canada	3.6
Australia	4.5

* Public Health Department, Muhimbili Medical Centre, Dar-es-Salaam.

Table 3. Economically active population in Tanzania by sex and occupation

Occupation	Males	Females
Agriculture	79.1	95.1
Craft/machinery operators	6.1	0.3
Sales/clerical	3.7	1.0
Professionals/techicians/ teachers	3.6	1.0
Managers/administrators	0.5	0.1
Non-agriculture labour	2.8	0.6
Other workers	4.2	1.9
TOTAL	100	100

The data shows that women predominate in agricultural activities and that their representation in the other professions is minimal. Not only are women underrepresented, but their rate of increase in these other professions is also slower than that of males; i.e., over a 10 year period representation of urban females in the skilled professions increased 17 per cent while that for males increased 34 per cent over the same period.

Table 4. Urban water supply - current status (percentage)

Area	Year	Year
Urban	68	82
Rural	17	28
TOTAL	23	34

The objective is to have a water supply within 400 metres of every household by the year 1990.

Total coverage for latrines is 84.7 per cent for rural areas and 94.7 per cent for urban areas. Much headway was made during the anticholera campaign with the establishment of village health subcommittees.

Table 5. Different sources of water available (percentage)

Area	Piped water within plot, house or village	Piped water outside plot, house or village	Well water within plot or village settlement	Well water outside plot or village settlement	Other source within plot or village settlement	Other source outside plot or village settlement
Urban	34	54.1	2.6	5.7	10.1	15.8
Rural	11.6	16.1	18.9	27.5	1.2	2.4

Table 6. Sanitation status (percentage)

Own	<u>Rural</u>		Own	<u>Urban</u>	
	Shared	None		Shared	None
67	17.7	15.3	46.9	48.7	4.4

Disease status (health status)

The next three tables show the most common causes of hospital admission, outpatient department visits and hospital deaths in Tanzania.

Table 7. Most frequent causes of admission to hospitals

Cause	Percentage
Deliveries, complications of pregnancy	16.2
Malaria	8.9
Pneumonias	8.4
Diarrhoea	7.0
Injuries	1.4
Hookworm	2.3
Measles	4.8
Iron deficiency anemia	1.8
Tuberculosis	1.4
Bronchitis	2.1

The data shows that conventionally ignored diseases, such as malaria, diarrhoea, hookworm - all sanitation-related - account for 18.2 per cent of total admissions. I would like to discuss some of the diseases that are traditionally not associated with water further on, after presenting causes of outpatient department (OPD) attendance and death.

Table 8. Most frequent causes of OPD attendance

Disease	Percentage
Malaria	12.9
Ill defined conditions	8
Respiratory diseases	5.7
Digestive system diseases	6.3
Accidents	4.8
Ulcers	6.3
Gastro-enteritis	6.7
Bronchitis	4.4
Nutritional deficiencies	5.2
Eye infections	1.5

From the above table, it can be seen that water-related diseases, such as malaria, ulcers, gastro-enteritis, and eye infections account for 27.4 per cent of all attendance.

Table 9. Most common causes of death (in hospital)

Cause	Percentage
Pneumonia	11.6
Gastro-enteritis	10.5
Malaria	4.8
Tuberculosis	3.8
Deficient nutrition	7.6
Anemia	4.6
Conditions of early infancy	5.3
Measles	14.7
Tetanus	2.1
Diseases of the heart	3.8

Water-related diseases account for 15 per cent of all hospital deaths. At least 16 per cent of children under five years of age have diarrhoea on any given day, a survey indicates.

Having given you the above statistics, let me now briefly analyze the situation and put forward some suggestions.

Looking at the disease statistics (which I have limited to the top 10 diseases only), it is clear that water-related diseases contribute to high rates of illness and death. (Drought, disease and peak working seasons all come together at the same time). I would also like to point out that when considering water and sanitation related health issues, we often limit our discussions to the strict water-related diseases. I would like to argue that the incidence of certain diseases could be reduced if more time were available to the mother. By this I mean, provision of adequate water supply as close to the house as possible would free some of the mother's time and create the potential for the mother to involve herself in preventive aspects of health as well as in developmental activities. I would consider all immunizable childhood diseases (tuberculosis, measles, whooping cough and polio), as well as conditions associated with child-bearing and pregnancy as falling into the reducible category when time is made available to the mother to attend maternal and child health clinics where the risk factors are identified and immunization programmes are carried out.

It has been estimated that on the average 9 per cent of calorie intake is expended in carrying water. This percentage was based on an intake of 2,840 calories per day. This estimate is higher than the finding for most women in developing countries. The amount of energy used in obtaining water can be as high as 15 to 27 per cent. An additional benefit of water

programmes would be thus a reduction in undernutrition for women and children.

In discussing the time element related to water carrying, the following should be considered:

- (a) the time actually spent in the entire process of looking for, fetching and storing water;
- (b) the other activities compromised or totally abandoned because of lack of time.

Because women are the major beneficiaries of water and sanitation programmes, it is important that they be involved in the whole process of siting, application of technology, maintenance and operation. Recent advances in appropriate technology make the procurement of water supply also simpler, more manageable, and relatively less costly.

Such a change can be best brought about if integrated with a general raising of women's status through education and, to a certain extent, change in the traditional role of women in the family.

I would plead that women be involved in:

- (a) Siting of wells, standpipes, bore holes, etc.;
- (b) Maintenance of pumps, with special effort to select women for training for such responsibilities;
- (c) Manning of pumps can be done by women. This responsibility has been entirely taken over by men; and I have observed that switching on and off of the fuel pump may not always relate to needs, a judgement that I believe can be best done by a village mother after minimal training.

Lastly, I would like to propose that countries and women's organizations make a conscious effort to link water projects with programmes for women. Activities generated should result in sustained betterment for women and children.

D. Women and the International Drinking Water Supply and Sanitation Decade

Olatokunbo A. Ogbe*

Women make up half of the total population of Nigeria (recorded at 80 million in 1963). In both urban and rural areas it is the duty of women to collect water for family use and to ensure that home and environment are clean. Less than half of the cities and towns have regular drinking water supply in homes. In most rural areas there is no pipe-borne water for a distance of several kilometres from the village. The women in both urban and rural areas therefore have to walk several kilometres daily in search of water.

There is usually a centre for domestic refuse dumping in small communities in urban areas. Arrangements for collection are made by the state government. Since villages are small and far apart, this type of arrangement is not feasible. The refuse is collected in the outskirts of the village and burnt by members of the community. In other villages, each family is responsible for its refuse disposal.

Only in recent times have a few communities in the urban areas been equipped with central sewerage and sewage treatment plants. The usual method is for each house to have a "soakaway pit", a pit dug into the ground and covered completely so that the sewerage is decomposed in an anaerobic environment. There is indiscriminate disposal of sewage around the outskirts of villages in the rural areas. If this becomes a nuisance, the women of the village are responsible for cleaning it up.

The goals of the International Drinking Water Supply and Sanitation Decade are to provide potable water supply and sanitation for all the world's population by the year 1990. The role of women helping to achieve these goals has not been considered separately. Women hold fewer than 20 per cent of policy making and top management jobs in the country. Apart from the drudgery of water collection for women, which is extended to girls of school-age and hampers their education, there are many communities whose culture does not allow the education of girls. In some other communities, while girls are educated, they usually have no chance of being employed or else have to stop working as soon as they get married. In many cultures around the country, women are seen and not heard; in some they are not seen and not heard. Because of the cultural aspects and the fact that women have acquiesced to this treatment for many generations, it will take a lot of planning and effort to involve women in the implementation of the IDWSSD programmes.

There are projects and programmes in the country which involve women and include water supply and sanitation components. There are projects on the integrated development of rural areas directed towards making them attractive in terms of job opportunities and social services, so that the migration to urban areas is reduced and ultimately ceases. The women in the rural communities are taught basic home economics and are encouraged and trained to take up small scale income-generating activities, such as baking,

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sewing and knitting. Women are also taught about proper nutrition, the importance of consuming only clean water and ensuring proper sanitation in the home and its environment. The need for clean water and proper sanitation is also stressed in the education of women in rural communities by health workers under the Primary Health Care Programme of the Global Strategy of health for all by the year 2000.

The National Council of Women's Societies has, during the past year, called for greater involvement of women in policy making and project planning in the country. This indicates that women are now recognizing the role they have to play in the country's development and are making efforts to ensure their involvement.

Involving women or enhancing their role in the activities of the IDWSSD has to proceed from both the community or grass root level and the national level. At the community level, women have to be made aware of the benefits to be derived from the implementation of IDWSSD projects and of how they can ensure that the goals are achieved. Their involvement could include the maintenance and basic servicing of the equipment installed for water supply (e.g. handpumps) and proper sanitation. At the national level, the policy making and project planning bodies should be committed to involve women and make adequate provision for their participation.

E. L'eau et la femme dans les communautés rurales **
de Burkina Faso

Aicha Traore*

L'eau représente 70 p. 100 du poids de l'organisme humain adulte et 80 p. 100 de celui de l'enfant. Une perte de 10 p. 100 de l'eau corporelle entraîne de graves conséquences et une perte de 15 p. 100 et plus peut provoquer la mort. Le problème de l'eau est donc un problème crucial pour les populations du milieu rural surtout, dont l'approvisionnement en eau est déficient tant en quantité qu'en qualité. L'eau potable doit répondre au double objectif de quantité et qualité car l'eau, même abondante, peut devenir la source de maladies quand on en néglige la qualité. La rareté de l'eau en milieu rural crée de réels problèmes d'inconfort, en particulier pour ce qui est de l'hygiène et de la santé. Le problème de sa contamination est plus préoccupant que la manque d'eau.

Plus que toute autre commodité de base, l'eau en quantité et en qualité suffisante et d'accès facile, représente le besoin le plus pressant des populations villageoises du monde en développement et particulièrement de Burkina Faso. A l'heure actuelle, on peut estimer sans crainte de se tromper que plus de 40 p. 100 de la population rurale n'a pas encore la possibilité d'avoir son litre d'eau par habitant par jour, et cela pour 1985.

L'eau suffit rarement aux besoins essentiels. Il y en a à peine assez pour boire et cuisiner. Il n'y en a pas suffisamment pour l'hygiène corporelle, la lessive, le lavage de la vaisselle et les autres usages domestiques. Les femmes et les jeunes filles habituellement chargées des corvées d'eau parcourent de longues distances à pied plusieurs fois par jour, et sont bien souvent obligées d'attendre de longues heures pour obtenir quelques litres d'eau de qualité généralement douteuse. Les familles, malgré leurs faibles revenus, achètent de l'eau aux porteurs, un baril d'eau atteignant des prix souvent excessifs.

Environnement

La dégradation de l'alimentation en eau et de l'assainissement a des repercussions néfastes sur l'environnement, surtout quand elle est liée à une politique plus large de conservation de l'eau et des ressources de la terre.

La construction de retenues d'eau permet d'éviter la dégradation du sol et les pertes en eau; des projets de reboisement et de conservation du sol pourraient contribuer à la lutte contre le déboisement, la surexploitation de la terre et l'érosion naturelle. Pour limiter l'épuisement des nappes, l'érosion du sol, la désertification et le déboisement, il faudrait une meilleure gestion des ressources en eau.

L'eau potable ne profite pas seulement aux êtres humains, mais elle freine aussi la disparition des plantes, des arbres, des animaux et des poissons. Il est nécessaire de prendre des précautions pour s'assurer que la construction d'adducteurs et de stations d'épuration des eaux ne dégrade

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** Presented in French as written by the author.

pas l'environnement. L'eau est souvent contaminée par des latrines mal construites. Le forage de puits nombreux et rapprochés pourrait entraîner rapidement le tarissement des nappes, leur salinisation, une pénurie d'eau dont souffriraient la végétation et l'agriculture, ce qui aurait pour résultat l'abandon des terres et leur désertification.

La femme et l'eau dans les communautés rurales Burkina Faso

Il y a des années, les pluies étaient fréquentes et abondantes; les puits traditionnels de chaque village, les rivières, les fleuves, les "voltas" regorgeaient d'eau pendant une bonne partie de l'année. Le puisage et l'exhaure ne posaient pas de problème particulier pour l'alimentation des familles rurales. Au contraire, c'était l'occasion pour les femmes et les jeunes filles de se retrouver, soit autour du puits pour bavarder ou laver les habits, soit au bord de la rivière où c'était alors l'occasion d'une véritable fête féminine; on y causait pendant une bonne partie de la journée et on se défoulait ainsi de l'isolement dû à l'éloignement des concessions.

Mais voilà que depuis quelques années les pluies sont rares en Burkina Faso. Les rivières ainsi que les puits tarissent, et les quelques puits construits par le service de l'HER ne suffisent plus à alimenter les populations assoiffées.

On assiste alors à une véritable corvée quand il s'agit d'approvisionner en eau les populations rurales. Ce sont le plus souvent les femmes et les enfants qui sont chargés de cette tâche. La scène varie selon la région où elle se situe.

(a) L'approvisionnement en eau dans les villages, est une des tâches quotidiennes des paysannes en Burkina Faso. Dans la plupart des villages le puisage se fait à partir puits traditionnels creusés à la main par les habitants mêmes, sans aménagement spécial.

(b) Les outils utilisés pour exécuter ces ouvrages traditionnels sont aléatoires et se composent généralement de pics, de houes pointues et quelquefois de barres à mines, ce qui indique combien l'état rudimentaire des puits traditionnels et la qualité douteuse de l'eau qu'ils contiennent contribuent à la précarité de leur existence. Depuis quelques années, les puits de genre continnent de l'eau seulement pendant quelques mois dans l'année.

Pendant un certain nombre de mois, généralement à partir de mars, toutes les populations se rabattent sur quelques rares puits modernes ou quelques forages équipés de pompes manuelles installées par les soins des Services hydrauliques; les besoins en eau sont loin d'être couverts.

Les points d'eau sont alors isolés par rapport aux villages. Certaines femmes se voient obligées de parcourir 10, 20 ou 30 kms dans l'espoir de trouver d'un seul coup 20 litres d'eau. On voit à ce moment-là de nombreuses files autour des points d'eau tout au long du jour. Il n'est pas question de revenir bredouille à la maison; on attend tout le temps qu'il faut pour avoir sa portion congrue d'eau.

(c) La plupart des femmes font le trajet deux fois par jour; celles qui ont de grands enfants se font relayer par eux de temps en temps; celles qui ont des co-épouses se font aider par elles. Elles font généralement le

trajet à pied, dans certaines localités, c'est le vélo qui sert de monture pour transporter le "canari" d'eau, mais l'attente est toujours la même au point d'eau.

Dans d'autres régions mieux nanties, des ânes attelés à des charrettes servent de moyen de transport, mais c'est plutôt rare, car cette monture moderne sert à d'autres transports, tels que le bois, le mil, les marchandises diverses, les fourrages destinés aux animaux tels que les moutons, les chèvres et les chevaux durant la période de soudure ou l'on ne trouve plus aucune herbe près des villages.

Les femmes mettent quatre, cinq et même six heures pour obtenir un "canari" de'eau d'une contenance d'environ 15 à 20 litres; on imagine aisément le temps que cela peut prendre à une femme, de l'aube à la nuit tombée, pour obtenir assez d'eau pour alimenter son foyer. L'approvisionnement en eau des populations rurales en Burkina Faso est un véritable fléau pour les femmes qui aimeraient travailler. Si nous soustrayons le temps consacré à cet approvisionnement, il n'en reste presque plus à la femme pour son propre développement.

Outre les tâches familiales telles que le ménage et l'entretien des enfants, la femme est contrainte d'approvisionner son foyer en eau. C'est une véritable corvée qui, pendant au moins quatre mois et demi, de mars à juin, occupe la quasi totalité de son temps de travail et empiète sur ses nuits, perturbant tout développement de son foyer.

Santé

Quantité et qualité

L'alimentation en eau salubre ne signifie pas seulement qualité mais aussi quantité. Lorsque les niveaux de consommation par habitant sont très faibles, l'alimentation des foyers en eau, même si celle-ci n'est pas contaminée, n'est pas nécessairement salubre.

Les menaces que font peser sur la santé la consommation d'une eau polluée sont très nombreuses: ce sont les enfants qui sont les plus exposés et qui paient le plus lourd tribut à la maladie. Le taux de mortalité infantile en Burkina Faso est de trois cents pour mille, l'un des plus élevés du monde. Il est surtout attribuable aux maladies diarrhéiques, qui sont une cause majeure de décès parmi les enfants. Beaucoup d'entre eux meurent de diarrhée avant d'avoir atteint l'âge de 5 ans.

L'eau et la maladie

L'eau contaminée pose de graves problèmes de santé parce qu'elle héberge de nombreux germes ou des agents susceptibles de transmettre la maladie. Elle agit comme:

Vehicule de l'agent pathogène: c'est le cas de l'eau utilisée pour la boisson, le lavage, la préparation ou le refroidissement de certains aliments.

Abri de l'hôte intermédiaire: par contamination humaine: en buvant de l'eau, cas de dracunculose ou maladie du ver de guinée. En se baignant, cas de bilharziose ou schistosomiase.

Abri de vecteurs de maladies: Les moustiques dans la transmission du paludisme ou de la fièvre jaune; les simalides dans la transmission de l'onchocercose ou cécité des rivières.

L'eau joue un rôle primordial dans la transmission de certaines infections: infections intestinales, dont la plus redoutable est le choléra.

Parmi les autres affections gasro-intestinales: les fièvres typhoïdes et paratyphoïdes, les parasitoses intestinales: dysenterie ambiante, amibiase, poliomyélite, hépatite infectieuse.

Causes de la pollution de l'eau en milieu rural

La principale cause de pollution de l'eau dans les zones rurales est le défaut d'assainissement: absence de latrines familiales ou collectives, dispersion des excréments humains et animaux dans la nature, mauvaise élimination des ordures ménagères, certaines pratiques agricoles ou pastorales, et, dans une certaine mesure, l'utilisation d'engrais et de pesticides.

Dans la majorité des projets d'hydraulique villageoise, l'assainissement est souvent considéré comme le moindre des problèmes. L'objectif poursuivi par les ingénieurs et les techniciens d'hydraulique est de ravitailler les populations en eau en quantité suffisante d'abord et ce n'est qu'ensuite qu'ils cherchent à en améliorer la qualité.

(d) Mesures à prendre

En vue d'instruire la population sur la manière d'utiliser l'eau pour éviter la majorité des maladies dont elle peut être la cause, un programme de formation en vue d'assurer une bonne hygiène avec de l'eau saine a été mis en place parallèlement au programme de forage.

Les ouvrages de captage, de distribution ou de puisage de l'eau doivent être entourés d'un espace suffisamment étendu pour être protégés de toute pollution. En d'autres termes, les installations doivent être éloignées de tout ce qui pourrait être une source éventuelle de pollution.

Il est en outre indispensable d'associer à tout programme d'approvisionnement en eau et d'élimination des excréments humains et animaux un programme d'évacuation des eaux usées et d'autres déchets. Aussi est-il souhaitable que soient simultanément entrepris dans toute la collectivité, la réalisation de projets de ravitaillement en eau, de projets d'aménagement d'abreuvoirs pour le bétail dans les zones à vocation pastorale, et la construction de latrines, et celle de lavoirs ainsi que la création de dépotoirs.

Dans les villages, des animatrices reçoivent une formation théorique et pratique. Puis elles forment les responsables villageois qui, à leur tour, transmettent les connaissances reçues aux femmes des différents quartiers dans les villages. Les responsables villageoises sont régulièrement suivies par les animatrices. A ce jour, les résultats sont mixtes: certains sont encourageants car beaucoup de villageois ont demandé des matériaux en vue de construire des latrines; d'autres, par négligence des actions pratiques à prendre en relation avec la formation reçue ne l'ont pas fait. Nous ne pouvons donc pas parler actuellement de résultats d'animation positifs.

Conclusions

Il est universellement connu que l'amélioration du milieu de vie et de la santé des collectivités passe par l'amélioration des systèmes d'approvisionnement en eau. En plus des effets directs de l'eau potable qui réduisent les maladies

intestinales, l'approvisionnement en eau saine peut procurer de multiples avantages sur le plan du développement économique et social.

Au niveau du village, l'eau libère la femme des corvées d'eau. Elle peut consacrer davantage de temps à ses enfants et à des activités lui permettant d'augmenter ses revenus.

Une fois bien organisés leurs projets d'approvisionnement en eau, les collectivités pourront, grâce à l'éducation et à l'information sanitaires, entreprendre d'autres actions de développement.

Fournir l'eau potable et assurer le minimum d'assainissement aux populations déshéritées des zones rurales et péri-urbaines, tels sont les objectifs que se sont assignés tout spécialement les pays du monde en développement pour la période 1981-1990, proclamée Décennie internationale de l'eau potable et de l'assainissement.

F . Water, sanitation and village health: a community organization and participation approach in the United Republic of Tanzania

United Republic of Tanzania, Prime Minister's
Office and International Reference Centre for
Community Water Supply and Sanitation

Abstract

From 1981 to 1983, a project was carried out by the Prime Minister's Office in co-operation with the International Reference Centre to determine (a) the need for an additional community participation component in the Tanzania rural water supply programme and (b) the national organizational set-up and general framework in which such a programme could operate. The project included a study on environmental health conditions and behaviour in 8 villages. This study showed that with the existing technical and health education procedures only a limited impact on village health can be expected.

A follow-up programme with greater community involvement in planning and maintenance of the village water supplies and a more participatory and locally-specific approach in health education was therefore tried out. In both activities, women were actively and successfully involved as managers and as target groups. Small group discussions in particular were successful for the realization of hygiene improvements. However, too much emphasis was still placed on typical women's issues at household level. In future programmes, the women must be made more aware of village-level issues for joint village action. Health education for men should emphasize the importance of supply maintenance for village health and those household improvements that customarily are the responsibility of men. An important condition for further experiments with the present approach is the establishment of a national policy for greater village self-reliance in water supply and the creation of feedback channels from the field to policy makers in the three departments concerned.

Introduction

The study and follow-up activities in water and water-related village development presented in this paper are part of a larger project on community participation in the Tanzanian rural water supply programme, carried out under the bilateral co-operation programme between the Tanzanian and Dutch governments. The purpose of the project was to (1) determine if there is a

* The project was a joint undertaking of the Prime Minister's Office of Tanzania (Community Development Department) and the WHO International Reference Centre for Community Water Supply and Sanitation (IRC) in The Netherlands, with M.W.Kirimai (Ms) responsible for project activities in PMO and C.A.van Wijk (Ms) in IRC. CD field staff involved were M. Manusa, B. Mganga, A. Mwashu and M. Njuu in Morogoro Region and A. Kato in Shinyanga District. The Health Education Unit of the Ministry of Health, the Rural Construction Unit of PMO and the Morogoro Wells Construction Project assisted in the training of the field staff.

need to link a socio-educational support programme to the national rural water supply programme in Tanzania and (2) develop practical models for such a programme, and test the selected model in the existing water supply programme in one or two regions. Based on the results of the study and field-testing, as well as indirect data from fieldwork in other regions, a national decision would then be taken on the general principles and organizational set-up on which socio-educational support programmes for the water supply projects can be built.

Methodology

During the first phase of the project a general assessment of the existing socio-educational procedures was carried out in 12 of the 20 regions. Various community participation models were developed and a national workshop was organized on community participation in rural water supplies. 1/ 2/ This workshop resulted in the transfer of the project from the Ministry of Water and Energy to the newly established Community Development Department in the Prime Minister's Office (PMO). The fieldwork for the project was carried out in 60 villages in two regions (Morogoro and Shinyanga). Twenty of the villages were already served with a water project, 20 were to be served and 20 were not (yet) to be served. Although the project was originally part of a feasibility study in the use of handpump wells on a national scale in Tanzania, it was later decided that villages with both handpump wells and a piped water supply would be involved in the community participation project.3/

All the field staff were regular Community Development (CD) workers, who were given a three-week theoretical and on-the-job training for the study and follow-up work. They started by staying for one week in each project-village to evaluate the existing water supply situation, its history and its link with further village development. Methods used were informal discussion and observations using a 3-page checklist for each type of village. The results and implications of the evaluation were discussed at a general meeting organized by the village government at the end of the week.

To start the local action programme, a special village water sub-committee (VWSC) was elected at each village meeting. The election of women as well as men was emphasized since water is an important women's affair. With this committee, the CD workers planned a locally-specific action programme that could include:

- (1) Village organization for maintenance of the improved water supply (selection of village caretakers for further training; organization of site maintenance; reservation and creation of village funds for the acquisition of tools and spares and a honorarium for and supervision of the caretakers);
- (2) Village improvements of traditional supplies;
- (3) Village improvements of public hygiene conditions;
- (4) Participation in planning and construction of new water supplies;
- (5) Productive projects to raise maintenance funds (e.g. vegetable growing, beer brewing) or to stimulate local development (e.g. brick-making);
- (6) Local health education programmes to improve hygiene conditions and behaviour patterns; and
- (7) Liaison of the CD worker with outside agencies for clarification of previous decisions and/or possible support to solve problems beyond village capacities.*

* Other priorities of the village might also be discussed to find solutions, e.g. a flour mill in a village where women walked over 10 kilometres and back to have their maize milled.

For the health education activities emphasis was laid on the use of a group discussion approach. The purpose of this approach was to help the villagers identify and avoid local risky conditions and behaviour patterns and plan and implement a local programme to reduce these risks. The theoretical health knowledge that the villagers had already acquired through existing health education programmes (radio, cholera control campaigns, lectures at health clinics) would in this way be shared among the members of the group and applied to conditions and behaviour in the village. To facilitate these discussions, 12 discussion posters were developed. A set of these was kept in each village for use by the local workers (adult educators, dispensary staff, primary school teachers, VWSC, etc.).

As part of the initial evaluation in the first phase of the project, a detailed study was carried out on environmental hygiene conditions and behaviour in a sub-sample of 18 villages from the main project sample. The same type of follow-up programmes was thereafter carried out in these villages.

The purpose of the detailed hygiene study was to find out if under the existing technical and health education procedures the improved water supplies would have a beneficial impact on village health. Since for various reasons the existing village health statistics could not be used to determine the health impact ⁴/₄, a comparison was made between observed and reported environmental health risks in 4 served and 4 unserved villages.

Methods used for data collection included:

- (1) General observations and informal interviews with women and girls at traditional and improved water sources;
- (2) Observations and interviews in a 10 per cent at random household sample; and
- (3) Observations on hygiene conditions at public places with the help of a checklist.

The main findings are reported below.

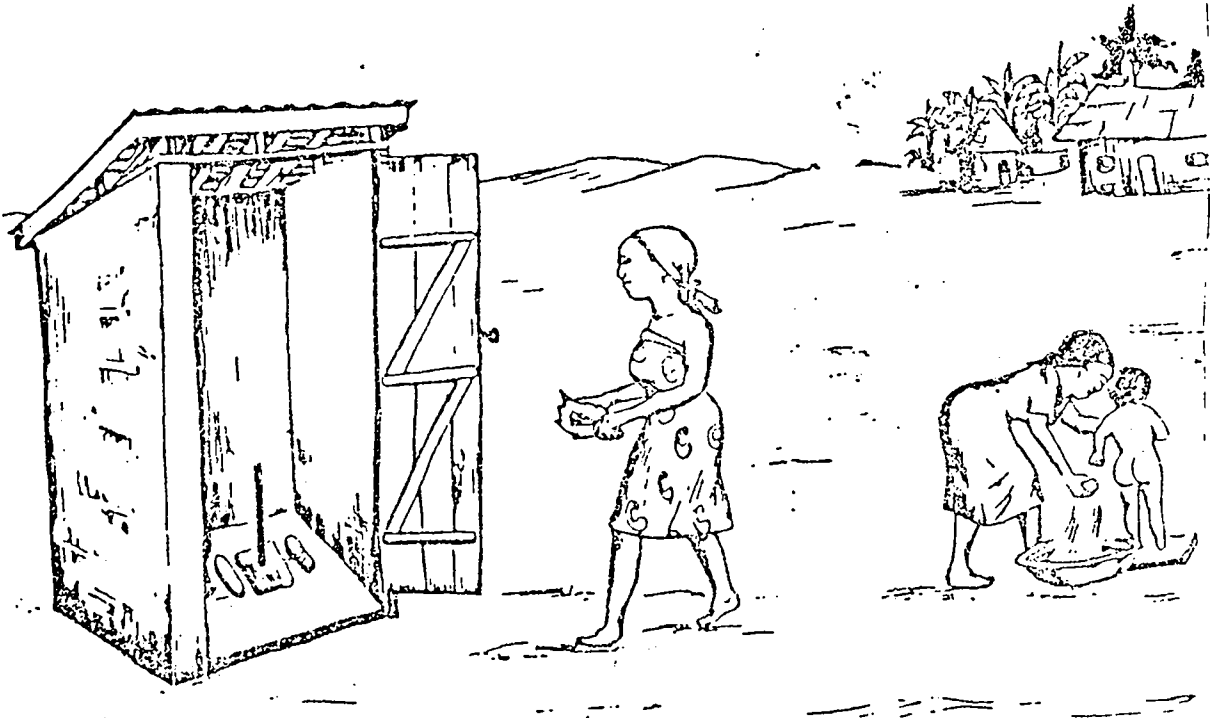
Results

Rational source selection and non-use of improved sources

One observation made was that women make rational choices about the places where they collected their domestic water for different purposes. The main criterion was the distance to the source. Preferably, the source within easiest reach was chosen. Health consideration also played a role, although women did not always have sufficient understanding of all factors involved. In one village, for instance, all the water was collected from a permanent river. When asked about the possibilities of contamination, the women pointed out that drinking water was always collected early in the morning, before other contaminating activities, such as bathing and clothes washing took place.*

* Such basic knowledge was found to be a good basis to build upon in local health discussions. During the training, for instance, a group discussion was held with women about the practices of other women in upstream villages. The group concluded that these women would do the same as they did and that their water in the morning was after all less clean than they had thought.

Figure I. One of the posters used for health discussions.
Theme: Safe disposal of children's wastes.



Other observations made included:

(1) The rejection of taps in favour of unprotected hand-dug wells, because the tap water originated from a river where many people bathed and was untreated, whereas the wells were shared between only a few and familiar households; and

(2) The preference for traditional wells with slow-welling water for drinking purposes, as this water was considered to be purer.

In most cases however, proximity carried more weight than quality. The result was that in spite of the health benefit a large percentage of women were not using the improved sources provided by the technical agencies because of long distances.

Consistency of choices

The study also showed that once a new pattern was built up, it was adhered to: when the women changed to an improved source they would seldom go back to another source for their drinking water. The only reasons for temporary non-use were the presence of a seasonal traditional source nearer-by which the women judged to be acceptable in quality, or the breakdown of the improved supply.

Problems of boiling drinking water

Nearly half of the women using unprotected sources said that they did not or not always boil their drinking water. Of these only 20 per cent said that they didn't see any need for boiling drinking water. The other mentioned practical constraints, especially lack of time. Some women said that during

agricultural peak seasons they did not even have time to cook more than one meal a day, let alone boil and cool their drinking water. The beginning of the rainy season when the fields must be planted is the period when women are busiest. This is also the period when children are most susceptible to diarrhoeal diseases because of dietary cutback and high contamination of unprotected water sources due to surface drainage. On the other hand, it was found that some of the women who were using the safe handpump water were boiling their drinking water. An additional problem connected with water boiling as observed in the study, was the risk of serious burns to children: over half of the households with one or more children under five were found to have risky cooking methods.

Uncertainty of improved water supply

In all the villages but one, women were completely dependent on outside agencies to keep the improved water supply functioning. This usually meant long waiting periods between breakdown, reporting and repair, even for very simple repairs. The villages with piped water had a local operator who had neither tools, spares, training nor authority to do the simpler jobs on his own and who was not responsible to the village government. Handpump caretakers were only taught how to fasten nuts and bolts, keep the surroundings clean and report breakdowns to the district water authorities. Because the caretakers were selected from the self-help labour recruited by the village chairman during the installation of the pumps and were all males, they had no personal interest in the functioning of the pump. Their motivation was further reduced by the lack of compensation, appreciation and local supervision of their work. They could not do anything as soon as the pump gave problems although the women were in serious need of the services. The villages were therefore not much motivated to compensate them for their work in any way, and preventive maintenance also suffered. Agency supervision of the caretakers was found to be rare. In one exceptional case of good maintenance, the village government gave the caretaker some tractor tools for pump maintenance and repairs and also gave him the right to use the village land at the end of the drain to grow vegetables in compensation for his work. This system had functioned satisfactorily since 1978, but incentives depend on the initiative of the village in question.

Water contamination through human practices

Major health risks observed were unhygienic conditions at the source (no village body was found to have specific responsibilities for supervision of site hygiene) and during the drawing of drinking water from the storage vessel (e.g. a communal cup placed on top of the covered pot). Other hygiene practices (bucket rinsing and hand washing before water collection, a separate and covered storage vessel for drinking water and reported frequency and intensity with which storage vessels were washed) were generally good, although considerable differences were still found between individual villages.

Other environmental health hazards

Other points of risk that were noted to constitute health hazards whether or not households were using an improved water source were, in particular, absence of water for hand washing in or near pit latrines, absence of a fly cover over the latrine hole, unkept latrine slabs, unroofed latrines (contributing to non-use of latrines and collapse of clay slabs in the rainy season), non-use of latrines, poor hygiene facilities at schools, dispensaries and other public buildings and few drying frames for household utensils in some

villages. The actual situation was found to vary from village to village; each village seemed to have its particular mixture of positive and negative health and sanitation practices.

Limited impact on disease incidence

In the absence of reliable health statistics, two questions were asked on disease incidence: one about any diseases that had occurred during the week preceding the interviews and one about the incidence of serious water related diseases during the preceding six months. Because this method has its weaknesses (it depends on a correct and complete memory recall and diagnosis) its outcome must be viewed with some reservations. Nevertheless, the data showed a significantly higher reported incidence of serious stomach disorders with fever in those households that used a traditional source of drinking water, reported no regular boiling of drinking water, or were observed to have risky methods of drawing boiled water. Women using traditional sources also reported significantly more cases of diarrhoea in their household during the preceding week (all in the dry season) than women using improved sources, but the samples were too small to differentiate further according to water use practices, village of origin, etc. Cases of diarrhoea were particularly prevalent among children under five.

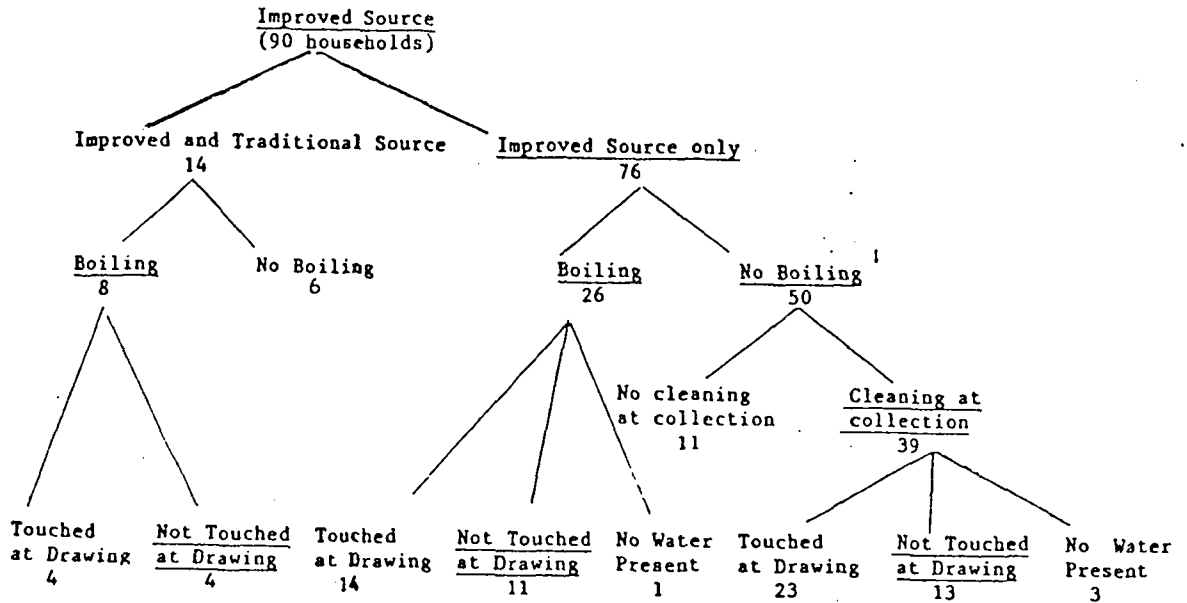
Noticeable was also the high frequency of cases of schistosomiasis reported in the three villages with handpump wells. Specification of the cases according to age and sex and correlation with reported bathing and laundry sites showed that those infected were mainly boys between the ages of 6 and 18 and girls and women of 11 years and older. Of the 26 girls and women for whom schistosomiasis was reported, 23 were using surface water sources for bathing and/or clothes washing. For boys, recreational swimming is probably the main reason for prolonged contact with infested water, but this assumption was not further investigated.

Remarkable was further that a high proportion of households in these villages (96, 96 and 57%) had a special secluded area in their compound for bathing. However, these sites were frequently only used by the men, for whom their wives brought bathwater every day. The women themselves often bathed in the river, which reduced their workload but posed a serious health risk as long as they took their baths in stagnant pools. Also, a small portion of women reported bathing less frequently (twice a week) than the men, who bathe daily.

As a general conclusion from these results, it can be said that water supply projects can have a positive impact on village health when there is a general change to the use of safe water in a safe way (figure II) and when other routes of disease transmission are cut off at the same time. Unfortunately, such general improvements have not yet been achieved with the existing technical and health education procedures.

Figure II. Risks of water contamination between source and cup for 90 households who had changed to the use of improved water sources in 4 villages in Morogoro and Shinyana Regions, Tanzania (safe water practices are underlined).

Figure II.



Three steps were therefore taken to increase the chances of an impact of the water supply programme on village health:

(a) A greater involvement of the community in local planning and decision-making on village water supplies. On the one hand, this should lead to a better adaptation of the technical projects to local needs and behaviour patterns as far as this is technically and financially possible. On the other hand, a better communication between the village and the technical agency, directly as well as through CD workers, should lead to a better understanding by the villagers of why some adaptations are not possible and what this means for their own behaviour patterns;

(d) More involvement in local maintenance and simple repairs for a more continuous functioning of the water supplies. Long periods of breakdown after some months or years of functioning not only affect the work of the women in many cases, but also increase health hazards as the natural resistance to diseases caused by contaminated water that was built up in the past decreases;

(c) Linkage of locally specific health education programmes to the water projects, using the existing structures for this purpose, but introducing a more participatory approach.

Evaluation of Community Participation Activities in 2 Villages

The results of the three activities were evaluated at village level in all project villages. 5/ 6/ However, a more detailed evaluation particularly of the participatory health education programme was carried out in two of the health study villages, one served and one not (yet) to be served.* The main results of this evaluation are summarized below.

* Shortage of trained staff made it impossible to carry out a detailed household evaluation in all 8 villages. The other 6 villages were therefore included in the general village level evaluation.

Local planning and decision making

In both communities general assemblies were organized to report the findings of the local evaluation and invite corrections, comments and discussion. Attendance at the meetings was fairly high: 206 men and 90 women out of 880 adults in Mhenda, and 417 out of 819 adults (with over 200 of them women) in Kihelezo. Decisions taken in Mhenda village (served) concerned:

(1) the organization of a village maintenance system for the existing handpumps, including the election of two caretakers for training, reservation of village funds for tools, spares and honorarium and arrangements for site cleaning;

(2) the promotion of a more general use of handpumps (only one out of 3 was fully used); and

(3) productive use of well water and 3 brick making projects (e.g. for school latrines).

The main topic discussed in Kihelezo village (unserved) concerned the liaison with water project and government authorities: the women in particular urged the CD workers to get clarification about the reason why their village had not received pumps and if they could still get an improved supply. They attributed the earlier project failure to a political problem (late registration as an Ujamaa village). In reality however, there had been sufficient water found for hand-dug ring wells only. The village had not been informed about this as the water project no longer made dug wells, but only hand drilled wells, which needed a higher recharge. The CD worker thereupon contacted the authorities concerned and learned that a piped supply was planned in the neighbourhood. He subsequently advised the village government to send in an early request for connection, so that the water department could adapt the dimensions of the scheme. (The village government did not know about this scheme, and a connection would have been unlikely since the scheme is meant for an agricultural estate. The final decision now lies with the regional planning authorities). A second topic in the discussion was the improvement of the existing traditional wells with locally available expertise, provided that this would not reduce the village's chances for an outside project later on. Finally, a local solution was identified for the problem of latrine collapse due to flooding and instable soil conditions.*

Both meetings also made recommendations on specific improvements in village an household hygiene, depending on the particular local situation, and elected a village water sub-committee to work out the recommendations. In Mhenda, this consisted of 2 elder women and the 3 ten-cell leaders living nearest to the 3 wells (a ten-cell leader is the elected leader of the lowest organizational unit of the Party, formed by ten adjacent households). In Kihelezo, the existing Committee for Culture, Education and Social Services (4 men, 1 woman) was chosen.

* The CD worker had noticed that some households had built their latrines on ridges or anthills. The meeting decided that this example should be followed wherever possible, with as many neighbours sharing one hill as could be arranged.

Participation in technology aspects

In Mhenda, the VWSC was actively involved during a second survey to find more well sites. Eight more sites were identified but only one (on the border with the next village) was technically acceptable. The VWSC however had problems in explaining the reason (high manganese contents) to the other villagers. Their position on the technical aspects was not strengthened by the fact that no authorization had been given to the village to acquire the necessary tools and spares for handpump maintenance, pending a central policy decision on the issue of a greater village self-reliance. The two village - elected caretakers have however received on-the-job training. They also serve the next village and get a mutually agreed honorarium on request for simple repairs. Although the period concerned (one year) is too short to draw any real conclusions, the system has functioned satisfactorily until now, and wells were observed to be better kept than before.

In Kihelezo, the CD worker had noticed that one villager had made a mound and drainage channels at a well to reduce contamination risks. The man had learned this at the sisal estate where he worked. His technique was also used to protect the other traditional wells for drinking water in the village. The wells were thereafter emptied so that clean water could well up from their depths, and the women committed themselves to use only long - handled scoops to draw water. As the village has a high flooding risk, it is yet to be seen if these improvements are effective enough or if a parapet of burnt bricks is needed, but a first step has been taken already in concerted village action.

Local health education activities: attendance and health knowledge

As part of the health level evaluation the number and type of local health education activities were investigated. The results are summarized in table 1.

Table 1. Number and type of health discussions reported by a 15 per cent household sample in two detailed study villages.

Type of activity	Reported participation	
	(n=55)	(n=53)
Village meeting	34	33
Adult education group	19	1
Group discussion at clinic	18	-
Group discussion with VWSC	6	-
Group discussion with health staff	4	-
Home visit CD worker	5	1
Home visit health staff	2	-
Home visit VWSC	2	21
Discussion after interview	2	8
No education needed	14	12

Approximately one quarter of the households had not participated in any local health discussions. One third of those not reached were older people (single or couples and completed families), while two thirds were fairly large households with small children. No relationship was found between non-attendance and the economic status of the households.

In most of the health discussions, the discussion posters were used. Recall and understanding of their contents are summarized in table 2.

Table 2. Number and type of messages recalled and understood correctly by a 15 per cent household sample in two detailed study villages.

Poster subject	<u>Mhenda</u>		<u>Kihelezo</u>	
	(n=55)		(n=53)	
	recalled	understood	recalled	understood
River pollution	41	41	32	32
Hygienic well surroundings	37	35	31	31
Pump breakdown	30	27	not applicable	
Unsafe collection and storage	38	36	31	31
Disposal of babies' waste	29	29	28	28
Washing children, clothes, utensils	28	27	32	32
Handwashing before meals	25	25	31	31
Schistosomiasis	17	17	30	30
Source protection	13	13	2	2
Hookworm	1	1	-	-
Spillwater use	1	-	not applicable	
Oral rehydration	-	-	-	-

The posters were not used for home visits. This explains the lower memory figures especially in Kihelezo. Recalled and understood best were those posters that referred to familiar situations and daily behaviour patterns. The use of the posters on a larger scale (they were pretested in one village) also demonstrated the need for some further adaptations, e.g. adding water for hand-washing at the latrine. The more abstract and complex concepts such as source pollution and oral rehydration were remembered and understood less frequently. These kinds of subjects probably need to be covered more thoroughly, in combination with demonstrations and adapted training for village workers.

Educational approach

The women in the household sample were also asked to describe in what way the various village workers had communicated with them. In Mhenda village, a discussion approach was reported for all cases except one visit by a WSC member. In all other cases the WSC was reported to have used a discussion approach. In Kihelezo, where the WSC did not feel capable of organizing a small group discussion without special training and only did home visits, the majority of women who had received a visit (16 out of 21) said that they had just been shown what improvements to make and why. Two women said that they had only been given instructions, two said there had been a discussion on what could be done best and one could not answer the question.

Impact of the participatory programme on environmental health behaviour

Continuous use of handpumps in Mhenda increased from 16 per cent to 48 per cent. Three quarters of the women concerned changed their water source

because the new pump on the border of the village was closer to their house than the other pumps, and one quarter changed as a result of health education (even though they had to walk farther). All the women concerned said the pump water needed no boiling because it came from a safe source, but that water from open sources needed to be boiled for drinking. One third referred to a particular occasion when this subject had been discussed. Reported cases (with probing) of boiling of unsafe water had remained the same in Mhenda (71 per cent), but improved in Kihelezo (from 76 per cent to 85 per cent). Reported reasons were explanation by VWSC (25 per cent) and killing the bacteria (75 per cent).*

All traditional wells used for drinking water in Kihelezo had been cleaned and protected and long handled scoops (cans on poles) were used to draw water. In Mhenda, all but one pump site (3 previously established ones, one at the cotton authority, and one shared with the next village) were now seen to be well kept.**

Extra latrines had been built at the school in Mhenda and were under construction in Kihelezo. Previously, 100-150 students had been sharing one pit latrine, which greatly hampered cleanliness. In Mhenda, the latrines had been built, they were clean and had longhandled fly covers which were observed to be in place, but handwashing facilities were still lacking. New or extra latrines were also under construction at other public buildings (dispensary, village office, flour mill). However, upkeep of the existing ones (including the one at the dispensary) still left much to be desired.

A substantial improvement was also found in the drawing and storage of drinking water. Of the 38 households (or 46 per cent) which previously used risky methods, 34 had changed their methods. Of these, 31 explained that touching the water with the fingers could make it dirty. There was a clear relationship between participation in local health discussions and improvement in handling drinking water; 30 of those who had changed had participated in one or more health discussions.

Household sanitation was another area where improvements were made. Disposal of small children's waste was already fairly good, but the few households which did not deposit cleansing materials (grass, leaves) in the latrine said they were now doing so. Most women however used water for cleansing.

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- * Water boiling nevertheless remains a difficult issue since it is so tempting to give an "ideal" answer. Also, the women face many practical constraints in keeping up this task. This was clearly illustrated in Mhenda, where the number of "new boilers" was equal to the number of women who previously insisted that they always boiled their water and who now said they didn't.
- ** At the fifth well, cleaning had been the week's task of an old lady who had not done her work. In future training, the task of the VWSC in noticing these things should be further emphasized, not only for the sake of well maintenance, but also to stimulate the VWSC to function continuously and work out appropriate local solutions rather than just imposing matters.

The changes most noticeable in waste disposal were the reported practice of burying wastes when working in the fields in Mhenda (from 16 to 60 per cent) and the construction of temporary or permanent field latrines by 25 out of 32 households in Kihelezo, where the fields are up to 3 hours walk from the village, so that people often stay there during the agricultural season. Latrine hygiene was also observed to have greatly improved: previously 54 latrines were not clean, now only 3 (2 old cases, 1 new). Fly covers had increased from 51 per cent to 92 per cent, with all but one observed to be in place. Also, many makeshift covers (e.g. a piece of a pot) had been replaced by proper ones (with handle).

The percentage of latrines in Mhenda was already high (98 per cent) before the project started. The new survey showed that latrine coverage in the sample had increased to 100 per cent. Existing latrines had been improved and the few unused latrines were found to be now in use.

In Kihelezo, absence of latrines was higher due to the caving-in problem, but the two households in the sample that had no latrines were able to construct them (without knowing that a follow-up survey would take place). Five sample households had constructed a new latrine on an anthill where the problem of caving-in would be avoided. One household in the sample had however given up its already poor latrine and had not constructed a new one due to unsolvable caving-in problems.

Least successful were improvements made in roofing of the outhouses and using water for handwashing (3 households in Mhenda, 11 in Kihelezo and none in public latrines). Mention of handwashing after latrine use (in an open question) increased from 36 per cent to 99 per cent, but this may just reflect a better knowledge or a decreased reluctance to talk about this subject rather than behavioural improvement.

At the end of the faecal-oral chain, food and kitchen hygiene improvements consisted mainly in the construction of drying frames for household utensils (increase from 48.2 per cent to 90.4 per cent) and kitchen improvements. Cooking places risky for children were however still prevalent, especially in Kihelezo where in many cases there is no separate place for cooking, and all cooking is done in the living space.

To prevent bilharzia infections, the women in 13 households in Mhenda had stopped bathing and/or washing in the river, an improvement of 54 per cent. However, there had been no discussion of a possible need for a special laundry and bathing facility at one of the wells, and if needed, how such a facility could be made and maintained. The VWSC has just permitted the washing of clothes at a distance of 20 metres from the pump. It still needs to be seen if the present change is the most appropriate for women and the water supply, since dirty water may seep back into the well.

Finally it was found that there was a strong positive correlation between changes that were observed in the villages and changes reported by the women themselves: of the 73 improvements that the women themselves mentioned, only 8 were not confirmed by observations of the researcher.

Conclusions and Recommendations

From the foregoing, some general conclusions and recommendations can be drawn with regard to community education and participation in technical programmes for rural water supply and hygiene improvement.

Participation in local technology issues

First of all, it is clear that better communication with the villagers, especially the women, in the local planning stage of technical projects is necessary to obtain a more general use of safe drinking water sources. An attempt must be made to site the new water points where general use is facilitated. Once the villagers understand how important it is for everyone's health that all households use safe water, and not just a lucky few, they themselves will be the best advisers on this point since they know the village and the water-use patterns best. Assistance from the CD worker in communication and organization of the village can help to smooth the process.

With handpump wells, good siting is less easy than with piped supplies, since ground water is not always available where it is wanted most. Here also, the women in particular will be able to tell which existing wells last longest, give most water, and have a good taste, for designating good test-drilling areas.

In case no suitable sites can be found in every village section, it will be important to discuss the reasons with the villagers, and especially the women concerned, and work out a possible solution that is acceptable to all parties (e.g. siting two wells in the next section or introduction of carts for water transport).

The taste of the new water supply, too, must be acceptable to the women. With a piped supply, the opinion of male and female villagers should be sought regarding the perceived quality of the water at the intake. With groundwater, however, changes in the chemical quality may occur (e.g. an increase in salinity). In the riskier areas, this issue should therefore be a point of discussion with the women, so that the possibility may be considered of sharing one or two good wells with all village households.*

A third issue to be discussed more closely is village involvement in maintenance. Without a specific body in the village with explicit responsibilities and tools (literally and figuratively) for looking after the village water supply, maintenance will fully depend on government support and be hampered in many cases by problems of shortage of manpower, transport and funds. Women, who are more directly concerned with water, should in any case be included in this management. They may also be successful caretakers since they are motivated

* A handpump is usually visited now by the women of the surrounding village section, and those less fortunate go on using their traditional sources rather than walk farther, wait longer and critically looked at as not belonging to the section households, and as increasing waiting time. This is also relevant when one of the pumps breaks down. Such issues are typical topics for discussion between the VWSC and the women, in general assemblies as well as in neighbourhood meetings, with the VWSC playing an active role.

by personal interest in the supply, have daily contact with it and are less career-oriented. In general, however, the villagers in the project still selected male caretakers for training.

Water projects should nevertheless make every effort to reduce existing barriers to women's involvement in maintenance and help villagers make a "reasoned choice" of caretaker candidates, considering also suitable village women. In the follow-up to the project it is therefore gratifying that training will now take place at village level, instead of at district or regional level, which would make it more difficult for women to participate.*

Participatory health education

Linkage of health education to water projects was found to be very important, especially in promotion of better village maintenance and in stimulating specific local hygiene improvements. The present study showed that there is a need for integrated local programmes carried out through the already existing institutions. A participatory approach helps to identify locally specific problems and solutions. The study showed that a discussion approach can be realized with on-the-job training. The study also showed that this is easier for people who have already had training and experience in educational tasks, than it is for VWSCs: the latter will need some specific training and materials.

The costs for such a programme need not be high. Training of the VWSCs for instance, can be carried out as a part of the village-level training courses for supply maintenance (the caretakers, too, should be trained in group discussion at the source). The present cost of the posters were only Tsh. 100 or US\$8 per village.** In this way, local health staff, educational staff and CD staff and village workers can strengthen each other's activities for an optimal effect of water projects on local hygiene and health.

In the training, special attention should be paid for ways in which people can be recruited who are not reached through the institutional channels (MCH clinic, adult education groups, village assemblies, etc.). Neighbourhood discussions at traditional and improved water sources at the usual collection hours and in selected compounds can be a useful supplement to reach those people who rarely attend more formal gatherings. This should also make it easier to reach more women, as women often are impeded by household circumstances or work to attend meetings.

* In the FINNIDA supported projects, too, training now takes place at village level and some female caretakers have also been trained by the (female) expatriate engineer responsible for maintenance training. One of the Tanzanian trainers is a woman. In the future, it might therefore be possible to compare the performance of male vs. female caretakers in the two projects.

**The cost of the new training/job manual for village workers on village hygiene improvements (which includes the posters in the form of flip charts) is estimated at ca. US\$12-15 per village. For comparison, the magnetic boards used for health education in some water projects would cover over 100 pounds (sterling) per village, and this material can then only be used by the health assistant serving ca. 8 villages, while the T/J manuals (5 per village) will remain in the village for use by the two caretakers, the VWSC, the primary school and adult education groups, and the local dispensary.

Similarly, messages for discussion will have to be adapted to local circumstances. A general propagation of water boiling, for instance, is not very realistic, because of the seasonal limitations on women's duties. It may be more practical to identify special target groups (e.g. women who choose to continue using traditional sources) and occasions (e.g. when a water supply is out of order) and together with the women concerned find a way to solve the personal problems experienced with regular boiling water (e.g. a different organization of the working day, or boiling of drinking water only for small children, who have less resistance to germs).

The evaluation also showed that men and women must both be reached by the health discussions. Women play a crucial role in household hygiene and are also most interested in these aspects, as illustrated by their poster recall. However, some of the improvements, such as the latrine, roofing and construction of kitchens, are a male responsibility. In the present programmes these fields were relatively neglected. Village level issues, which are no less important than household issues also tended to get less emphasis in discussions with women. Yet women can be very effective motivators for changes at village level.

A case may even be made for two types of programmes, some adapted more to women, with regard to time, gathering places and topics, and other oriented in particular to men, with emphasis on the importance of a good water supply and hygiene for everyone's health, including their own; the economic aspects of village health; the importance of involving women in decision making on water supply and other fields where men can make relevant contributions to household hygiene.

Sanitation improvements

The study also showed that the necessary sanitation improvements can to some extent be achieved with local means and knowledge, especially when both men and women are involved. However, not all technical problems can be solved in this way. In some cases, outside technical support must be made available through the water projects and/or health staff. Here also, the actual type of solution can best be decided upon through a dialogue with the people concerned, so that local environmental and financial conditions, skills and cultural factors (cleansing with water, privacy norms, etc.) are taken into account.

Policy on community participation

A successful participatory water supply and sanitation programme cannot be imposed but only developed gradually through ongoing experiments with and evaluation of general procedures. One condition for such an approach is the establishment of a general policy framework that allows and favours such a system.*

* At the end of the present project an Interministerial Meeting was organised at which the main results of the project were reviewed by the main departments concerned with rural water supply in Tanzania (Ministry of Water and Energy, Ministry of Health and Prime Minister's Office) and those donor agencies involved in large scale water projects. This meeting resulted in a series of specific recommendations for a greater village self-reliance in water and water-related development, for consideration by the National Government and Party.

Another condition is that experiments are not carried out in isolation, but that feedback channels are created between regional projects and the national departments concerned. Otherwise, there is no likelihood that lessons learned are used also by others and integrated in policies and programmes for water supplies and manpower training of the various types of staff concerned with water and water-related village development.

The present project will therefore not only have to be followed by a general policy framework on community participation that reflects the experiences of this and other projects in Tanzania - including those regarding the various functions in which women can be involved - but it will also be necessary to make arrangements for on-the-job manpower training on the ongoing programme and for periodic evaluations that allow further development and adaptation of community participation procedures subject to technical and socio-economic conditions.

Notes

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G. The Role of Women in the International Drinking Water
Supply and Sanitation Decade in
China

Changjie Chen*

Outline of the Situation of Drinking Water Supply
in China

There are one billion people in China - 85 per cent of them, more than 800 million, live in the rural areas; 6 per cent in towns and small cities; 9 per cent in big cities.

People who live in the cities have much better water supply systems than those in rural areas. There are about 247 cities in China, of these 221 have built their central water supply system with 616 water works. Thirty-two and a half million tons of water are supplied every day. The pipelines network is 47,000 kilometres long. Seventy-seven million people (85 per cent of the city residents) have tap water. The average daily water consumption for domestic purposes is 130 litres. The water quality can generally meet the official "Drinking Water Quality Standards". Half of the people who live in towns have tap water supply.

In rural areas, about 40 per cent of people are supplied with adequate and safe water meeting the hygienic requirements. 15 per cent receive tap water.

The main problems of water supply in China are as follows:

- (1) Twenty-six cities still have no tap water. For cities with such a supply, the available quantities do not meet the increasing demands of the residents. By rough estimate, an additional 12 million tons of water per day are still needed. Due to water pollution, the quality of water is getting worse in a few cities.
- (2) China has a total of 3200 counties and towns with a population of 60 million. About 1600 counties and towns still have no tap water. The tap water quality for the remaining half does not always meet the Standards.
- (3) About 500 million peasants do not have an adequate and safe water supply.
 - (a) About 45 million people in 574 counties under 26 provinces, municipalities, and autonomous regions drink water with high fluoride content.
 - (b) Sixty million people drink water that is bitter and salty.
 - (c) One hundred and fifty million people use surface water contaminated by industrial and domestic waste, and pesticides.
 - (d) About 50 million people live in areas lacking water sources.
 - (e) Two hundred million people use water that does not meet the official water quality standards.

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Outline of Plan for Improving the Drinking
Water Supply in China

China is a vast country with a large population, and complex natural conditions. A program for improving the drinking water supply has been set up, correlating the distribution of the population with the water resource situation. The emphasis is on the rural areas. The main points are as follows:

(1) Improving the drinking water supply condition for 500 million peasants;

Between 1983-1985, build 25,000 small tap water systems, solving the problem of drinking water for 50 million peasants;

By the end of 1990, to solve the basic problem of drinking water supply for 300 million people living in rural areas;

The problem of drinking water supply for the remaining 200 million people to be solved by the following approach - replacement of the old facilities; upgrading of old equipment; protection of water sources against pollution.

It is estimated that 7.5 billion US dollars will be needed for this purpose.

(2) Towns - sixteen hundred towns in China need to develop tap water supply systems - 3000 systems will be set up before 1985, another 500 in 1985-1987, and 800 before 1990. By 1990, 95 per cent of the towns will have developed tap water systems.

(3) Cities - tap water will be supplied to 16.6 million people in cities who lack such a supply now, and present facilities protected in order to increase or safeguard the available water supply. Coverage of tap water supply will be raised from 85 per cent to 95 per cent. By the end of 1990, domestic water consumption per capita per day will have been raised from 130 litres to 150 litres.

According to preliminary estimates, 15 billion US dollars are needed for all the items mentioned above.

To fulfill the objective of the International Drinking Water Supply and Sanitation Decade, the State Council of China has designated the National Patriotic Health Campaign Committee of China (NPHCC) as the leading body for the programme. Decade activities should be included in the long-term programme and annual plan of certain ministries. NPHCC and the Ministry of Public Health have already decided to establish the Technical Advisory Centre (TAC) for rural water supply technology within the Institute of Health, China National Centre for Preventive Medicine.

For the implementation of the activities of the Decade in China, manpower training considerations are very important. If each county were to be provided with only 4 staff people responsible for engineering

design, financial planning, construction supervision and water quality detection, then a total of 8340 personnel will be needed for the 2085 counties in the country.

Two training centres are now being set up for this purpose. In 1981, the Chinese Government formally took part in the launching of International Drinking Water supply and Sanitation Decade activities. Since then, two million people in areas with high fluoride levels get defluorized water and 40 million people in dry areas receive adequate water supply.

These advances notwithstanding, drinking water supply in China still presents a difficult problem. China is a developing country with a relatively poor economic base. However, the Chinese Government has decided to make every effort to solve the basic water supply problem before 1990, and plans to solve it completely by the year 2000.

Status of Chinese Women

Before the People's Republic of China was founded, Chinese women were cruelly oppressed and exploited by feudalism. After liberation, women in China have equality with men. According to the Constitution of China, women enjoy equal rights with men in all spheres of political, economic, cultural, social and family life. The status of women is raised along with the development of socialist material and cultural civilization.

Political and Social Position

In China, women enjoy equal rights with men to vote and stand for election. For example, women make up 21 per cent of the National People's Congress. Eight women have been designated ministers and vice ministers in the government. Thirty-eight hold positions as provincial leaders. Four point seven million women work in factories, offices, and other units owned by all the people. Women represent 26 per cent of total workers.

Many women hold leading positions in scientific research institutes, hospitals and colleges. For instance, the Minister of the Ministry of Water Conservancy, is Dr. Qian, a woman highly respected in China.

Of medical and other health workers in china, women make up 57.4 per cent. At the Institute of Health, half the total research staff is female, some holding jobs as director of the Institute or as head of a department.

Economic Status

In addition to social equality, Chinese women also have economic independence. They can choose any job without discrimination; and they enjoy equal pay for equal work. In cities, the number of women clerks, workers and cadres is almost equal to that of men. Few women stay at home as housekeepers. In rural areas, although the principle of equal pay for equal work has been accepted, the income of women peasants is still lower

than that of men. Recently, new forms of production responsibility were put into effect, contributing greatly to reducing the social division of labour and raising the productivity of women. This will further improve women's economic status.

Position in Family

The Marriage Law of China prescribes monogamy. Both husband and wife have equal rights in deciding family affairs and managing their common properties. Wives and husbands are encouraged by society to share the housework. However, vestiges of the ideology of feudalism still exist. To change the old feudal idea of "regarding men as superior to women" will take quite a long time.

The role of women and the International Drinking Water Supply and Sanitation Decade

The problem of drinking water supply is of great importance to women. Not only do women often spend much time in fetching water over long distances, they may also be the most seriously affected by inadequate and polluted water. Yet, women are the first beneficiaries of the improvement in drinking water supply and should, therefore, be called upon to take part in the activities of the Decade.

Women can play an important part in the Decade within the specific situation of China:

(a) Direct participation in the activities of the International Drinking Water Supply and Sanitation Decade. At present, a number of women are working in the Chinese National Patriotic Health Campaign Committee, the leading organization for Decade activities in China. At the Technical Advisory Center of the Institute of Health, nearly 50 per cent of the skilled staff are women, as mentioned above. In the Patriotic Health Campaign Committees, Sanitary and Antiepidemic Stations at provincial and country level, women staff make up more than 50 per cent.

(b) Education. If the importance of drinking water hygiene were understood by everybody, the impact on health would be enormous. In China, more than half of the teachers in elementary and middle school, and of the doctors and nurses in hospital are women. Teachers can teach their students, and mothers can educate their children on the importance of water hygiene, water source protection, drinking water disinfection, as well as the danger of water-borne diseases.

(c) Water Treatment in Family. The main problems of drinking water quality in China centre on off-colour and odour caused by organic pollutants, mottled teeth, fluorosis caused by high fluoride levels, and water-borne infections during seasonal epidemics. All these problems may be affected by women with micro-type treatment facilities. For example, activated charcoal filters remove the colour and odour. They are rather cheap and easy to use. The micro-type defluoridation

facility for domestic purposes can reduce the fluoride concentration from 4.8 to 0.9 milligrams per litre and only costs 0.1 US cent for one litre of water. Also, a water disinfection method has been developed using disinfectant tablets. If the housewife can be taught to manage the domestic treatment methods, the incidence of water-borne diseases will be greatly reduced.

The above examples demonstrate the important role women can play in the implementation of Decade activities in China.

H. The Indian Dilemma

Banoo Coyaji*

Introduction

The Interregional Seminar on Women and the International Drinking Water Supply and Sanitation Decade was convened at a very opportune moment by the International Research and Training Institute for the Advancement of Women. The decision taken by the 1977 United Nations Water Conference at Mar del Plata, Argentina, that the period of 1981-1990 be observed as the International Drinking Water Supply and Sanitation Decade was endorsed by the thirty-first United Nations General Assembly late in 1977. The Seminar was called together to review the Decade plans of member countries, progress towards implementation, and the feasibility of achieving the objectives by 1990.

The Decade's achievements will affect the well-being of all - men, women and children. However, this issue is of great importance to women, since they are the primary haulers and users of water for storing, cooking, washing and cleaning - themselves, their children, their homes and their surroundings. No plans, however ambitious and well implemented, can be successful unless women are involved in the whole process from planning to implementing, managing and monitoring. To be successful, programmes should be targeted "where it counts: mothers of small children". 1/ Women should have adequate support to enable them to function efficiently and effectively in their new roles. This should include relevant health education and training programmes, recognition of the importance of women and their organizations as change agents and women's representation on decision-making bodies.

Water, sanitation and health - the Indian situation^{2/}

The total volume of water available for use in India is estimated at 1900 billion cubic metres per year. About 86 per cent of this derives from surface runoff - rivers, streams, lakes and ponds.

Urban water situation

A staggering 70 per cent of the water in India is polluted, according to scientists at the National Environmental Engineering and Research Institute (NEERI). Wastes from human settlements account for four times as much waste water as industrial effluents. Most of these wastes are discharged untreated into watercourses. Out of 3119 towns and cities only 217 have partial (209) or full (8) sewerage and sewage treatment facilities covering less than a third of the urban population.

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Demographic pressure

Almost 24 per cent of India's population is squeezed into its 3000 odd cities and towns covering just 1.3 per cent of the land area. Overcrowding of this magnitude - 156 million people in 1981 - has severely curtailed the the availability of clean water in Indian cities.

The quality of water supplied is deteriorating. In some cities, hours for water supply dropped from 8-10 hours a day in 1970 to 2-3 hours in 1975; thus creating a health hazard. The pressure in empty pipes is low, and this negative pressure can draw sewage water from neighbouring leaking sewage pipes. Ninety to 100 per cent of the urban population receives intermittent water supply. Infectious hepatitis and other epidemics can result.

Urban sanitation

This situation is much worse. More than a third of the population - well over 50 million people - does not have access to latrines of any kind. Another third is served by bucket latrines which are hardly sanitary. The remainder, in big cities, has access to sewered facilities. In small and medium towns, excreta is often flushed into open drains along the street.

Rural water situation

Despite all Government efforts, 70 per cent of rural areas remain without drinking water. The Government has designated 231,000 villages with a population of 160 million people as "problem villages" without a water source within a distance of 1.6 kilometres, or water is available only at a depth of more than 15 metres. Others are located in hilly areas where water is available at an elevation difference of more than 100 metres from the habitation. Some are villages with water sources with excessive salinity, iron, fluoride and other toxic elements hazardous to health. Also belonging to this category are villages that expose the villagers to risks of water-borne diseases, such as cholera, guinea worm, etc.

Rural sanitation

This seems to be an intractable problem. The Government estimates that only about 2 per cent of the rural population is covered by sanitary facilities. Because of the lingering influence of Mahatma Gandhi, India's First Five Year Plan in 1952 allotted 83 per cent of its combined budget for rural water supply and sanitation. By the Third Plan, almost all of this budget was spent on water supply, with the result that the gap has become a chasm.

Modernization

The extension of irrigation is creating an excellent breeding ground for disease carriers, including the mosquito that spreads fatal Japanese encephalitis, unknown in India 30 years ago. Malaria and kala azar have staged a comeback.

The large expansion of modern industry has created a new source of pollution - uncontrolled, untreated industrial wastes. The Central Prevention and Water Pollution Act of 1974 was enacted to combat this very problem. Implementation has been very difficult and tardy.

Health

The implications of massive pollution for the health of the nation are related to water-borne causes. A 1979 survey found that among children one to five years old, the major causes of death were typhoid, pneumonia, dysentery and diarrhoea. 3/ The incidence of cholera has been reduced significantly, but acute diarrhoeal diseases are rampant. They attack children in particular - three die every minute, about 1.5 million in a year. Current morbidity shows that smallpox has been eradicated, malaria has been curbed, and immunization has protected children from whooping cough, diphtheria and tetanus to a limited extent. However, diseases arising from poverty, ignorance, malnutrition, lack of safe water supply, sanitation and drainage are still prevalent. While most old diseases continue to be rampant, new ones, due to modernization, are arising rapidly.

The country thus carries the double burden of new and old disease, of microbial pollution due to under-development and chemical pollution due to industrial activity. Diseases of poverty and affluence co-exist. 4/

Government of India's Plan for the Decade

As of March 1981, protected drinking water was available to 80 per cent of the urban, and to 30 per cent of the rural population. This compares favourably with the World Health Organization figures for developing countries of 75 per cent and 29 per cent respectively. Sanitation figures are dismal. Urban areas had some sewerage - 34 per cent, and rural areas had 2 per cent coverage. The comparable figures for other developing countries are 53 and 13 per cent.

India is a signatory to the Mar del Plata Resolution and accordingly, launced the Decade programme on April 1, 1981. The Government of India is taking its commitment to the Decade very seriously and has drawn up a national plan of action. Supply of drinking water to all "problem villages" is Point 8 of the 20-point Socio-Economic Programme of the Prime Minister.

After considerable effort at various technical and administrative levels, the following targets have been recommended for the Decade:

- (1) Urban Water Supply - 100 per cent of the population to be covered by March 1991.
- (2) Rural Water Supply - 100 per cent of the population to be covered by March 1991.
- (3) Urban and Sewerage and Sanitation - 100 per cent of the population to be covered in Class I cities and 50 per cent in Class II

and other towns. Overall coverage in each State should be 80 per cent of the urban population by means of sewerage and simple sanitary methods of disposal.

- (4) Rural Sanitation - 25 per cent of the population to be covered by sanitary toilet facilities.

These targets are expected to supply 74.4 million people in urban areas and 445.7 million in rural areas with water, and to provide 113.2 million people in urban and 148.4 million in rural areas with sanitation. Of the 113.2 million, 62 million will be served by sewerage and the remainder by low cost sanitation facilities, such as water-sealed latrines, leaching pits, or septic tanks. It has been estimated that approximately 14,167 million US dollars at 1980 price levels would be required to achieve the Decade goals.

Successful implementation of the Decade programme calls for sound policies, priority for the underserved population, appropriate technology, intersectoral co-ordination, and efficient management to reduce waste.

The linkup of the Decade programme with programmes in related sectors, such as rural development, health, industry, education and social welfare, is expected to contribute in great measure to achievement of the Decade goals. Community participation is also crucial.

The ambitious plan has been put into action beginning with the Sixth Plan (1980-1985). More resources will be found during the Seventh Plan (1986-1990) now in preparation. It is estimated that 42,000 "problem villages" have already been covered.

The situation of women and children

India's population today is a little over 700 million. Of these, 48 per cent are women; nearly half of the latter are girls. While India has successfully battled against some of its major killer diseases, the greatest failure of the present health system is the unacceptable high female, infant and child mortality. This is an indictment of society's failure to provide not only medical care but also food shelter, water and sanitation to mothers and children.

Mortality

India has achieved a steady decline in the general death rate, from 27.4 in 1941-1951 to 14.8 in 1981. Laudable as this is, almost one third of the total deaths occurs among children under five years of age. Though the death rate has fallen, it is still higher for women than for men for all age groups up to age fifty. This is particularly true of women in the reproductive age group of fifteen to forty-four. Life expectancy at birth has increased from 32.1 years in 1941-1951 to 52 years in 1981. A very sensitive and revealing index of the health status of women is the sex

ratio. India is one of the very few countries in the world where it is adverse to women. It has become increasingly unfavourable, from 972 in 1901, to 931 in 1971, with a marginal rise to 935 in 1981. 5/

Maternal mortality is still 480 per 100,000 births. Estimates vary from 373 to 570, the latter possibly being true for the rural areas. These deaths constitute over one per cent of all deaths and nearly 3 per cent of all female deaths.

Although the infant mortality rate has declined from 160 per 1000 in 1947 to 126 in 1981, it is still very high and has not changed significantly in the last decade, especially in the rural areas. Every ninth child born in India dies before it reaches its first birthday. More than half of the infant deaths occur in the first month of life, and nearly half of these in the first week.

Child mortality of pre-school children aged one to five is still 35-40 per 1000. It is higher for girls than for boys and higher in rural than in urban areas.

The reason for this state of affairs is not far to seek. Women and children, especially female children, exist under dismal conditions. In India, deliberate infanticide may have been forestalled, but evidence of neglect of female babies in providing nutrition, education, parental care and health facilities is patent. Infant mortality is higher; age specific death rate is higher; the sex ratio is adverse; and literacy is lower. The Physical Quality of Life Index (PQLI) is significantly lower. 6/

Malnutrition and Infection

The two major factors contributing to child mortality and morbidity are undernutrition and infections due to an insanitary environment, principally diarrhoea. "There is a close synergistic interrelationship between these two factors. Undernutrition increases the susceptibility to infections and infections aggravate malnutrition by further reducing the intake and absorption of food. This vicious cycle of undernutrition and infection is the characteristic feature of the 'poverty syndrome' in which a large part of our child population is now entangled." 7/

Women in general, and pregnant and lactating women in particular, tend to be undernourished. Iron deficiency anemia is present in 70 per cent of pregnant women. It is directly responsible for 20 per cent of maternal deaths and has an adverse effect on the well-being of unborn children. 8/ Malnourishment, coupled with infection, is the likely cause of the high incidence (40 per cent) of low birth weight in Indian newborns.

Education is one of the important tools of health care. Primary education is compulsory and guaranteed by the Indian Constitution. Yet, in 1981 nearly 54 per cent of males and 75 per cent of females were illiterate. Female literacy, which was 0.6 per cent in 1901, has risen steadily but too slowly to 24.9 per cent in 1981. 9/ Literacy rates for women fail to reveal the fact that fewer than one per cent of girl school entrants in rural areas complete high school. The health education

component in primary education is weak. Health education, therefore, never reaches the poor masses.

Women have not benefited from the enormous development that has taken place in India. Development activities, in a great many cases, have had an adverse impact on women. In agriculture, food production, the dairy industry and marketing, training has been given to the better educated men. Men and machines have replaced women.

Women's impossible workload

Apart from the reality of poverty which deters the majority of the people, women carry the burden of childbearing, child-rearing, and care of the ill, infirm and old members of the family. All this is in addition to supplementing the family income through back breaking work in the fields, construction sites and factories. They have few or no decision-making powers and little self-esteem even as wage earners.

A report from South India estimates that at least three fourths of a peasant woman's time is spent in the field - sowing, planting, weeding and harvesting - in addition to her household duties. She produces 75 per cent of the food. ^{10/} A woman works 16 to 18 hours a day. She has no help from her menfolk, nor receives any technological assistance to relieve the unending drudgery of her housework. A major activity, which saps her energy, is fetching heavy loads of water and fuel over long distances. Overwork, lack of time, perpetual fatigue and resultant stress undermine her physical and mental well-being. This situation begins in childhood when girls, who should be in school, are kept at home to relieve their mothers of tasks or look after younger children while mothers are out working. This condition holds throughout their lives. Women are thus conditioned to bear their suffering silently and tacitly accept their lot.

Appropriate technology

Lack of resources is the greatest constraint to the implementation of Decade plans. Desirable as it might be, it will never be possible to have a tap in every home or a complete water-carried sewerage system. The most one can hope for in the foreseeable future is percolation tanks, bore wells, protected dug wells and taps at not too great a distance from her home. Simple, easy to manage water resources must be provided.

A pour-flush latrine with twin pits, developed by the Global project of the United Nations Development Programme may be an answer to the sanitation problem in relation to technology and cost. It is cheap, costing about 10-15 US Dollars per capita; it eliminates mosquito and fly breeding; its maintenance is easy and cheap; and it makes rich fertilizer available. A great social benefit would be the elimination of the so called "scavengers" who each night empty bucket latrines. The conversion of excreta in composting latrines to nitrogen-rich, harmless, odourless fertilizer would aid the farmer. The production of biogas for cooking purposes from a mixture of human and animal excreta and waste water might ultimately replace wood as a source of energy and save our forests and the energy of

our women. The efficiency with which these facilities would function would depend on their appropriate design, sound construction and proper maintenance. The equipment should be simple, indigenous and standardized and should be capable of being repaired with parts replaced in local workshops. Careful planning, good organization, management, surveillance and co-ordination between public works, irrigation, agriculture, sanitary and health authorities would be important factors for success.

Women's participation

Clean water and environmental sanitation will hopefully be provided to India's underserved population by 1990. This will not necessarily bring about eradication of water-borne diseases unless women, who are the main users of water, are involved in a massive health education programme. The water from newly installed taps may be clean and safe. It will not remain so, unless women are taught that the containers in which that water is collected also need to be clean, that the surroundings must be clean, and that animals should not be washed at the same source. The importance of washing of hands, the daily bath, the washing of utensils, the safe storing of water, the necessity of a clean dipper, the hygiene of cooking and protection of food must be explained. Cultural inhibitions must be patiently broken down - an example is the common belief that children's feces are harmless, perpetuating the diarrhoea cycle. The fecal/oral route of infection has to be explained and re-explained. Women should be involved at the planning stage regarding the location of water points and privies. They should be consulted as to their design, which should accord with local customs. Only if these steps are taken will the facilities be used.

Hope for success

India is a signatory to the Alma-Ata Declaration of 1978 and has decided to make the primary health care approach espoused at the Alma-Ata Conference the main focus of its health services in order to fulfill its commitment to the WHO target of health for all by the year 2000. It has initiated four important programmes - the Integrated Child Development Service, the Health Guide (Community Health Workers) Scheme, the Trained Birth Attendants Scheme and the Non-formal Adult Education Programme. All four programmes will greatly contribute to implementation of the Decade strategies.

The Integrated Child Development Service was started in 1975 to provide vital children's services to 33 of India's 5000 administrative blocks. It is expanding rapidly and anticipates to cover all blocks by 1990. Using village women with a minimum of from six to ten years of schooling - the 'anganwadi worker' - it hopes to improve the nutritional and health status, and the psychological, physical and social development of children in the zero to six year age group. The Service seeks to provide a package of services - supplementary nutrition, immunization, health checkup, referral services, nutrition and health education and non-formal education - to children below six years of age and their mothers.

The Health Guide Scheme was inaugurated in October 1977 in 741 primary

health care centres. The objective is for a community of 1000 population, or a village, to select persons from among its own residents - preferably women - to work as community health workers. The persons selected would be trained at primary health care centres in health and nutrition education, health surveillance, maternal child health, family planning, environmental sanitation, first aid and curative services for minor ailments. By 1980 175,000 health guides had already been trained and are now working in their villages. It is anticipated that there will be at least one guide in every village by 1990 - 585,000 in all!

Birth Attendants are being trained with the help of the United Nations Fund for Population Activities. The indigenous "dai" is undergoing re-orientation in safe delivery practices, and there will be one for every village in the near future.

Non-formal Adult Education is another tool to improve the capabilities of women. This is an opportunity for adult women and girls, who dropped out of school or were passed over entirely by the formal education system, to develop functional literacy. In this process, messages of health education, nutrition, maternal and child care, safe water and sanitation and family planning will be conveyed.

The non-governmental organizations involved in health, rural development and socio-economic activities are another great resource in India. They are working with the people, and specially women, in dozens and dozens of successful programmes relating to water and sanitation, health and total development.

Women in India are thus being trained to fulfill their multiple roles as members of the family and of the community, and as agents for social change. There is still a long way to go. The process has, however, started. Our under-privileged women might be illiterate but they do not lack basic intelligence. With a truly caring service, they will realize their rights, their needs and responsibilities. Without their active and willing participation, nothing can be done. With it, nothing is impossible.

India has a gigantic task ahead of her. She needs help from all sources. - national and international. The slogan of the 1972 United Nations Conference on the Human Environment 'Only One Earth' was the beginning of a sense of shared stewardship for our common planetary home.

"To give the world clean drinking water and decent sanitation might cost \$80 million a day for the next ten years. This is trifling compared with the continuing haemorrhage of resources to instruments of death - on which we spend a shameful \$1.4 billion a day.

So far this insane scale of priorities remains acceptable to the rich - to the rich nations of the North and the rich minorities of the South. We must be thankful that the 1980s are opening with a practical focus on sanitation and hope that in easing the daily grind of hauling and carrying water, in saving life, in giving a sense of being cared for, it will help to produce a more stable, a more peaceful and ultimately a more humane planet." 11/

Notes

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I. Women's participation in the International
Drinking Water Supply and Sanitation Decade

United Nations*

Introduction

The Secretariat of the Inter-Agency Task force on Women and Water has prepared a strategy paper for enhancing women's participation in water supply and sanitation activities addressed to planners, decision makers and implementors of Decade programmes at the national and international levels. According to the paper, "the strategy envisages involving women at the policy making, management, and technical levels for the programming, monitoring and evaluation of existing or future Decade activities" without establishing separate and parallel programmes.

This paper examines the practical aspects of implementing this strategy with the goal of providing realistic recommendations for enhancing women's participation in the Decade programme.

The provision of water supply

The main activities involved in the provision of water supply are:

- (a) Drawing up of national Decade plans;
- (b) Field investigations and formulation of project plans;
- (c) Preparation of designs and corresponding cost estimates;
- (d) Fund raising;
- (e) Construction;
- (f) Operation and maintenance.

Not included in the above list are other activities carried out simultaneously, such as training and information activities.

It is assumed that by this time, a large number of countries have drawn up national Decade plans and are already in various stages of carrying out the activities listed above.

It may be useful to go briefly into the nature of each of the above items and describe what is involved in implementing them. It must be stressed that these activities refer only to the provision of drinking water supply.

Field investigations and formulation of project plans

This activity requires: the determination of the number of people to be served; an assessment of the per capita requirement per day and the total account to be supplied daily; an investigation of various alternative sources of water supply (both surface and ground water) as to quality and dependable quantity on the basis of hydrologic, hydrogeologic and laboratory analyses; formulation of alternative schemes; preparation of corresponding preliminary cost estimates for each scheme; and selection of the most economical scheme that would supply the necessary requirements.

* Secretariat of the Economic and Social Commission for Asia and the Pacific.

Preparation of designs and corresponding cost estimates

This activity involves the preparation of the final design plans of the scheme selected in the preceding activity. The difficulty of this activity would vary depending on the type of scheme selected and its complexity. If it is a rainwater collection scheme, then it is only a matter of drawing up a standardized design for a typical household which includes the collection, conveyance, provision for bypass, and storage tank, the capacity of which could vary depending on the size of the household.

If the source of supply is ground water, this requires the design of the diameter and depth of the well or wells (if more than one) depending on where the principal aquifer is located, its various components, the capacity of the pump, the pump foundation, and provision of drainage.

If the source of supply is surface water or a spring, the design could be more complex since the source might be located some distance from the community and might require the design of storage and conveyance structures.

Only after the final designs are completed is it possible to make a detailed estimate of the cost of the system.

Fund raising

It is assumed that fund raising could be carried out simultaneously with the final design of the scheme being prepared, based on preliminary cost estimates of the selected scheme. The possibility of reducing the total cash requirements should be explored. This activity involves discussion with budget officials in the local and/or national governments and convincing them to allocate the necessary funds for the construction of the scheme.

Construction

Once the funds are provided, the system can be constructed under the supervision of either the national or local government, depending on the source of funds. The construction could be awarded to a contractor or it could be carried out by the administration using government workers and, where possible, labour contributed by the community. Very simple schemes, as in rainwater collection systems, could be carried out easily by the household members themselves or through community participation. More complex schemes could benefit from community participation in the construction of the simple components.

For systems using ground water as the source of supply, construction involves drilling the well, installing of casings, installing the pumps, taking care to ensure that the well is vertical, constructing the pump foundation and drainage ditch.

Systems using a stream or a river involve more complex arrangements depending on the relative elevation of the source which governs the use of either a gravity system or a pumped system. A gravity system may also require a diversion dam, an intake and a conveyance canal or pipe to bring

the water to the community. Treatment facilities to make the water potable may be required. Storage facilities may also be required to take care of the fluctuation in both supply and demand. It may be noted that this type of system demands a high level of technical expertise.

Operation and maintenance

The work involved in operation and maintenance depends on the type of system. Obviously, only simple tasks are required for the individual household rainwater collection system. Even then, periodic cleaning of the storage facilities, a simple task is often neglected leading to pollution or contamination of the water supply.

For pumped wells, regular maintenance of the pump is most important. Cleaning of the drainage ditch to keep dirty water from backing up and contaminating the well water is also an important task. Keeping surrounding areas in the vicinity of the well clean and sanitary is necessary to prevent the well water from being contaminated.

The operation and maintenance of systems using surface water require more tasks than any of the others. It involves the operation and maintenance of the intake, treatment and storage facilities, not found in pumped well systems.

A suggested modification of the strategy

It will be noted from the brief description of the activities involved in the provision of water supply that most of them are highly technical and cannot be carried out even by men without a technical education or training.

The realization of the proposed strategy, as mentioned in the introduction, would therefore require the participation of women with the appropriate technical background in the provision of water supply. It is unrealistic to expect that non-technical women, or men for that matter, would have the required knowledge and experience to usefully contribute to policy making, management and technical activities in this area. And in fact, in most countries of the ESCAP region, there is nothing at present to prevent women with the appropriate education, training and experience to participate in such activities. In China, Burma, Indonesia, India, Malaysia, Philippines and Thailand, to cite a few countries, women engineers are actively participating in the provision of water supply systems.

It seems appropriate that the target of the strategy should focus on the majority of women, even those without any education, for it is the active participation of this large group, comprising the majority of users of domestic water supply, which could add a useful dimension to the Decade. With some training, this group represents a huge potential force for facilitating the completion of the various activities required for the provision of water supply systems.

If, however, as stated in the Task Force strategy document, a separate

and parallel programme is not to be established, such a training programme should be community oriented and should not be confined solely to women.

Elements of a training programme

The elements of the training programme could be drawn up from an analysis of the constituent activities of the provision of a water supply system. They comprise those tasks not requiring a technical background that can be learned by simple demonstration and example. Some of the possible elements of the training programme follow:

Field investigations

- Indications of the presence of ground water or springs to be reported to field investigators
- Read and record standard rain gauges
- Read and record staff stream gauges
- Mark flood levels and record dates
- Measure and record water levels in open dug wells.

Although all of these are simple tasks, if carried out they would provide valuable data to hydrologists for an analysis of the water situation.

Fund raising

- Organization of a negotiating group
- Negotiation methods and procedures
- Identification of target officials.

Training in this field could create potent and effective groups to deal with local officials to raise needed funds for projects.

Construction

- Digging canal ditches
- Mixing cement
- Looking for deposits of sand and gravel
- Construction of rainwater storage tanks using locally available materials
- Construction of shallow wells
- Construction of pump foundations.

Community participation in these activities would reduce the costs of the system.

Operation and maintenance

- Pump maintenance
- Replacement of simple pump parts
- Public health care

- Maintenance and repair of drainage system
- Water conservation practices.

Training in the above elements would prevent an early breakdown of the facilities, prevent pollution and health problems arising from incorrect use of the facilities and prevent the waste of water.

These are only examples of the possible elements of a training programme. No doubt, a more detailed analysis of the activities involved in the provision of water supply, as well as of sanitation facilities, would yield a comprehensive and practical training programme appropriate for women whose potential still remains to be tapped. It should be a realistic programme adapted to the level of education, or lack thereof, of the majority of women in the rural areas.

Of course, in the process of training this large group, it is to be expected that some highly intelligent, efficient and outstanding women, capable of being trained for more difficult tasks and higher responsibilities, will be identified. Such women could be given advanced training and form a core group which would eventually assume responsibilities at the policy making, management and technical levels as envisaged in the strategy paper.

J . Women and the International Drinking Water Supply
and Sanitation Decade: Sri Lanka

R. Harold Peter Fernando*

Introduction

Sri Lanka has a population of 14.85 million (1981 census) out of which 21.5 per cent are living in urban areas and 78.5 per cent in rural areas. The sex ratio is 104 males to 100 females. Over 35 per cent of this population are children under fifteen years of age.

Due to heavy concentration on social service programmes over the past three decades, the quality of life indicators show standards that are inconsistent with economic conditions. In the United Nations classification of countries as Most Seriously Affected by economic conditions and Least Developed Countries, Sri Lanka ranks among the leading 5 per cent in social indicators of infant mortality, percentage of children who die before five years of age, total fertility rate, life expectancy, and percentage of literate adults. Some relevant social indicators for Sri Lanka are:

(a) Infant mortality rate per 1000	31.1		
(b) Children who die before 5 years (per 1000)	3		
(c) Life expectancy - Male:	64.2	years	
Female:	67.03	years	
(d) Percentage of literate adults - (i.e. population 10 years and over able to read and write at least one language)			
Male:	90.5	%	
Female:	82.4	%	
(e) Maternal mortality rate per 1000	0.8		
(f) Crude death rate per 1000	6.1		
(g) Birth rate per 1000	6.1		
(h) Percentage of children attending school (1981):			
5 - 9 years	84.5	Male	84.2 Female
10 - 14 years	82.9		
15 - 19 years	41.1		42.7

Compared to these, some of the relevant economic indicators are:
GDP (at 1970 constant factor prices) - Rs. 21,775 m. (US\$87)
GDP per capita (do) - Rs. 1,429 (US\$57)

General overview of water supply and sanitation sector.

In regard to the drinking water supply and environmental sanitation sector, Sri Lanka ranks among the third worst in the percentage of total population with access to a safe source of drinking water. Thus, nearly 80

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per cent of the rural population of Sri Lanka obtains water from unprotected wells. A further 13 per cent obtains drinking water from tanks, rivers and other open unprotected sources. Only about 7 per cent of the rural population gets its water from piped systems or protected wells.

Consequently, there is a high incidence of disease resulting from poor environmental conditions. The government health care system, too, places greater emphasis on curative rather than on preventive medicine. The result of this imbalance is seen for instance in the fact that, while the mortality rate declined dramatically from 1952 to 1981 - from 10.4 to 6.1 per cent - the diarrhoeal morbidity rate remained practically constant during this period.

Regarding the coverage for water supply, while in the urban sector 65 per cent of the population has access to piped water, the comparative figure is about 18 per cent. In the rural sector, a vigorous programme for protected community wells has been started and already over 2 per cent of the rural population obtains safe drinking water from this source. In sanitation, about 23 per cent of the urban housing units have flush toilets. The comparative figure for the rural sector is 2 per cent. A further 57 per cent of the urban housing units have water seal, pit or other types of latrine, while 20 per cent of the housing units in urban areas have no toilets. In the rural sector 44 per cent of the housing units have pit or other latrines, while 12 per cent have other latrines, leaving 42 per cent of the housing units without latrines. These overall figures of water supply and sanitation should be treated with care and the levels of service and quality of water supply, too, have to be taken into consideration.

Government investment and programme in the sector.

Government investment in the water supply and sanitation sector has shown a marked increase in recent times. Up to 1976 the share of the capital budget that went for this sector was about 1 - 2 per cent, whereas now it is in the range of 5 - 6 per cent. This is even more significant in view of the fact that the size of the capital budget itself has increased several-fold in recent times. This growth is seen in the social overhead sector itself. While water supply and sanitation had only 21 per cent of the social overhead budget in 1976, this share has grown to 37 per cent by 1982. All this points to the fact that the water supply and sanitation sector has shown a significant growth in recent times, emphasizing the need for proper planning and involvement of the people concerned, particularly women, in a range of activities in this sector.

The programme for the sector plans to provide 100 per cent coverage in water supply for the urban areas by 1990. The target for the rural sector is 50 per cent. Sanitation is expected to achieve the 100 percent target by the end of the Decade, or within a few years thereafter, for both the urban and rural areas. Emphasis in the first few years of the Decade has been placed on supporting programmes. Coverage programmes have been limited largely to on-going construction projects, with the exception of the community well construction programme and the toilet construction programme in the rural areas. Thus, areas such as operation and maintenance, human resources development and community participation are receiving special emphasis now. The involvement of women in sector work through the promotion of community participation is a clearly visible feature in this sector programme.

How women are involved in sector work.

Before examining the topic, a radical change in the form of local government took place in Sri Lanka in 1981 which must be explained. Previously, there were about 750 village councils and town councils. These were replaced by 24 district development councils. A village level organization called the Gramodaya Mandalaya (G.M.) - the village re-awakening council - was also set up. There are now approximately 4500 of these councils. The chief function of the G.M. is to conduct resource surveys and plan the development work in its area of operation. The councils also undertake construction work with community participation. Various responsibilities concerning operation and maintenance are also given to the G.M.

There is no direct election to G.M., this being its most important characteristic. Instead, the presidents of all recognised voluntary organizations in its area of operations become members of the G.M. Thus, the G.M. consists of presidents of voluntary organizations, such as social service, religious, cultural, women's and sports organizations, along with various development organizations. This functional representation in the G.M. varies according to the number of voluntary organizations in its area. There are some councils with only five to six members, but many have over 15. Several voluntary organizations concerned with women are represented in the G.M. Some of these are: women's rural development societies, the Fellowship of Mothers, the young women's religious organizations, such as the Y.W.C.A., the Girl Guides Association, etc. There are many councils with a women president.

Through their representation in the G.M. women have the opportunity to get closely involved in the planning and implementation of sector work. This opportunity has been used well in several areas where women have been involved in the following sector activities:

(a) Conducting base-line surveys of sector. Youths, mostly women, have been voluntarily engaged through their organizations to conduct surveys related to water supply facilities and water usage habits, toilet facilities and their use, health conditions, etc.;

(b) Site selection for community wells. Women have been playing an increasing role in their voluntary organizations in the preliminary planning for community well programmes;

(c) Providing voluntary labour in construction of small water supply schemes and community wells. Women have been involved both in the provision of voluntary labour required for construction as well as in the arrangements to provide snacks and tea to voluntary workers;

(d) Serving as voluntary caretakers. Each protected community well has a caretaker who is normally a member of the voluntary organization handling the maintenance of the well, living close-by. These caretakers are given training in handpump and well maintenance, and have certain responsibilities for keeping records and general management of this water supply. Selection of women as caretakers has been encouraged, and a considerable number of women serve in this capacity;

(e) Serving as health volunteers. This is being tried out in a pilot basis. Educated village youths, both male and female, are selected by voluntary organizations to be trained as health volunteers. The training lasting for a few days is of a very practical nature. The subjects covered include general health and sanitation, water supply, nutrition and family health. A health volunteer is then assigned seven to eight households in the area he or she

lives in. Duties include promotion of good health habits and health education, keeping records of morbidity, assisting the government health worker covering the villages under the volunteer's care and providing liaison between the assigned households and the health clinic in the area.

The impact of activities in the water supply and sanitation sector on women, or women's impact on the sector, have still not been properly studied. However, the following observations are made:

(a) In water scarce rural areas of the country the construction of tube wells has had a significant impact on water supply and on time use of the water collectors, i.e. women. Since the maximum walking distance is limited to a quarter mile, there is considerable savings of time that otherwise would have had to be spent in walking several miles to an uncertain supply. The social and economic benefits of this time savings have still to be analysed, particularly the effect on the drudgery conditions of a woman's work.

(b) Restriction on water delivery times in urban areas with piped water and with standpost supply for the poorest sections of the community, causes much hardship for women who have to queue up at the time water is delivered. This often means making radical adjustments in management of affairs at home, with bathing and washing needed to be done at very inconvenient times. Here again, the social and economic impacts have not been studied.

(c) Consultation with voluntary organizations, particularly women's organizations, prior to commencement of any sector programme has yielded encouraging results in proper siting, participatory construction, and handling of maintenance responsibilities. Many interesting questions however, still remain to be answered. For example, are women happy with the level of service in the new supply, or would they prefer an abundance of supply even if at a greater distance, or of a poorer quality? What is their response to the technology used? Has the opportunity provided women for consultation in this sector served as a catalyst to obtain other improvements through women's participation and leadership?

(d) Involvement of women as well as caretakers has yielded desired results - most important ones in some cases. Women have not been second to men in assembling a fully dismantled hand pump. They have kept well surroundings clean and brought control to use during dry periods. Women appear to be better for this work than men because they are at home or close by the well to care for and protect it. Their qualities of leadership and the extent of their dependence on men for performance of certain activities deserve study.

(e) Involvement of women in the collection of base line data and other regular information concerning the sector, is yielding very attractive results, and further training in this area appears to be fully worthwhile.

(f) Involvement of women as health volunteers appears to hold out the best prospects. Women have been able to create awareness about health needs, provide information on health and sanitation, handle family health matters with care, mobilize women's participation in various sector activities and integrate sector activities with primary health care. Normally such involvement build up women's leadership, so that a well-planned scheme for training women health volunteers appears likely to yield the most desired results.

When examining the subject of involvement of women in sector activities, it is essential to consider the cultural background affecting their values and attitudes towards sector work. There is a belief system attached to water, for instance. There are beliefs associated with traditional community functions supported by the culture, such as a ritual to invoke the blessings

of the gods for rain. There are also beliefs supported by the process of socialization and by norms without any direct relation to traditional community functions, such as those which compel people to observe rules set by the elders. Well water, for instance, is not allowed to be polluted by normal usage, or women are not to go unaccompanied to a well at noon. Still other beliefs are adopted by particular behaviour patterns which become entrenched over a period of time. Belief that running water is ideal for drinking because it is purified as it runs, or that available water must be good irrespective of its quality, falls into this category. Similarly, there are culturally determined roles related to the family in general and the position of women in particular. Thus, for instance, the women prepares the meals, feeds the children, serves the husband, and is the last to eat. Again, the women consult the head of the house in most matters and his decision is respected. Yet, the women manages the financial affairs of the family, generally left in her charge. Any move to involve women to a larger extent in sector work will have to consider and analyze this cultural background.

To conclude, the following example from Sri Lanka may serve to highlight the successful promotion of the participation of women in sector activities in particular, and women's involvement in development work in general:

(a) A separate Bureau for Women's Affairs was set up in the Ministry of Plan Implementation within the last five years. This Bureau has now been absorbed as part of the new Ministry of Teaching Hospitals and Women's Affairs. The Ministry was involved in the setting up of income-generating projects for women, and in social welfare programmes affecting women. It is also associated with co-ordination of women's work in programmes of other Ministries. It is currently in the process of organizing the women who work in the public sector as well as the wives of officials in the public sector into voluntary organizations to handle certain aspects of development work. The Minister in charge and the Director of the Bureau are both women.

(b) The setting up of Gramodaya Mandalayas for local government, on the basis of voluntary organizations, has proven to be a very promising step for greater involvement of women in sector work.

(c) The well caretaker system and the health volunteer scheme have also significantly advanced the involvement of women in sector work.

K. Women and the International Drinking Water Supply and Sanitation Decade: A donor country perspective

Jonathan C. Fletcher*

Introduction

This paper draws primarily on my experience with water supply projects that have formed part of New Zealand's bilateral assistance programmes. It focuses on projects developed over the last years and attempts to assess the extent of and success of efforts to take into account the views of women and other primary users of the schemes. Because of the very limited number of projects from which I was able to draw material, the paper is somewhat anecdotal in nature. However, if nothing else, I hope it sheds some light on the level of consciousness in one donor country to the issues to be addressed in this seminar.

An early project

Some nine years ago, soon after I left the university, I worked for a consultant who had two briefs: one, to prepare a feasibility study on some city water supplies, and another on waste disposal for some smaller towns in Papua New Guinea. In both cases, sociological perspective was very limited.

For the water supply problem, we had some concern about the level of service provided - who would get internal household taps, who individual household standpipes, and who communal standpipes. However, our concern with these questions was with the effect the choice of service level would have on water demand, the ramifications for waste water disposal, and on how to recoup the costs of water supplied from communal facilities.

Regarding the waste disposal study we asked about local practice concerning type of squat plate or seat required and did some investigation into whether communal facilities were acceptable, and if so, was it necessary to provide separate male/female facilities.

Although I was not involved directly with the field investigations, I understand that answers to the questions on type of facilities provided were obtained by asking local officials.

By the time we had finished, we had faithfully carried out our brief and outlined strategies which would determine the future shape of water and sanitation facilities for the cities and towns involved. As engineers, our concern was primarily for technical and costs problems involved, and our brief required us to focus on these. There is no denying that these problems were great - providing facilities for rapidly expanding urban areas is difficult. We spent hours discussing and considering options designed to reduce the costs

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The permission of the Commissioner of Works to prepare this paper is acknowledged. The views expressed in it are however mine and are not necessarily shared by either the Ministry of Works and Development or the New Zealand Government.

and optimize the water reticulation layout. Similarly, we considered in detail what areas had to be served by a reticulated sewerage system, what could be serviced by water borne on-site systems, where should pit privies be provided, and where would a sanitary pan service have to continue.

I think our unstated philosophy (and probably that of the officials who commissioned and briefed us) was that anything we could provide would be better than what was there. We also carried with us a series of assumptions about a hierarchy of service. We assumed that ideally every household should have running water in the house and a flush toilet. Where that was not practical, private household facilities were to be preferred to communal ones and water-borne waste systems preferable to non-water-borne systems. The hierarchy may or may not have been valid, but we made no attempt to check it.

The Indonesia studies

In searching through information for this paper, I came across two reports prepared by ENEX (an off-shoot of the association of consulting engineers of New Zealand, established to co-ordinate overseas consulting work) for the New Zealand bilateral assistance programme. Both were prepared in 1979 and both dealt with proposed water supplies for Indonesian towns. One was a feasibility study, and the other a preliminary project assessment. Both showed an awareness of the socio-economic aspects of water supply, and the feasibility study included a section on "socio-economic aspects" and another on "other social aspects". Both reports also showed an awareness (if a somewhat rudimentary one) of the politics and power relationships involved in provision of water supplies. One of the reports noted the tendency "to provide taps near to the most influential people, so that they then pay (to the water vendor) the lower price for water because of the shortest distance. The poorer people then pay the highest price because of the relatively greater distance to be covered by the vendor. In fact, it is suggested that water may become so expensive for poorer people that they use polluted wells or river water as the only viable source of supply". The reports also noted that people forced to buy water from vendors pay many times the cost per cubic metre than those on reticulated supplies pay (the example quoted shows that water supplied at US\$0.12 c/cu.m. could cost up to US\$2.15 c/cu.m. from the vendor).

Ironically, the photographs in the reports provide the best commentary on the role of women in water supply systems. The people shown engaged in the commercial activity of selling water (i.e., the vendors, the designers and operators of the system and the study team) are all men. While the people shown buying, carrying, drawing or using water are all women.

A 1980 feasibility study review of a bilateral aid water supply project prepared by a New Zealand consultant for another Indonesian city covers the social and economic structure of the city under review in some detail and includes the results from a specifically commissioned "socio-economic survey". A considerable amount of time, money and effort was put into this survey which included interviews with 340 household heads (predominantly male?) and 48 business proprietors using questionnaire forms filled in by the interviewers. In addition, group interviews were held involving most of the local community leaders (again all male). The survey was designed by a woman from the University of Sydney, Australia, who had had previous experience with similar

research in the country involved. The interviews were carried out by a team of seven men and two women who were young high school graduates with probationary positions in the local civil administration. An approximate 5 per cent random sample of the households in the study area was visited. The survey aimed to collect data for both descriptive and analytical purposes. However, it was considered of "special importance for analysis to have data relating to income and expenditure so that realistic tariffs could be set, and to have data relating to dwelling type and location so that a distribution network could be planned". The main emphasis of the survey was therefore on household income and expenditure, with some importance attached to ascertaining the household's priority for a piped water supply.

The results of the survey and the group interviews with local community leaders was stratified according to three income groups - high, medium and low. Medium income household heads and community leaders placed more emphasis on electricity reticulation than water reticulation, and although most indicated that they would be willing to pay for a reliable water supply connection, the acceptable water rate was only 80 per cent of the acceptable electricity tariff (electricity for lighting only) and 60 per cent of the cooking fuel cost.

The question arises as to whether this stated household priority would be the priority of the women of the household on whom the burden of fetching the water (usually either from a private or shared shallow well) and boiling the drinking water (95 per cent of households indicated that drinking water was boiled) fell.

Overall the middle income group saw electricity and clean water as development priorities and regarded schools and health clinics as important. They looked forward to steady progress on all four fronts.

The low income group in the group interviews simply said they could not afford the connection fees unless they were spread over ten years, and even then they doubted it would be worthwhile as the water could only be used for drinking. Public standpipes were seen as a good way around the problem of costs although difficulties were anticipated over rights to water and illegal connections. This group placed a higher priority on schools and health clinics than water supply, apparently because the total costs of these was seen as being borne by the government whereas water supply involved private costs.

Rarotonga

New Zealand has also been involved with the World Health Organization (WHO) and others in the development of a water supply for Rarotonga (population about 10,000), the main island of the Cooks group. The history of this supply goes back some fifty years, but the existing supply system has been extensively re-developed since 1973. The supply is comprehensive, serving over 99 per cent of the 1760 dwellings on the island and drawing water from five small surface catchments. During the dry season, the design demand requires over 90 per cent of the available yield.

Water is supplied to households unmetered and uncharged for, with the costs of operating the system being met from the government budget. The results show the other side of the vexed question of how to pay for water

supplies. Whereas in the situations discussed above the need to charge for water meant that if the poor bought water from the system they had to pay several times the price paid by the more affluent (in order to cover the costs of the commissionaire or vendor). Further, any charge for water put it out of the reach of the very poor who were forced to continue to use their often contaminated and inconvenient traditional sources. In this case the failure to charge for water leaves the supply authority entirely dependent on the civic and government budgets for revenue. This leads to:

(a) A grossly underfunded supply authority which does not have the money for either the staff it requires or the maintenance supplies it needs;

(b) A lack of any incentive for the civil or government authorities to fund further extensions of the system because every new connection represents not only a capital expense but also an ongoing drain on the budget for operational costs;

(c) A highly politicized supply. Since the supply of water is a free benefit, the powerful fight hard to get the supply for themselves, and the powerless are left without.

In my view, this dilemma over tariffs is extremely serious and particularly relevant to the deliberations of this seminar. Assuming women place a higher priority on having a piped, convenient water supply available than do men, we face a real problem. Experience suggests that if the water is supplied free to consumers, supply systems will be developed slowly with the rich and the powerful being supplied first (if the rich pay and the poor do not, the trend to supply the rich will be accentuated), and also, once installed, the supply will be badly operated and maintained. On the other hand, if tariffs are charged the importance that women attach to water supply will not be adequately expressed. Women's lesser influence in household decision making and lesser economic power means the importance that they attach to water supply will not be fully reflected in the service provided.

Western Samoa

Another major study commissioned by the New Zealand Ministry of Foreign Affairs is on the water supply and sewerage for Apia, capital of Western Samoa. In this 1980/81 report, one of the early chapters is entitled "Socio-Cultural Aspects of the Water Supply and Sewerage Projects" and looks in some detail at the social structure of the town. There are several reasons for this close interest, including:

(a) The social structure of the country is traditionally tight and well organized with the village and the extended family still forming the basic political units. These units have survived the urbanization process and in fact have been recreated in the urban situation where necessary;

(b) Cash incomes even in the urban areas are low, so to pay for water and sanitation services will involve a significant percentage of cash income. If the scheme does not have local support, and the water is charged for, people will simply not connect. If the water is supplied free, and the scheme not supported, political pressure will reduce the operating budget;

(c) The social structure of Samoa is well documented and is well known and appreciated in New Zealand.

The other interesting point about the country is that it has well

organized, well established and multifunctional women's associations with a history that extends back to the 1830's. Every village has its own women's committees and these function as women support groups performing a wide range of functions from organizing monthly meetings with the district public health nurse, to fund raising and village project organization (e.g. food production and crafts manufacture).

Despite the existence (since the late 1950's) of a National Council of Women which provides training and advisory support for the women's associations, the study report notes "it is evident that little attempt has been made to integrate them into the development projects and ongoing activities. Women's activities have been seen as domestic and auxiliary to men and to the development process itself". This comment is significant for two reasons. On the negative side, it shows just how hard women have to struggle to get their perspective recognized. Here is a long established, widespread and well organized group which still has not gained influence and power in the policy making process. On the positive side, there is an engineering report that acknowledges the importance and value of women's groups in achieving the improved public health aims of the IDWSSD.

Groups such as the Samoan Women's Association may be an important key to getting women's perspectives on water supply and sanitation better recognized. It is probably impractical to expect any form of brief survey associated with the development of a specific project to adequately collect women's opinions. Social organization and the male dominance of community representation will, in most cases, serve to mute women's voices. However, research done by and the expressed opinions of such groups as the Samoan National Council of Women may in fact give enough generalized information on women's attitudes and priorities to enable designers to adequately gauge and take cognizance of women's perspectives.

Solomon Islands

In 1980, the New Zealand army engineers were involved in a training exercise that saw them install some twenty small village water supplies in the Solomon Islands. Typically these supply systems consisted of either a weir across a small stream above the village from where a pipe carried water to one or sets of village standpipes, or of a purpose built roof catchment and storage tanks. The villages chosen to receive supplies had all been selected in consultation with the government and provincial authorities.

About a year after the supply systems were installed, I was part of the inspection team which visited all the sites to check on how they were operating. Apart from the number of technical points, the most notable of which was that the taps installed on the standpipes were of poor quality and had, almost without exception broken, there were several other matters which stood out:

(a) The success of the projects was very much a hit and miss affair. In some cases the supply had been installed in the right place at the right time. The facility was clearly valued and appreciated and had been carefully looked after (the intake cleaned, the taps repaired, and drains to discharge spilt water constructed and maintained). This was the situation in a minority of cases;

(b) More commonly, the system had been left unmaintained. Two examples: one of the weirs had filled with rocks during heavy rain and nothing had been

done to remove them. In another case low flows had caused the hydraulic ram to stop and neither of the men who had been shown how to restart it had done so. In both cases the failure of the system meant a long walk for the women who hauled the water (well over a kilometre each way in one case). In both cases also, repair involved "men's work", although the beneficiaries of the work were the village women;

(c) In the last two cases the installed supply was ignored in favour of the traditional water source. In one case this was because the use of the standpipe area for food preparation and washing had turned the surroundings into an unpleasant smelly bog and in the other apparently because use of the standpipes had reduced the social contact that was so much a part of water using activities. In one village, the village guide commented that the villagers had asked the army to put in fewer standpipes than originally proposed because they did not want the village split into many small groups;

(d) In one case where there was a roof catchment and limited water available, a village man had padlocked the tap and used his control of the key to restrict water use. He told us he had done so to stop children playing with the water and wasting it, but other men in the village resentfully suggested other motives.

The study team of which I was a member was all male, as was the army construction team and the original scheme investigation team. During my four week trip, apart from a New Zealand trained nurse, I do not recall speaking to a woman in any of the villages, and I have no reason to believe that the earlier teams had either. Quite simply, we got a male perspective on the whole project, despite the primary beneficiaries of the scheme being female.

North East Thailand

Between 1978 and 1983 New Zealand was involved with a small scale project, working out of the department of water resources of Khon Kaen University in North East Thailand. The aim of the project was to begin to provide water to 80 per cent of the rural population of the area who do not have access to large reservoirs or reliable rivers and who can only be supplied by small scale development projects such as ponds, weirs and wells. The scale of the project was very small, with the total expenditure by the New Zealand and Thai governments over the five year period amounting to about US\$400,000. The project concentrated on the building of weirs and rain water storage tanks and aimed primarily at providing irrigation water for the rice crop as surveys had shown that this was the farmer's highest priority for water use.

The scheme involved up to two New Zealand engineers, a Thai technician who helped with construction supervision, and the help of academic staff from the department of water resources. A typical construction project would involve the building of an 8 metre wide weir, with the materials supplied by the project and the farmers doing the construction under supervision. Typical costs for materials for the weir would be US\$3,000.

Initiative for a particular construction project usually came from a direct approach from farmers, and it was soon found that the completion of a successful (from the villagers' point of view) project rapidly generated up to six further requests for assistance from the same tambon (group of villages).

Though a project was usually instigated by the villagers themselves, much of the preliminary planning had been done before help was requested. Even so, the team took care to organize a series of site meetings designed to explain to the villagers the expected benefits and the free labour concept, and to finalize construction organization details and give the project team a chance to assess the amount of interest in the project.

Maximum use was made of the village chang (village expert) and of villagers trained by the project to supervise construction. To help with this, extensive use was made of construction manuals and models, and designs and dimensions were kept as simple as possible. Overall, the project involved the building of some forty-five weirs of which only two have suffered significant damage, and these were both easily repaired.

The project did have its difficulties, most of which stemmed from the project staff's failure to appreciate the nuances of north east Thailand village organization. However, the project was completely free of the water management problems and disputes that have plagued large irrigation schemes in the area. Overall, the project is considered to have been very successful, cost effective and with a good level of skill transfer from the project staff to the villagers. As an example of a project designed to make maximum use of village level skills and organization, and to meet village needs as villagers perceived them, it has much to commend it. One serious problem is that the project was very small scale and its benefits somewhat piecemeal.

Project staff themselves noted that there are probably about 1000 other sites in Khon Kaen province where a weir could usefully be built; and at the project's rate of progress, it would take 100 years to build them all. Scaling-up the project is necessary to get the required work done. However, scaling-up faces two major difficulties. Firstly, it may be difficult to proceed faster without losing the essential character of the project that made it successful. Secondly, the Thai Government (which would have to be directly involved in a larger project) does not have an agency to organize, fund and provide technical assistance to such small projects.

Some general concerns

One matter of concern to me, because it affects costs, has a bearing on the aims of this seminar, is the question of design standards. Particularly when dealing with urban areas, western consulting engineers and western trained engineers design to standards that have been developed for use in affluent western urban areas. The logic is impeccable and follows this reasoning: this developing urban area is expecting a steady increase in living standards, and residents served by a reticulated water supply expect an unrestricted supply of water treated to best WHO recommendations. In addition, the supply must be capable of meeting firefighting demand. Where a scheme involves aid donors, a further pressure is that the donors like to be associated with "the best". The reality is unfortunately somewhat different. In particular:

(a) The cost of treatment and reticulation to this high standard means that only the lucky few ever get a supply at all;

(b) Even in those areas where reticulation is available only the better off are able to connect because only they can afford the water charges;

(c) The requirement for firefighting capability increases the size and cost of the minor reticulation significantly;

(d) Often money shortages, problems with chemical supply or a lack of skilled staff mean that the relatively sophisticated and expensive treatment plant is not operated as it should be. So the quality of the water supplied is variable and often not up to design standard. A water supply of variable quality is more dangerous and worse than a supply that is of a consistent, if lower standard. If a community knows that a water supply is of a lower quality, it can take precautions (e.g., boiling the water before giving it to young children to drink), but if the community is unaware of the deterioration in quality it has no opportunity to take precautionary measures.

I am not suggesting that water should be supplied that is downright dangerous, but I would much rather see eight people supplied with 60 litres per day of water of a quality that needs precautionary boiling before drinking cold, than have one person supplied with 250 litres of best quality water and firefighting supply, and the other seven miss out completely. This dilemma is facing both the Indonesian and Samoan situations discussed above. Despite the Repelita III implication that basic water supply capacity should be for 60 litres per day, actual design figures used in Indonesia tend to be much higher, often over 200 litre capacity per day. In Samoa, the cost of keeping the existing Apia water supply adequately maintained is imposing severe burdens on the government and threatening the viability of much needed proposals to expand and improve the supply.

There are technical difficulties with trying to restrict demand, and there are no easy answers to these. However, experience suggests that per capita consumption only starts climbing dramatically when water is available from internal household taps. If water has to be carried before use, consumption remains relatively low. One option therefore is to require all householders who are installing household taps to also install header tanks large enough to hold a day's supply (for a household of 6-8, say 500 litres). Supply to the house could then be through a restrictor valve to this tank. The restrictor valve would be designed to deliver the 500 litre flow over a 24 hour period (0.35 l/min). This arrangement works well in that it not only restricts consumption but means that both treatment and reticulation facilities need be designed only to meet average rather than peak demand. An additional benefit is that meters and meter readers are not required; householders can easily and fairly be billed on the capacity of their restrictor valve and storage tank. Similarly, use of restrictor valves on lines feeding local reservoirs can make for very economic sizing of pipelines supplying outlying communities. Restrictor valves have been used successfully on rural water supplies in New Zealand.

For rural areas, even more than for urban, it is vital to accept that simple low cost improvements often yield the best results. One example: many Papua New Guinea highland villages have traditionally been built on ridges for strategic reasons. One effect of this is that the village women have to walk long distances to bring water to the village in bamboo tubes. A simple weir across the upper reaches of the stream and a small diameter pipeline bringing a water supply to the outskirts of the village saves the village women much time and effort.

Another area of concern is the relative importance given to designing and constructing facilities as distinct from training and education. It appears that countries, aid agencies and others are much more willing to spend money on engineering projects than on training and education, yet I suspect that dollar for dollar the latter yields the better return. While I have no direct experience of primary health care and nutrition education, I am aware that some of our more successful bilateral assistance programmes were training programmes. In one of these we helped set up a water and waste water treatment operators' training school in Papua New Guinea, and this is now entirely staffed by Papua New Guineans and is training operators from all over the country. The availability of properly trained staff has greatly improved the reliability and operation effectiveness of installed plants.

The Khon Kaen University project discussed earlier had a very important spin-off in skills that the project transferred to villagers and village technicians. This training, informally given on-site, concentrating on practical demonstrations with assistance from carefully prepared construction manuals, aimed to leave the villagers with sufficient skill to repair their weirs and tanks. The villagers were clearly well motivated, and they learned fast. It seems to me to be very unfortunate that we are reluctant to learn from this sort of experience and put more effort into involving women in the implementation and operation of water supply and sanitation projects. In most societies labour is so divided that women benefit most from improved water and sanitation services, and it therefore makes sense to involve women more in such projects. One corollary of this is that the technical experts and "outsiders" involved in the design and implementation of projects would have to be women, or at least include a significant proportion of women. Given the social conditioning that occurs in most societies, if we are expecting women to be involved at the local level, it is essential that women are seen to be prominent throughout the decision making and training structure.

Conclusions

Overall, I think it is reasonable to conclude that concern for tailoring water supply projects to the needs of the user has filtered down to engineers, designers and planners. However, I think it must also be said that the major pressure for this has been a concern with tariffs and generating a return on investment. Not all decision makers realize that there are different male and female perspectives on water supply and sanitation needs. We have taken the household as the basic economic unit for design purposes and tended to regard the male head or his community representative as speaking for it. That the less economically or political powerful women household members might have different priorities is not appreciated.

We are still working on the assumption that because over three quarters of all diseases are caused by dirty and inadequate water supply, simply providing water and sanitation facilities will solve the problem. However, as long ago as 1966 a WHO report "Diarrhoeal Disease Studies in Seven Developing Countries" concluded that "where a piped water supply was available, diarrhoea rates were reduced but still remained at a high level. The real reduction was very little and of limited practical importance". To make progress, we must not only tackle the water and sanitation problems but also the underlying problems of poverty and powerlessness.

The educated males who hold the purse strings, make the decisions and dominate the engineering and construction industries, have moved some way towards an appreciation of the fact that their engineering decisions have socio-economic ramifications. However, provision of water supply and sanitation services is still seen as primarily an engineering task with other considerations coming a poor second. The need to consult women as the prime users of the services is generally not appreciated.

There is an acute shortage of women in decision making positions or with advanced technical training. While it would be a mistake to see more women in influential positions as a cure-all (women are just as likely to get out of touch with their poorer fellow citizens as men), it is important that more women climb through the ranks to positions of influence. In trying to assess and gather women users' opinions to help in system design, it is essential that women be used to do the field work, as only women can collect women's opinions. However, it is not adequate simply to slot in a few women to do the social survey. That sort of tokenism will deliver only token improvements.

To gather women's opinions by surveys linked to a particular project may, in many cases, be next to impossible, and it may be more productive to encourage existing women's and research organizations to research and articulate women's views on a wide range of development issues including water and sanitation requirements. This data could then be used to assess how a project can best be designed to meet women's needs.

I. The role of women in water supply and sanitation:
Indonesia

Titi Sumbung*

Introduction

The objective of national development is equal justice and enhanced wellbeing for all. Drinking water is an essential and adequate sanitation, a desirable requirement for human life, and the provision of both should be a prime component of any development programme.

Since 1974, the Government of Indonesia has provided funds to construct drinking water and sanitation facilities in rural areas. As a result, 25 per cent of villages have access to drinking water, and 25 per cent have family latrines. In 1980, 50 per cent of the urban population had drinking water facilities.

The International Drinking Water Supply and Sanitation Decade (1981-1990) is a milestone in accelerating the provision of drinking water supply and sanitation nation-wide, equitably spread through all regions. A National Programme for the Decade has been set up, and policy, strategy and target have been formulated in workshops involving various sectoral agencies. The Decade programme is part of the Third National Five Year Development Plan (REPELITA III), 1979-1984, and of the first year of REPELITA V.

Implementation of the drinking water programme in the urban areas is the responsibility of the Directorate General of Housing, Building, Planning and Urban Development. The programme for the rural areas is assigned to the Ministry of Health (MOH). Generally, MOH handles only simple drinking water systems, whereas drinking water systems requiring higher technical skills are handled by the Ministry of Public Works in conjunction with the technical office of the local public works.

Based on policies and strategies formulated by Workshop I, held in August 1981, Workshop II set up a programme for the provision of drinking water supply and sanitation facilities for the remaining period of the Decade, i.e. 1983 through 1990.

Urban drinking water supply and sanitation

The present capacity of drinking water systems in the urban areas throughout Indonesia is estimated at 33,000 litres per second, compared to 9,000 litres per second in 1969, the beginning of PELITA I (First Five-Year Development Plan).

Drinking water services from facilities constructed by the Government (GOI) are estimated to have reached 35 per cent of the urban population in 1982. In addition, since 1969, several facilities were constructed to bring drinking water to airports and industrial parks. Local authorities also constructed facilities with regional budgets. Taking this into account, 50 per cent of the urban population can be said to have access to drinking water. It is anticipated that at the end of REPELITA III, coverage of the

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urban population will rise to about 60 per cent.

With REPELITA III, after the Government adopted the basic needs approach, it has been possible to serve more people from all socio-economic groups. Under the basic needs approach, low-income people are not required to pay towards development costs. The development costs of drinking water systems are subsidized by the Government.

Grants under this policy pay for installation of public standposts and an increased number of house connections, so that more people will have access to drinking water. There is a charge for house connections and low-income groups are reluctant to take advantage of this service because of costs.

Sanitation presents a different picture. Statistical records are lacking but estimates indicate that sanitation services are far behind compared to the availability of drinking water supply facilities. Only about 30 per cent of the urban population currently have sanitation facilities.

The target for provision of drinking water supply for the urban population by the end of the Decade is 75 per cent. Emphasis will be on the low-income groups. Construction of sanitation facilities is anticipated to cover 60 per cent of the urban population by 1990.

Rural water supply and development

Since nearly 80 per cent of the Indonesian population lives in rural areas, this paper will focus on the provision of drinking water supply and sanitation in rural areas.

Many health problems prevail in rural communities, due to adverse environmental health conditions or noncompliance with basic health requirements.

Poverty and lack of awareness, ignorance, carelessness, indifference and habit are the factors that influence poor health and disease.

At the end of REPELITA II (1978), only 18 per cent of the rural population had reasonable access to drinking water. By the year 1982, this figure rose to 25 per cent. At the end of REPELITA III (1984), it is anticipated that about 30 per cent of the rural population will have access to clean water.

At the end of REPELITA II, only 20 per cent of the rural population used toilets. By the year 1982, rural inhabitants utilizing sanitary toilets were estimated to be no more than 25 per cent. The remaining 75 per cent dispose of their wastes in rivers, ponds, gardens, fields, and wherever. By 1984, the population having sanitary facilities is expected to rise to around 30 per cent.

Types of drinking water facilities in rural communities, based on 1982 data, are as follows:

	<u>Percentage</u>
Dug well	1.1
Shallow hand pump tube well	72.5
Deep hand pump tube well	5.2
Water spring protection	3.7
Rain water collection	1.5
Artesian well	0.7
Piped water supply	15.3

Drinking water supply, excreta and waste disposal in rural areas are essentially the responsibility of each household.

From the point of view of management and operation, as well as priority, efforts by the Government to improve basic sanitation are insufficient compared to the magnitude of the problem.

The target during the Decade, 1981-1990, is for 60 per cent of the rural population to have reasonable access to drinking water services and for 40 per cent of the rural population to have sanitation facilities.

Indonesia has many directly financed, co-financed and non-governmental (NGO) water supply projects throughout the country. Water supply activities of one type or another can be found in almost all of the government ministries. Bilateral and multilateral funds are also used in the implementation of these projects.

GOI is co-operating with many governments, United Nations agencies and non-governmental organizations in the provision of water supply and sanitation: WHO, UNICEF, UNDP, World Bank, Asian Development Bank, West Germany, Holland, Japan, CARE and many others. Most of the foreign aid is in the form of construction, technical assistance and manpower training.

Community participation

The most common problem associated with water projects in rural areas, is the lack of community awareness concerning the importance of maintaining the water supply facilities. The human resource potential of the community has not been fully realized in the implementation of development activities and management of water projects in particular.

An attempt has been made to increase the participation of the community in implementing Government and NGO water projects. In some cases, GOI and other agencies have involved the community from the planning stage. In CARE projects, field officers discussed the planning of a project with the village chief, his staff and other traditional leaders. They also discussed the project plan with other members of the community. Quite often these community discussions are held at the traditional meeting times.

In other cases, there is reluctance in the village to have a water project using its springs for other communities, especially if a water distribution system is planned to extend some distance. Obtaining voluntary labour is another difficulty, especially when the male villagers are working in the rice fields.

In most areas, however, community leaders are supportive of water facility projects, but poor operation and maintenance often result in malfunction or failure of the facilities.

World Bank research in 1976 indicated that understanding of socio-cultural factors and the participation of communities are of major importance for a successful water system. Human values must not be neglected in the construction of drinking water supply and sanitation facilities; people must remain the object and subject of the improvement effort itself.

Women's involvement in water supply and sanitation programmes

Women are the primary users and the link between water source and the household demand for survival. Women and children expend great amounts of time and energy carrying heavy loads of water over long distances. This traditional role is a fact that is taken for granted in most communities. In community needs assessment, water for home consumption is rarely given priority as an urgent community need. The women themselves have never been consulted or involved in improving existing supplies.

Since women bear most of the burden in collecting water, they will also benefit most directly from the improvement of both water supply and sanitation. This points to the very strong need to more actively integrate women in the planning and implementation of all water-related projects. Their participation is one of the keys to the success of the Water Supply and Sanitation Decade. Many objectives could be reached at the same time by involving women in the provision of water supply and sanitation.

Health aspect

WHO estimates that 80 per cent of all diseases in the world are associated with poor personal and household hygiene and inadequate water supply and sanitation. Diarrhoea diseases are responsible for the high infant and young child death rate. A fatal combination of diarrhoea and malnutrition contributes to the death of many more. Skin and eye diseases - known as "water washed" diseases - cause discomfort for countless children and can lead to disability. Parasitic worms cause infections. All these health problems are brought on by a shortage of clean water and lack of proper sanitation. Women will use a limited water supply for drinking and cooking only, with nothing left for washing and personal hygiene.

Women have traditionally been important health care providers. It is the mother who is the first health agent in the family; she prepares the food, she provides nursing and home remedies when a family member gets sick. At the same time, the mother is the "change agent" because she can motivate change of attitude, behaviour, acceptance of new ideas and concepts of living. She plays a central role in the socialization of the child and in teaching good sanitary practices.

The provision of clean water for drinking and general household use should emphasize accessibility to a large enough quantity of water as a precondition for healthy living. Attention should also be given to protect the quality of water, i.e. water safe for drinking.

The most significant good of the provision of a sufficient quantity of

clean water is that women will also be released from the danger of water - related diseases.

Furthermore, a successful water supply and sanitation programme, as one of the components of Primary Health Care, which has emerged as the Global Strategy for meeting health needs in developing countries, means an important contribution to the achievement of "health for all by the year 2000".

Socio-economic aspects

Water supply and sanitation improvements are closely linked to reducing the workload of women. When a source of water is close to home, time and energy are saved, and the drudgery of women and children lessened.

Development is a process of change geared towards a better quality of life for the entire community. The success of development depends on the dynamics and ability of the people to respond with common sense to existing problems and challenges in the community.

Women in Indonesia constitute 50.3 per cent of the total population (about 160 million), but development efforts have not fully included women, nor equitably distributed the benefits of development activities; women lack power as individuals and interest groups in the decision making process.

Much of the economic activities of women both in rural and urban areas are not adequately understood by planners (either overlooked or taken for granted), because their knowledge about women is scanty, and they are not aware of the changing image and role of women.

The strategy to integrate women in development hinges in including women in the formulation and implementation of development activities, so that they become both agents and beneficiaries of development and their needs can be met and taken into consideration in development planning at all levels.

A study on Rural Household Economics and the Role of Women conducted in two villages in Java indicated a strong norm for a wife to participate in income earning activities alongside her husband.^{1/} Another study by Gillian Hart, showed that poorer families were dependent on women's earnings for survival, while better off families depend on women's work for well-being and social mobility.^{2/} Women in the top income group in the village spent a quarter as much time as their men earning family income; while women in the lowest income group worked about the same hours as men and contributed equally to family income. In all families, women did most of what was defined as "housework". Adding up all the "work": household and income earning of men and women, the average number of "working" hours per day for adult women was higher than for men. Women worked 7 to 10 hours a day, while men spent 6 to 9 hours working daily.

With access to safe water supply and adequate sanitation, women can be released from their burden and devote their time and energy to development or income generating activities. The benefit derived from these activities will motivate them to take care of and maintain the water supply and sanitation facilities.

The policy

To expand affirmative measures for effective involvement of women in the planning, implementation, maintenance and utilization of water supply and sanitation systems, the multiple functional role of women must be taken into account in the National Water Supply and Sanitation Decade Programme.

Opping (1981) has designed a framework for representing the roles of women in water supply and sanitation. Mary Elmendorf summarizes the system into four categories as follows:

- . Women as acceptors of new technologies; considerations for project planning.
- . Women as users of improved facilities; factors in project implementation.
- . Women as managers of water supply and sanitation programmes; including them in training.
- . Women as agents of behavioural change in the use of facilities; implication for project evaluation.^{3/}

The above classification can be further adjusted to socio-cultural conditions and practices, leading to more successful attempts to introduce change.

The strategy for affecting change in human behaviour is to plan change, to attempt to bring about change based on intentional use and application of knowledge as an instrument for modifying patterns of behaviour and institutional practices.

Developing the programme

So far, there is no programme in water supply and sanitation that purposely intends to involve women in planning and management. There are only projects that, in one way or another, make some efforts to involve women in the implementation of projects.

Government of Indonesia and UNICEF Project Co-operation in Water Supply and Sanitation

GOI and UNICEF are co-operating in water supply and sanitation projects in nine (out of 27) provinces. Projects have been implemented in villages of one sub-district (Kecamatan). Within the last two years, changes were made in the planning process of projects. The number of pumps to be installed used to be decided at the top. Now, the village elders, through the Village Community Resilience Board (LKMD), can have a say in the decisions. There is also an attempt to involve women in the utilization (not yet planning) of water supply by putting one woman in charge of one pump. She is responsible for organizing the use of the pump, is trained to recognize and understand a malfunction in its early stage and to refer it to an identified mechanic for repair. This is a new practice and still needs to be evaluated for efficiency and effectiveness.

UNDP sponsored project on women's participation in Drinking Water Supply and Sanitation Decade

This is an interregional project still in the design stage of the project

proposal. It will be the first project that consciously involves women from inception of project planning.

From discussions with officials in charge of water supply and sanitation, it would appear that there is still some resistance from the community to involve women in an official way. Traditionally, only men are entitled to take part and speak out in discussions of "public" matters. Social values are still affected by the traditional image of women in their role as homemaker. Although women may serve as an entree point for better management of water supply and sanitation, we must take into account the natural rhythm of village life, culture, attitude, leadership and community structure.

In Indonesia, women's voluntary organizations have long played the role of pressure group and been a driving force in improving the condition of women. The most effective group is the Family Welfare Movement (PKK), a village-based self-help movement to promote the welfare of the family. As a component of the Village Community Resilience Board (LKMD) (under the Directorate of Rural Development, Ministry of Interior Affairs), PKK has a wide operational context: rural development as a whole.

Since the 1970s, the PKK movement has expanded throughout Indonesia and recently been acclaimed by the President as a model and channel of rural development activities. PKK receives a President's grant of \$250 every year for each village (there are more than 60,000 villages) to be spent for village development programmes.

This existing country-wide institution promises a good start in favour of the effective involvement of women in water supply and sanitation programmes.

Notes

1/ "Rural Household Economics and the Role of Women," Pudjiwati Sajogyo, University of Indonesia, 1981.

2/ Hart, Gillian, "Time Allocation in a Javanese Village," 1978.

3/ Elmendorf, Mary L. and Isely, Raymond B., "Public and Private Role of Women in Water Supply and Sanitation Programmes, 1981.

ANNEX

General Indicators - Indonesia.

Total area	1,919,443 square kilometres
Population (1982)	152,513,000
Density (1980)	77 per square kilometre
Provinces (1980)	27
Regencies (Kapupaten)	246
Municipalities	54
Sub-districts (Kecamatan)	3,383
Villages	63,635
GNP per capita	\$ 540
Percentage of population	<u>Rural: 77.6</u> <u>Urban: 22.4</u>

Life expectancy at birth (years)

	<u>Male</u>	<u>Female</u>
1961 - 1971	45 - 0	48.6
1971 - 1975	50.3	53.3
1976 - 1980	54.5	57.7
1981 - 1985	56.5	60.0

Infant mortality rate (aged - - 1)

1961 - 1971	137
1976	110
1980	98

M. A report from Japan on women and the International Drinking
Water Supply and Sanitation Decade

Ryutaro Yatsu*

Introduction

Development of public water supply in Japan

The origin of the water supply systems built for public purposes in Japan is not clear. It is assumed to have been constructed about 400 years ago. By the 18th century, the population of the capital reached a little more than one million. The government constructed five systems of waterworks to cope with the increasing population and the shortage of water. The water was supplied unprocessed from sources via open channels by means of gravity. After being collected at a central point in the city, the water was distributed through stone or wood conduits laid underground. The water from these conduits was preserved in chambers from which it was distributed to the people who were taxed to cover maintenance expenses.

Similar water supply systems were built in various large cities in the same time period.

Japan's trade with foreign countries became increasingly active around the mid-19th century. At the same time, there were nation-wide epidemics of cholera and typhoid fever. To cope with the situation, the construction of a modern water supply system was undertaken in Yokohama - the largest port city in Japan at the time - in 1883, and the service was started in 1887. This was the first modern water supply system in Japan which provided continuous supply of water with cast iron pipes, pumps and filters. This kind of effort was duplicated by port cities throughout our country. In 1911, there were 23 waterworks which served 4.1 million people.

Figure 1 shows the development of modern water supply systems, indicating the remarkable progress in the past 27 years - the percentage of the population served was 37.7 per cent in 1955 and 92.2 per cent in 1982.

Realization in 1952 that water supply systems were an essential infrastructure for the establishment of a modern nation, brought construction grant and loan programmes by the central government for small scale water supplies serving a population of more than 101 and less than 5,000. These programmes helped to construct water supply systems in many rural communities. At the same time, the grant or loan programmes were improved to develop large scale water supply systems serving a population of more than 5,001.

Japan's waterworks development is expected to play an increasingly important role in the future.

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Waterworks policy in Japan has the following objectives:

- (a) To reduce areas where public water supply is not available;
- (b) To secure the safety of water supplied;
- (c) To develop new water sources;
- (d) To minimize the regional differences in water rates.

In Japan, we have three kinds of waterworks:

- (a) Large scale public water supply (Jô Suidô) serving more than 5,000 people;
- (b) Small scale public water supply (Kan'i Suidô) serving from 101 to 5,000;
- (c) Private water supply (Se'nyo Suidô) for private use of dormitory, company house, sanatorium, etc., serving more than 100.

Besides these, there is bulk water supply to supply purified water to large and small scale water supply bodies.

Table 1. Increase of population served (unit: X10)

Items Fiscal Year	1960	1965	1970	1975	1977	1978	1979	1980
Total population (A)	93,420	98,275	103,720	112,279	114,459	115,500	116,060	116,680
Population served (B)	49,910	68,244	83,754	98,397	102,350	104,253	105,560	106,910
Percentage of population served (A/B)	53.4%	69.4%	80.0%	87.6%	89.4%	90.3%	91.0%	91.5%

Table 2. Number of waterworks (1980)

	Bulk water supply	Large scale public water supply	Small scale public water supply	Private water supply	Total
Number of water supply systems	85 (77)	1,896 (1,886)	12,148 (12,267)	4,128 (4,108)	18,257 (18,336)

(): 1979

Table 3. Changes of water source (unit: 10⁶m³/year) (including bulk water supply)

Changes of Water Source (Unit: 10⁶ m³/year) (including Bulk Water Supply)

	Surface Water (River)			Lake	Subsoil Water	Shallow Well	Deep Well	Others	Total
	River	Dam (Direct)	Dam (Flow)						
1965	3.58	0.45	0.30	0.06	0.95	0.23	0.71	0.17	6.45
1970	4.75	0.64	1.27	0.09	1.04	0.52	1.31	0.23	9.85
1976	5.63	0.90	2.15	0.13	1.04	0.74	1.84	0.32	12.75
1977	5.83	1.07	2.01	0.14	1.12	0.82	1.97	0.33	13.29
1978	5.81	1.06	2.12	0.15	1.00	0.85	2.07	0.48	13.54
1979	5.83	1.06	2.22	0.17	0.96	0.91	2.02	0.49	13.66
1980	5.40	1.08	2.57	0.18	0.95	0.89	1.96	0.47	13.50

Waterworks and public health

Role to reduce diseases

Safe water supply can reduce the incidence of water-borne diseases, not only enteric cholera, dysentery and typhoid fever, but also trachoma, some kinds of skin disease and a number of diseases caused by parasites. We could reduce or eliminate enteric diseases. This is naturally attributable to medical progress and the development of new medicines. However, the biggest contributing factor is believed to be the continuous supply of safe water through an advanced water supply system.

However, it must be noted that the water supply system can also endanger people and harm their health if something abnormal or an accident should occur in the system. The water supply system has the potential to be a route of disease-producing organisms or toxic substances and thus of reaching directly a huge number of people.

Role to improve living conditions

Use of the water supply is not limited to drinking. Supplied water is also used for various other purposes of living and for industry. Living conditions have improved with the introduction of many kinds of equipment and facilities for convenience in daily living, such as washing machines, automatic dish washers, bath rooms, flush toilets, and air conditioners. Modern living presupposes an ample supply of water. In this sense, the water supply is a vital factor in the improvement of the standard of living.

Communicable diseases are quite rare now. According to recent statistics, the number of cholera patients in Japan was 15, of polio 18, dysentery 1260, of typhoid fever 247 and of paratyphoid fever 201 in 1982. The infant mortality rate was 7.1 per 1000 births in 1981, (109, in 1935). In 1982 the average life span of Japanese - 74.22 years for males and 79.66 for females - was one of the highest in the world.

Thus, the development of modern water systems has contributed greatly to the promotion of health and the improvement of living conditions in Japan.

Figure IV. Trends of outbreaks of water-borne disease and percentage of population served.

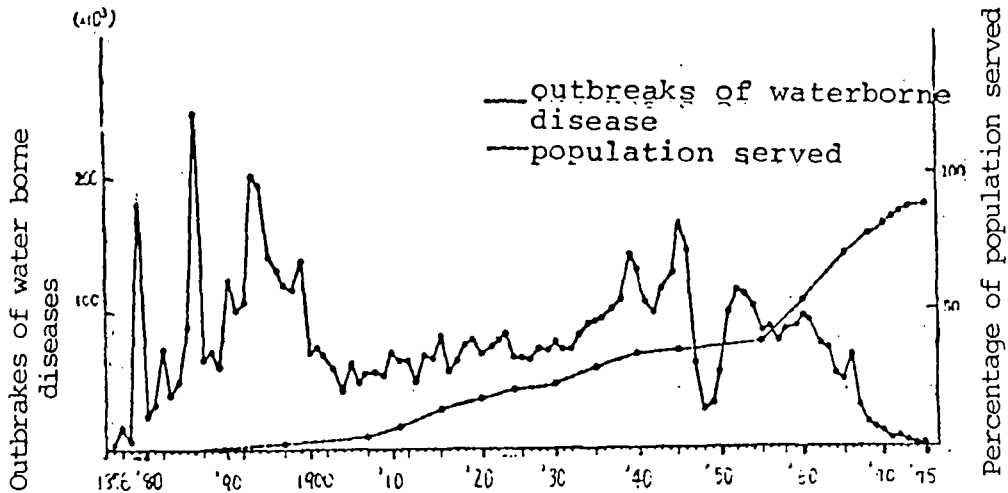


Table 4. Interrelationship between establishment of water supply and death rate due to typhoid fever, dysentery and cholera, and crude death rate in Japan.

CITIES	DEATH RATE DUE TO TYPHOID FEVER DISENTERY AND CHOLERA. (PER 10,000 PERSONS)			CRUDE DEATH RATE (PER 10,000 PERSONS)		
	AVERAGE (BEFORE WATER SUPPLY)	AVERAGE (AFTER WATER SUPPLY)	INCREASE OR DECREASE	AVERAGE (BEFORE WATER SUPPLY)	AVERAGE (AFTER WATER SUPPLY)	INCREASE OR DECREASE
TOKYO METRO. CITY	7.93	3.83	-4.10	205.5	186.8	-16.9
OSAKA CITY	19.44	8.95	-10.49	243.5	241.2	-2.3
YOKOHAMA CITY	93.46	11.74	-81.72	433.7	226.9	-206.8
KOBE CITY	30.66	8.03	-22.63	262.5	245.3	-20.2
NAGASAKI CITY	44.40	14.17	-30.23	236.2	176.1	-60.1
HIROSHIMA CITY	40.53	4.22	-36.31	214.3	188.6	-25.7

Source: HIROSE and ISHIBASHI

Science and Technology

Drinking water quality standards

The Ministry of Health and Welfare has responsibility for establishing the drinking water quality standards which are applied to all water supply systems throughout the country (table 5). The standards were first set in 1958 and amended in 1966 and 1978. According to the regulations of the Water Works Law, every water supplier must meet the standards and at the same time keep residual chlorine at the end of the distribution system. The lower limit of chlorine residual is 0.1ppm for free chlorine and 0.4 for combined chlorine (chloramine). The regulations also set monitoring requirements. The frequency of water quality examination varies with the component of the standards. For example, chlorine residual, colour and turbidity should be examined every day, and other components at least once a month. The Ministry also set some guidelines for tap water which do not have legal power, such as trihalomethane content at 0.10 mg/l, trichloroethylene at 0.03mg/l, tetrachloroethylene at 0.01mg/l, selenium at 0.01mg/l, acrylic amide and formaldehyde at non-detectable levels, and sodium silicofluoride to meet the standards of fluoride and total residue.

Design criteria of water supply systems

Design criteria are prescribed in the Water Works Law. Criteria for selection of a suitable purification process form a part of the design criteria, (table 6). Basically, three types of purification processes are used in Japan: disinfection by chlorine only, slow rate sand filtration and rapid rate sand filtration. The Ministry of Health and Welfare recommends slow rate sand filtration for small scale water supply systems because of easier maintenance and small scale water systems are usually located in rural areas where most of them can get unpolluted raw water. Detailed design criteria are published by the Japan Water Works Association, and the Ministry of Health and Welfare has a supervisory role.

Guidelines for maintenance and operation of water supply systems

Water supply systems supply safe drinking water to consumers. This is achieved through consecutive stages of planning, designing, construction and maintenance. Since the systems fulfill its function through daily management, this stage is quite important. Guidelines for maintenance and operation of water supply systems are published by Japan Water Works Association and supervised by the Ministry of Health and Welfare. Guidelines for maintenance and operation of small scale water supply systems will be available from Japan Small Scale Water Works Association in the near future.

Socio-economic development

Role of women in the development of public water supply

Before construction of water supply systems, carrying water was one of the heaviest duties for a housewife, usually the wife of the eldest brother. The Ministry of Health and Welfare estimates that a woman in an average family in rural areas walks a distance of 18,000 kilometres in her lifetime to fetch water. Thus the contribution of the repaid development of water supply systems during the past three decades, especially in rural areas, is rated high.

Table 5. Drinking water quality standards

Item	Standards
Nitrite nitrogen and Nitrate nitrogen	Max.10mg/1 (as N)
Chloride ion	Max. 200mg/1
Organic substances (as potassium permanganate consumption)	Max.10mg/1
Total colonies	Mx.100mg/1
Coliform group	Not to be detected
Cyanide ion	Not to be detected
Mercury	Not to be detected
Organic phosphate	Not to be detected
Copper	Max. 1.0mg/1
Iron	Max. 0.3mg/1
Manganese	Max. 0.3mg/1
Zinc	Max. 0.1mg/1
Lead	Max. 0.1mg/1
Chromium (hexavalent)	Max. 0.05mg/1
Cadmium	Max. 0.01mg/1
Arsenic	Max. 0.05mg/1
Fluoride	Max. 0.8mg/1
Calcium, Magnesium (hardness)	Max. 300 mg/1 (as C ₃ CO ₃)
Total residue	Max. 500 mg/1
Phenols	Max. 0.005mg/1
Surface-active agents (anionic)	Max. 0.5mg/1
pH value	8.6 to 5.8
Odour	Not to be abnormal
Taste	Not to be abnormal
Colour	Max. 5 degree
Turbidity	Max. 2 degree

Criteria for Purification Method Selection

Technique	Raw water quality	Treatment technique		Synopsis
Only chlorination	① Coliform group (100 ml MPN) max. 50 ② Total colonies (1 ml) max. 500 ③ Other items is fitted with water quality standard	Disinfection only		
Slow sand filtration	① Coliform group (100 ml MPN) less than 1000 ② BOD less than 2 ppm ③ Yearly average turbidity less than 10 degree	Slow sand filter	Sedimentation basin unnecessary	Yearly max. turbidity less than 10 degree
			Sedimentation basin (ordinary)	Yearly max. turbidity 10 to 30 degree
			Chemical sedimentation basin	Yearly max. turbidity more than 30 degree
Rapid sand filtration	Others	Rapid sand filter	Chemical sedimentation basin Rapid flocculation basin	① Min. turbidity almost 10 degree, max. less than 1000 degree, Small fluctuation of turbidity ② Small fluctuation of treatment amount
Special treatment	Corrosive free carbon dioxide	Aeration, Alkali treatment		
	pH adjustment	Alkali treatment		
	Iron	Prechlorination, aeration, pH control, iron bacteria method		
	Manganese	① [Oxidation] + [flocculation] + [sand filtration] prechlorination, potassium permanganese treatment, (Ozonization) ② Contact filtration, manganese filtration, double filtration ③ Iron bacteria method		
	Plankton	Chemicals [copper sulfate, chlorine, copper chloride] treatment, double filtration, micro strainer		
	Odor	Organisms removal, aeration, activated carbon treatment, chlorination, ozonization		
	Detergent and phenol	Activated carbon treatment (ozonization)		
	Color	Flocculation, activated carbon treatment, ozonization		
	Flourine	Activated alumina, bone charcoal treatment, electrolytic process		

Among the voluntary organizations in each rural community is a women's social organization, which usually plays an important role in improving life-style and environmental sanitation through co-operation with the local government.

The central government provides a construction grant to local governments as a form of financial assistance. The grant programme is central to development of the public water supply in rural areas. However, each community is responsible for a share of the construction budget and the women's social organization arranges for a waterworks fund, the so-called "egg saving account", "consoling wife savings account", and so on.

Financial aspects of public water supply

Public water supply systems in Japan are managed on a self-supporting basis in principle. That is, construction of waterworks is financed by grants and loans from the central government, water rates are charged consumers to pay back the yearly installment as well as to maintain the system.

There is a wide range of water rates among the water supply systems because of the self-supporting principle and the effectiveness of the systems. Investment yield for small scale water supply systems is usually lower than that for large ones. Policy established by the Ministry of Health and Welfare seeks to minimize the regional differences in water rates. In 1982, the average rate was 0.4 US dollars per cubic metre. Expenditure on water shares amounts to 8 per cent of total expenditures of an average family.

Figure V.

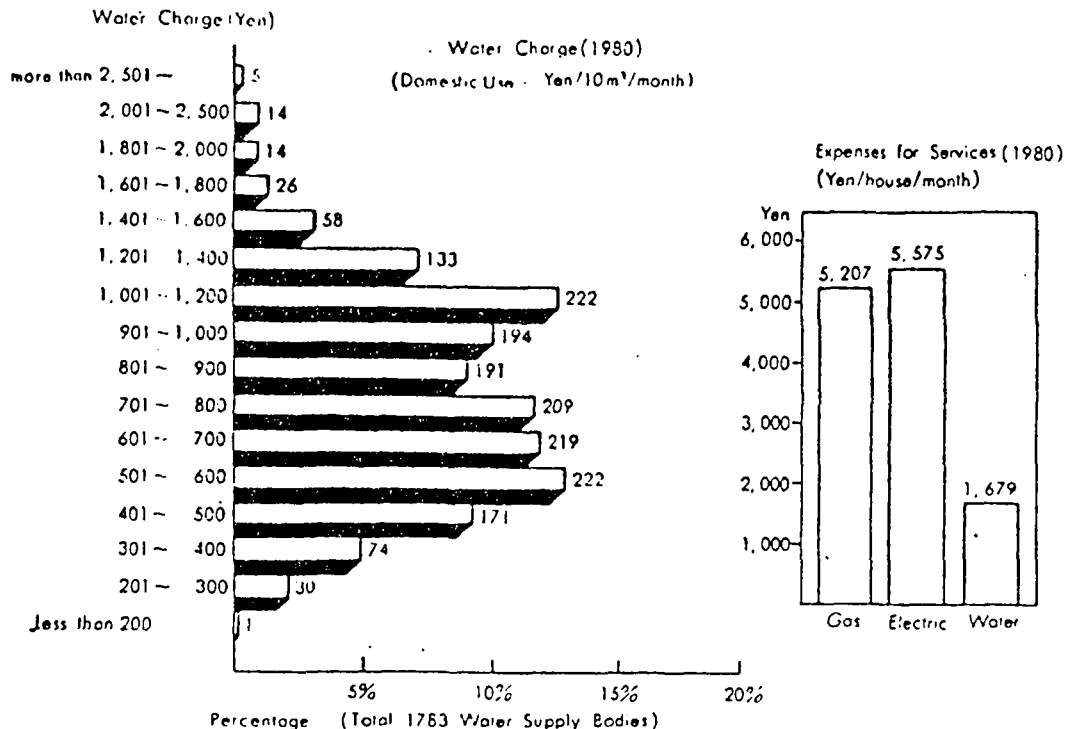


Table 7. Domestic expense and water charge
(unit: Yen/Family/Month)

Fiscal year Items	1960	1965	1970	1976	1977	1978	1979	1980
Total Expense (A) (Yen)	31,276	51,832	82,792	178,851	193,742	205,259	219,081	237,682
Water Charge (B) (Yen)	153	244	421	1,115	1,272	1,421	1,537	1,679
Percentage (B/A)	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.7

Object: Families living in cities where population is more than 50,000.

N. The International Drinking Water Supply and Sanitation
Decade: a mediation of inconsistencies

Mette Jorstad*

This paper is concerned with the drinking water supply and sanitation (WSS) projects undertaken by various national and international development agencies in co-operation with governments in developing countries. As will become apparent, modification in the planning and implementation strategies in connection with these projects are strongly recommended by the agencies themselves as a result of evaluation activities and lessons learned. The issue most emphasized by the agencies is an increase in community participation. The realisation that this is a crucial component is not new. However, in spite of this there are few projects that have succeeded in involving the target groups in all phases. This paper attempts to outline some of the major constraints on the promotion of participation of women and of communities. Since the focus is on constraints, the presentation may seem unduly negative. I therefore want to stress that the pinning down of some of the factors that reduce the chances of (at least partly) reaching Decade objectives should serve as the basis for re-thinking.

Relationship between improved WSS and improvements in health

The stated objective of the Decade is to obtain better health for all through improved water supplies and sanitation. There is presently great concern in some quarters over evaluation reports indicating that many of the projects may have had little, none, or even adverse effects for target groups. There is no one-to-one relationship between an adequate supply of potable water and better health. In the water sector there are consistent data showing that expected benefits are often reduced by:

(a) An approximate average of 50 per cent of the installations being out of function at any given time. Main reasons for this is lack of ability and/or lack of motivation to prevent or repair break-downs;

(b) Varying degrees of non-use of improved supplies due to a variety of socio-cultural or socio-economic factors, or due to reduced accessibility compared to the traditional source;

(c) A 50 to 100 per cent re-pollution of clean water during tapping, transportation, storage and consumption;

(d) When water taps are not installed in the house, as is the case in most rural projects, evaluations show an almost 100 per cent failure in making the target groups increase their use of water to adequate quantities. According to Ross Institute of Tropical Disease, London, the quantity of water used is at least as important in relation to health as the quality of water used.

Water supply is usually considered a social amenity by the project populations. Sanitation projects are usually not considered social amenities in rural areas, due to lack of privacy, queuing and smell. This fact alone would indicate that optimal use of sanitary installations would be even more difficult to ensure than optimal use of water supplies.

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The above factors will indicate why WSS projects have had little effect in improving the health situation of target groups. The above constraints to an improvement in health can be reduced or removed through various measures. As will be seen, there is a consensus among most of the major development aid agencies that more emphasis must be put on the inclusion of soft-ware components, and that unless community participation and involvement becomes a reality, one should expect WSS projects to fall as short of reaching their objectives in the future as they have in the past. The justification for a continued investment of significant resources in the International Drinking Water Supply and Sanitation Decade depends on serious attempts at removing the above constraints to health benefits. Community participation and involvement is crucial because the above constraints are closely related to the community's ability and willingness to adopt new technology and to modify its behaviour in the desired direction.

Promotion and support of community participation should be synonymous with a promotion of women's participation because:

(a) Women constitute the main user group of water supply since they are the collectors, transporters, storers and distributors. In order to frame the importance of involving women more dramatically, one should say that women are the ones who re-pollute clean water;

(b) Women socialize children as to sanitary and hygiene practices and habits closely related to water and sanitation installations;

(c) Rural communities will often consist of at least 60 per cent females due to labour migration of men, higher educational participation by males and the often longer life expectancy of women.

There is, however, reason to believe that unless women's participation is specifically mentioned in the project documents, they will continue to be "invisible" and the Decade objectives of better health for all will suffer additional reductions in their chances of being reached.

Why was the assumption that the IDWSSD would automatically lead to better health disproved? Probably because the logic behind the assumption was weak: it did not distinguish between necessary and sufficient conditions for change in the desired direction. Whereas improved water supply and sanitary measures are necessary conditions for improved health in the third world, they do not constitute sufficient conditions.

Evaluation activities and lessons learned

Over the past few years, major multi and bi-lateral organizations have been increasingly concerned with community participation. Their conclusions have been categorized and are represented in the table.

Is this concern reality or rhetoric? There have been attempts over the past few years to manipulate the components of projects in order to increase the involvement of local communities. This manipulation has, however, been aimed at the lower administrative and implementing levels of projects, which implies that possible positive effects will be limited. It is my aim to argue that planning, design and evaluation procedures as formulated by the highest administrative and monitoring levels is where the modification must start. The following is a discussion of constraints that can only be

modified or removed by top planners and administrators in the donor countries and organizations.

Project documents and statements of objectives

These are designed and formulated by the top administrators and planners in the developed countries. The following are meant as indications on where and how the required modifications might start.

The objectives of the projects are usually stated as short-term and long-term. The short-term ones are based on an assessment of the logistics for hardware components:

(a) Number of units to be installed is based on calculations of quantities needed for the local population, with varying considerations of accessibility;

(b) Duration of project will be based on the above plus calculations of the time required, depending on soil conditions and depth of water table, expected yield per borehole, anticipated frequency of dry holes drilled, etc.;

(c) Cost of project is commonly assessed on the above projection and limited to those factors.

Cost-benefit calculations will be related to size of target group and this is presented as the justification of the project. On completion of the project one rarely finds a re-assessment of these calculations on the basis of how many individuals or households actually do use the installations and at what probably benefit. Reports frequently state that "some" women or "some" sectors of the population still use the traditional and polluted water sources. The same is true for excreta disposal technologies, where recent research suggests that the provision of superior water and sanitation facilities to a small cluster of houses may not protect those families from infection if the over-all level of faecal contamination of the environment is high. ^{1/} This clearly indicates that further research and efforts to include non-users is warranted in the future.

Long-term objectives are normally not as quantifiable as the short-term ones, both because they aim at fairly vague concepts like an improvement in over-all health situation or a better quality of life, and because baseline studies, against which the effect could be measured, have rarely been performed. "Long-term" is not defined as to duration between implementation and expected benefits, but merely indicates objectives to be reached at some future time, - and an evaluation can therefore be postponed indefinitely.

Not only may long-term effects be difficult to measure, but even when a set of indicators is used to try to quantify them, the effects cannot be directly credited to specific project inputs. At best, correlations between project inputs and modifications in behaviour may be found, but correlations do not define cause and effect. Improved WSS is but one factor influencing social change among a number of other factors that cannot be kept constant. The disparity in evaluation methods and measurability is probably what has led to negligence in evaluating the deeper social consequences of WSS projects, except as more sporadic research efforts.

There is an interrelationship and mutual reinforcement between the

Evaluation activities and lessons learned as stated by the following countries and organizations -

Components to be stressed in future water supply and sanitation projects:

	Germany	Denmark	Finland	Australia	Canada	Sweden	UK	USAID	UNDP	WORLD BANK	WHO
Comprehensive TOR and adequate prefeasibility studies				X				X		X	X
Comprehensive socio-cultural and socio-economic studies of target groups		X		X				X		X	
Ability and willingness to pay for services and effective collection of fees for services	X			X				X		X	
Human resources assessment and training	X			X	X		X	X	X	X	X
Water and waste disposal	X			X						X	
Project adaptation to local circumstances				X	X			X		X	
Adequacy of procedures for operation and maintenance	X	X	X		X	X		X		X	X
Health and hygiene education	X	X	X		X	X		X	X	X	
Appropriate technology	X				X	X	X	X	X	X	X
Community participation	X	X	X		X	X	X	X	X	X	X
Improved system of information exchange on all levels									X	X	X
Adequacy of relevant administrative institutions in receiver countries	X			X	X		X			X	X

Source: Data compiled from IDWSSD, Catalogue of external support, April 1983.

criteria for design and planning, and criteria for evaluation. As long as the criteria are the installation of hardware components, the lessons learned about the crucial importance of including software components in WSS projects may have no practical effects, and the projects may continue to have little, no, or adverse effects on the population they are meant to assist.

Decade project personnel

From its inception, IDWSSD projects were categorized as mainly technical, and therefore the planning and implementation units consisted mainly of technical engineering personnel, and this is still the case. This category of professionals has established criteria for evaluation of job and project performance, and some main criteria are, and have to be:

- (a) How many supplies constructed;
- (b) Average construction time per unit;
- (c) Average cost per unit.

As pointed out above, project documents and short-term objectives will be specific on the same points. These are not conducive to an inclusion of software components, such as the motivation and organization of local communities for involvement in all stages of WSS projects in order to obtain changes in attitude and behaviour necessary to achieve better health for all. The incorporation of software must often, from the technical efficiency point of view, be experienced as counterproductive. Not surprisingly, conflicts between the proponents of hardware and the software professionals will occasionally arise because project long-term objectives implicitly demand software provisions whereas the main provisions are geared to reach the short-term objectives. Not surprisingly, the priority of the technical engineer expert will be the installation of hard-ware components because this is the criterium on which his performance will be judged by colleagues and superiors, and this creates the standard of performance on which his future career depends.

Project implementators are either professionals directly contracted by the development aid agency, or they are contracted by private companies specializing in technical engineering consultancies. The companies have been tendering for the sub-contract and are there for economic profit. Nevertheless, development aid agencies seem sometimes to work under the assumption that the contractors will communicate with, motivate and educate the local communities, simply because they are on the spot. Such assumptions must be criticized on two counts: Firstly, personnel chosen for their technical engineering qualifications may have no qualifications as educators, motivators and organizers of local communities. Secondly, it is unethical to expect that profit-making units should perform time-consuming tasks for which they have not been asked to budget.

Thus, any criticism of field level technical engineers regarding their criteria for judging job performance, or their criteria for evaluating projects is beside the point - and stupid. Their criteria are not only acceptable, but necessary. Criticism, however, must be directed at the fact that the above are almost the sole criteria for planning, design and evaluation of projects whose aims are twofold:

- (a) To improve or provide water supply and sanitation installations;
- (b) To organize, motivate and educate local communities, with emphasis on women, to adopt new technology and adapt their behaviour in order to obtain optimal benefit from the hardware inputs.

In order to obtain the necessary communication with local communities and women in project areas, resources are presently being invested in search of innovative methods for the sensitization and motivation of all levels of personnel involved in the projects in the recipient countries, from ministerial to field level. It is the aim of this paper to argue that in order to remove some of the major framework constraints on promoting software components to a par with the hardware ones, it is the designers, planners and evaluators in the donor countries who must become sensitized and motivated to adopt a new approach.

It is not easy to reorient one's whole way of thinking about WSS projects. A new source of water supply, as for example a well with winch and bucket, seems such an objective measure of success. When erected in an arid region it is a thing of beauty. How far less in dramatic effect is the sight of a woman who washes her baby and her hands with soap and water after having safely disposed of its excreta. And yet, this may constitute a better indication of success of the project.

Bilateral development aid organizations

The Scandinavian and a few other of the above organizations are under pressure to strike a precarious balance between, on the one hand, designing and implementing projects that make provision for the time-consuming inclusion of software components, and on the other hand, of efficiently spending the enormous amounts allotted for development aid every year. While under strong political and public pressure to spend the money, the agencies are likely to initiate projects that may have no long-term beneficial consequences for target groups in the third world. Instead of being supportive of development, such projects may become oppressive to development.

Often understaffed on administration and expertise, the bilateral agencies can afford neither the time nor the manpower required to make small rural schemes a success. This conflicts with political and public opinion demands that development aid efforts do give priority to rural populations.

In order that WSS projects in the future will do more to promote self-sustained and long-term development processes in the target groups, one has to make provisions that the technical advisory, health and maintenance education services match the rate at which the hardware components are installed, and one has to make reasonably sure that the environment is conducive to such educational services. These provisions would almost invariably slow down the projects down to varying degrees, and this contrasts with political and public demands for efficiency spending.

Research, evaluation activities and lessons learned leave little doubt that development aid experts realize the importance of including software components in Decade projects. If development aid procedures are not modified

to conform with lessons learned, the Scandinavian countries are heading towards a strange situation:

- (a) The general public and politicians, due to a lack of professional knowledge of the state of the art, and out of a genuine allegiance to third world populations, insist that wrong procedures are used in order to help the poorest of the poor. (Wrong procedures are here meant as inadequate inclusion of the issues presented earlier because they will hamper efficient spending of large amounts of money);
- (b) The development aid experts, in spite of their demonstrated knowledge of the crucial importance of including software components, who continue to use the wrong procedures, will ultimately be accused that their genuine allegiance is not to the third world population.

Thus, development aid is set on a collision course where the ultimate losers are the deprived populations in the developing world. A change in attitude is possible for both groups. If the attitudes of the general public and politicians are left as they are, it might lead to drastic and unfortunate reductions in development aid because of impatience with the often negligible long-term positive effects. If the experts adjust their professional activities to conform to their professional knowledge, in spite of public demand, the credibility gap between the two groups will slowly close.

I have focused on the Scandinavian countries as representative of a small group of nations with similar commitments to development aid, i.e. to assist third world populations in initiating a self-sustained development process through a transfer of resources. The other group of countries, which through bilateral development agencies year by year get a return of from one to several hundred per cent of their investments in the aid sector, do no longer seriously pretend that this is an unintended consequence of trying to assist the developing world. The priorities of these countries do not coincide with those expressed by the general public in Scandinavia.

Thus, in the developed Western world, there is a basic disagreement on objectives between the Scandinavian countries and other nations. A crucial question therefore arises: to what degree are Scandinavians and Scandinavian ideologies represented at the decision making levels in the United Nations? To what degree are Scandinavian funds used by the United Nations in accordance with Scandinavian objectives, which coincide with the terms of reference of the United Nations development agencies?

Multilateral development aid agencies

The most important of these are the United Nations organizations. Their central position, amount of funds, easy access to the best experts on a global basis, their responsibility and opportunity (unfortunately neglected) to create a centre of up-to-date information on the state of the art should have made them the leaders in appropriate Decade planning and implementation. Whereas their research work is often excellent, their project activities, as measured against the issues, are not. The United Nations organizations are working under pressures different from those of the Scandinavian agencies, namely the resource-consuming competition between

the different United Nations organizations and departments to maintain and increase their respective share of funds, prestige and power.

When the Scandinavian agencies are understaffed, this is a (regrettable) consequence of public demand that development aid funds should reach the poorest of the poor and not be spent on administration at home. The consequences of understaffing are unfortunate, but the fact of understaffing is an expression of solidarity with the deprived populations in the developing world. When the United Nations organizations have thousands of redundant personnel, this shows an open disregard for the target groups and for the donors. Flaunted overstaffing will raise the question whether the United Nations agencies' efforts and expertise are concerned with promoting self-sustained development in the third world or with promoting self-sustained bureaucracies in Western world metropolises.

Thus, multilateral development aid too is set on a collision course and the ultimate losers are the deprived populations in the developing world. If the Scandinavians' increased concern about the priorities of multilateral agencies is allowed to remain or to grow, a change in attitude is anticipated since donors can then no longer justify a continuation of an unconditional transfer of funds. If the multilateral agencies adjust their activities to conform to their terms of reference, the credibility gap will gradually narrow.

A development aid ombudsmanship

Not only inertia, but strong vested interests in many quarters may want to keep project procedures and project performance at their present operational level. The time seems ripe to suggest an ombudsman to represent the often illiterate target populations' interests in order that development funds are not used inadvertently or advertently to further oppress and deprive them. Experiences field personnel will have come across all of these examples:

(a) Projects that are likely to have neither negative nor positive long-term consequences for the target populations. Typical examples of this are the inappropriate technology projects planned and implemented exclusively by external personnel. Although regrettable, the only negative consequence of such projects is that resources from the developed world have been wasted;

(b) Projects that are likely to have no long-term positive effects, but some short-term negative effects for the target groups. Typical examples are Decade projects that solicit free labour, materials or cash from the already deprived local communities, while the project provides and installs imported hardware components, but does not provide the necessary spare parts or the expertise necessary for operation and maintenance, nor the motivation necessary to make the project function over time. These projects are quite numerous and therefore have not yet become professionally stigmatized, in spite of the fact that they oppress local populations by unduly raising their expectations and by misusing their scarce resources. According to lessons learned, there is no excuse for lacking knowledge about the requirements for sustained improvement in the health situation of third world populations in relation to Decade projects.

Alternative causes:

- (i) The project got cleared because of a lack of knowledge of the state of the art, possibly or probably caused by understaffing or negligence;
- (ii) The project got clearance in spite of the fact that planners had full information on probable consequences. This situation would be caused by priority interests that lead to disregard of development objectives and target populations. Negative consequences are not unexpected, and may or not be intentional.

Notes

- 1/ Transactions of the Royal Society of Tropical Medicine and Hygiene, Vol. 77, No.4, 515-521, 1983.

O. The role of women in water supply, waste disposal and solid waste management

María Helena de Andrade Orth*

All women could be like the women I met in Chan Kon, Yucatán, Mexico - guardians of health. Whenever there was a pump break, they alerted the local authorities and pointed out that there was a higher incidence of diarrhoea following the break. The pump was repaired immediately.^{1/} Thus, how many sons were saved?

Introduction

The World Health Organization, on the basis analyses of data collected in 1980, came to the conclusion that approximately three out of every five people in developing countries lacked easy access to drinking water; three out of every four people in the world did not have any kind of sanitary facility; and the rural areas were affected most. The United Nations Children's Fund (UNICEF) calculates that approximately 15 million children die in third world countries every year. Sadly, the lack of sanitation and adequate supply of water for human consumption carries the major responsibility for this tragedy.

Faced with the worsening crisis in quality and quantity of water supply, especially in the developing countries, the United Nations declared the International Drinking Water Supply and Sanitation Decade with the goal of clean water and adequate sanitation for all by the year 1990. The objective is to cover all communities, without regard to the stage of their economic and social development.

Within this larger picture, the United Nations Decade for Women: Equality, Development and Peace, which concludes in 1985, will also serve to advance the goals of the Water Decade. A clear link between the objectives of the former - which stress promotion of participation of women as managers and educators in community projects dealing with water, sewage and wastes, and those of the latter has been established.

Women and water supply

The fresh water available on this planet to meet human needs constitutes only about 3 per cent of the total volume of existing water. Out of this, up to 3 per cent are trapped in a solid state in the polar ice caps and only a small fraction is represented by surface water. The importance of this scarce natural resource hardly needs further elaboration.

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In contemporary society, the eventual risks posed by some chemical substances in the environment aroused ecological consciousness and led to the understanding that the need for upholding environmental quality pertains to all generations. Nature must be preserved to serve life both in the present and in the future. Out of this perspective emerged the concern for the preservation of water resources with regard to both their quality and quantity.

Great health risks are posed by the ingestion of water contaminated by bacteria or infested with eggs and larva of parasites. Water is the habitat for schistosome larva and those of the water-breeding mosquito. The importance of malaria, filariasis and other endemic diseases is well known.

Some five million die every year due to water-related diseases, and 25 per cent of hospital beds are occupied by patients suffering from such diseases. As many as 500 million people are afflicted every year. 2/

In Brazil, enteric diseases rank first among the five main causes of death in the age group zero to one year age group, and among the first in the age group from one to four years.

Water-borne diseases and those transmitted by water seriously reduce the energy and the work capacity of women, leading to work accidents, undernutrition and new diseases.

However, women are also a major link in the contamination chain which starts with the choice and transport of water in locations without running water and continue with the preparation of food, care and feeding of children and sanitation habits. To exert influence on the behaviour of all members of the family and the community regarding the importance of hygienic practices in their multiple roles as wife, mother, consumer, citizen, worker and farm workers, women are, fortunately, also in an excellent position.

Water for human consumption

Since the beginning of civilization man has settled close to sources of water in order to meet his bio-physico-chemical and economic requirements. The water well is one of the primary systems for supplying water in areas that lack public facilities. Well water should promote health and not cause disease transmitted by micro-organisms such as: cholera, typhoid fever, paratyphoid fever, diarrhoea and hepatitis.

Well water should be analysed to ascertain whether it carries any risks to health before being used. However, in practice this is not feasible. Certain conditions that are likely to contribute or lead to the contamination of well water have therefore been identified. The presence of factors listed below indicates a high probability of contamination of the well, mainly bacteriological in nature:

the persistence of diseases, particularly those related to the digestive system;

the proximity of latrines, sanitary sinks, stables, pigsties or plantations;

the lack of shelter, protection and the possibility of flood;

proximity of refuse dumping;

the lack of draining ditches and fences to prevent the entrance of animals;

location in highly populated areas (without sewage systems, or where sinks are too close to the well);

the use of contaminated hands or buckets to draw water.

Whenever one or more of these conditions prevail, there will be a deterioration in the quality of the water from the well, requiring preventive and corrective action to eliminate the causes of the degradation. Whenever possible, a bacteriological analysis is recommended to evaluate the results of the measures taken.

Public water supply and its quality

Cities supplied with water through an arterial system receive an abundant amount of water which, after treatment is consistent in quality and suitable for human consumption.

There are many cities in Brazil today with such water supply networks, representing an investment of many million dollars. However, because of poor operation and maintenance of these systems, associated with a lack of community interest, many of these facilities are out of order or supply poor quality water that does not meet the quality standards for human consumption established by the Ministry of Health (Act 56 Bsb). This is a pressing problem to which special attention must be given, in this decade, to achieve systematic control of the drinking water supplied to the population.

To elaborate, for truly efficient control, both from the operational and the economic point of view, rational planning is required to obtain the necessary data and to implement the appropriate correctional procedures, based on independent financing.

Water supply systems constitute an integrated whole starting with water source, quality control, extending to water treatment systems and finally to delivery to the public. The basic control should be in keeping with a policy which will meet the requirements of the "whole" and consequently those of the "parts".

In order to guarantee water quality, in accordance with standards, particularly in small and medium size communities, a healthy survey of the operational conditions of the public water supply system should be made to detect causes that might endanger water quality and to propose adequate preventive and remedial measures if needed.

The following should be evaluated during the inspection:

the location of the water source in relation to possible domestic and industrial sources of pollution;

the vulnerability of the water source to possible change in water quality;

the existence of protection measures in the drinking water;

community water consumption in relation to the capacity to protect the system;

the constancy of the supply of energy;

the fluoride content of the water;

the existing fluoridation processes in the reservoirs. 3/

At the same time, the role of human resources must not be forgotten. Sanitation affairs should be conducted by qualified technicians, including the person in charge of water treatment plants. This can be a woman suitable trained; her job should have status in the community. In this phase of the process, motivation is of major importance, but quite often it fades due to carelessness by the local authorities or because of fluctuations in the labour market.

One of the reasons responsible for the poor quality of the operation of services is the lack of control over and continuous inspection of water supply quality. In this regard, women can perform an essential role, as discussed by Dr. M. Elmendorf. 4/ She underlines the four basic roles of women in relation to water supply: as users of the traditional water services, as introducers of new services, as managers of water resources for the family and the community, as disseminators of hygienic conditions and as agents capable of interrupting the fecal-oral infection cycle by means of the proper use of the services.

To advance these multiple roles of women, the Pan American Health Organization (PAHO) seeks to integrate women into the implementation process of the Five Year Regional Health and Development Plan by action in the following areas.

preparation and experimentation with pilot programmes in sanitary education relating to the development and conservation of water supply systems, sewage disposal and food hygiene;

development of pilot projects in primary education on health and sanitation in rural areas, using women employees;

training of women in rural and urban areas to enable them to participate in the planning and the application of projects involving water supply;

technical training of women to carry out operating maintenance services and repair of water supply systems so that they can fully participate in the operation and quality control of these systems.

Flouridation of water for human consumption

Without doubt, this fact is widely known - adequate water supply promotes both the health of the community and advances its socio-economic and cultural development. The reduction in infant mortality is one of the main points relating to this issue and does not require any further justification. Yet, the full benefit that can be realized from any water supply system adequate both in quality and in quantity, has not been very well worked out. The water supply can be further improved through fluoridation. This reduces the incidence of dental cavities by up to 65 per cent and affects the community as a whole, independently of the economic level of its individual members. To indicate the nature of the problem, Professor A. R. Viegas, School of Public Health, Sao Paulo, cites these data: In Brazil, three-year-old children already have 3.5 decayed teeth on average. At six, this figure climbs to 7.5, 1.5 of which is decay in permanent teeth. At seven, 2.8 of the teeth have cavities or are completely decayed, or have died (GPO). At eleven years of age, the figure is 5.8, and at fourteen it is 11.2. From fifteen to twenty it corresponds to 15, and from twenty to twenty-five years it is 18.2. From thirty to forty it corresponds to 21.9, and from fifty to sixty it is 26.4. 5/ According to the World Health Organization, in Latin America, by the time children start school they are already missing three teeth. By age fifteen this number increases to 11.

The knowledge of the benefits to be derived from fluoridation and of the recommendation for its use to prevent dental decay, issued by the international health agencies, was slow to spread through the scientific community.

Gradually, however, this practice has been adopted for public water supply systems. In many cities fluoridation is now carried out on a routine basis. For example, 200 cities in the State of São Paulo use artificial ion fluoride, and 11 use natural ion fluorine. Out of these totals, 18 employ sodium fluor-silicate and the remainder, fluorsilicic acid. In the State of Sao Paulo, eight million people benefit from fluoridation.

In addition to control of fluor levels, the dental professions should survey and evaluate CPO epidemiological data to determine the efficiency of the fluoridation system.

Women and waste disposal

Sanitary waste disposal is essential to protect public health. Typhoid fever, cholera, enteric diseases, and infectious hepatitis are some of the diseases that can be transmitted through sewage discharge. Two domestic sewage disposal systems are known - one dynamic and the other static. The first is characterized by taking away the discharge by means of sewers, as far as the waste treatment plant. The second is the septic tank. It is very much used where there are no sewers, and it is the primary means for domestic waste water disposal. The waste water from kitchens, domestic

laundries, showers, lavatories, water closets, bidets, bath rubs, urinals, is drained into the septic tank.

Contrary to general belief, the wastes look like and have the characteristics of dirty greyish water. Around 99.9 per cent of waste water are highly contaminated. The liquid is disposed of by percolation through the ground (the action or process by means of which a liquid passes through interstices), while the organic settled matter (around 0.1 per cent) is mainly treated in the septic tank. The lack of knowledge that the effluent of a septic tank is highly contaminated, and must therefore be properly disposed of, causes peoples to pay little attention to this problem, resulting in disastrous consequences to public health.

The septic tank can be bought from manufacturers, or it can be built in a designated location. It can be defined as a settling and decomposing unit, generally covered, that provides horizontal continuous discharge. It is designed and built with waterproof material so that it can receive waste waters, particularly of domestic origin.

Short retention of the waste matter in the tank causes the separation of the solid fraction from the liquid, bringing about the decomposition (bio-chemical transformation) of the organic matter and settlement of the solids, and enables the liquids, somewhat purified, to overflow into a disposal field.

The septic tank and its disposal area must be so located as to:

prevent deterioration in the quality of water supply for human consumption;

preserve the bathing quality of beaches and other sports and recreational resorts;

be easily cleaned and maintained;

prevent bad odours, insects and other nuisances;

prevent direct and indirect contamination of people and animals. 6/

Regarding the role of women in the community, the essential task is to teach them basic hygienic practices relating to the use of waste disposal systems. Women should be trained as users and managers of sanitation services so that they can see to:

adequate utilization and care of latrines by family members, particularly the children;

basic instruction on how to dispose of feces and how to wash hands after defecating and before preparing food;

adequate recovery of waste water and excreta;

adequate maintenance of sewage systems by supervising daily operations;

inspection of the domestic, regional and municipal systems by the local authorities in charge of public services, as well as the training of other members of the community and the family itself.

A programme of this type has recently been developed by Companhia de Saneamento de Minas Gerais, Brazil. It is co-ordinated by women as a community development project. A new method of sanitary education is introduced into the school curriculum by which the pupils are taught how to care for their bodies and health, and how to identify community problems related to sanitation, and so to contribute to a reduction in the infant mortality rate. A set of attractive supporting materials are used - folklore, plays, songs, serials and games - which make the learning process more efficient and agreeable than the traditional method of sanitary education.

Women and solid wastes management

As soon as women get together in a community, they try to dispose of the wastes they generate by dumping them into the ground or by burying them. Then they see to it that the surroundings of their homes are clean. As the community grows, more organized services for packing, collecting, transporting and disposing of the solid wastes generated need to be implemented.

In Brazil, municipal governments usually carry out this kind of service through the "public sanitation services". However, growing industrialization and rapid demographic expansion worsen the problems related to domestic, hazardous and toxic solid wastes, which, in turn, present more serious hazards to health and the environment.

Public sanitation services and women

In small, medium or large town, public sanitation constitutes a basic municipal service that usually expends from 10 to 15 per cent of the town's budget. These services must accord with existing conditions in each municipality and should include the following:

collection and transport of wastes generated in houses, hospitals, shops, small industries, markets, and so on;

maintenance of clean streets, public parks and paths by sweeping, water flushing, provision of litter baskets, and other procedures;

complimentary services, such as cleaning of drains, culverts, trenches and canals, street-weeding, cleaning of monuments, tunnels staircases, streets markets, shores, disinfestation and disinfection of public sites;

final disposal of all solid wastes produced in town. 6/

The interaction of women with sanitation services takes place through a chain which starts with waste generation, its packing and disposal. A woman cannot keep the wastes in her house but, where can she dispose of them? What can be done to prevent dumping sites full of fleas, cockroaches, rats, black vultures, and foul smelling?

In the absence of municipal collection, the most simple and economical solution is to bury the wastes. If a municipal service does not exist, it is the women's job to pack the wastes properly and take them to the spot from where they can be collected by the service, taking into account its schedule and frequency. These wastes are then taken to treatment plants, or to landfills, or composting plants, or incinerators.

However, the role of women in the field of public sanitation is not restricted to these activities. In Brazil, most of the sweeping services are carried out with female labour. Women sweep streets, squares, gardens, and other public places and they perform tasks of coordination and inspection. Those who sweep the streets in Brazil are affectionately called "Margaridas", meaning "crown daisy" or "marguerite". The nickname originated in the beginning of the century with a public sanitation contractor in Rio de Janeiro, who was born in France. His name was Gary, and his workers were called "Gary's men". Still today, in all of Brazil, the sweepers are called "garis". The women who use yellow suits, the colour of the "crown daisy", became "margaridas".

The important point to underline is that women perform basic services to the community with regard to major aspects of hygiene, and that the work of the "margaridas" is as noble and essential as the drawing desk, the T-square and the computer.

Notes

- 1/ Elmendorf, M., and Isely, R.B. 1982. "Función de la mujer en el abastecimiento de agua y el saneamiento". Foro Mundial de La Salud 3, 2: 261 - 26.
- 2/ United Nations Children's Fund, Situación Mundial da Infância, 1983 (New York, 1983).
- 3/ Batalha, B.L. 1980. Guidelines for drinking water control. São Paulo, Brazil: CETESB.
- 4/ Elmendorf, M. 1981. Women, Water and the Decade. Arlington, Virginia: Water and Sanitation for Health. Project (WASH).
- 5/ Viegas, A.R. 1982. International Seminar for Drinking Water Fluoridation. São Paulo, Brazil: CETESB.
- 6/ Batalha, B.L. 1982. "Não construa um poço contaminado". In the manual Água para Consumo Humano. São Paulo, Brazil: CETESB.

P . Women and the International Drinking Water Supply
and Sanitation in Latin America

United Nations*

Introduction

At the beginning of the International Drinking Water Supply and Sanitation Decade (IDWSSD), the people of Latin America were better provided with water supply and sanitation than those in Africa and Asia (table I). Nevertheless, more than 50 million women and 45 million children under 10 years of age were without access to a potable source of drinking water in 1980, and more than 65 million women and 55 million children were without access to adequate sanitary facilities. Naturally, the large majority of these women and children were poor and lived either in the slums of the large metropolitan centres or in the least developed rural areas of the region. The existence of these circumstances at the beginning of the IDWSSD is perhaps not surprising as the raison d'etre of the Decade is the very recognition of this situation. What is more serious is the probable continuation of the situation at the end of the Decade. Even accepting the relatively optimistic targets set by the countries in 1980 - as probably achievable by 1990 - more than 30 million women and 25 million children will still be without adequate source of potable water and millions more will still lack adequate sanitation (see annex).

The question posed by this situation is whether it is unavoidable or not. Could a different approach to the provision of water supply and sanitation, even within the prevalent difficult economic climate, bring about better levels of service over the present decade? If a revised policy could be developed, what should be its basic ingredients and what ways would it differ from the existing policies pursued in most countries of the region? These questions together with a review of the current water supply and sanitation situation in Latin America are discussed in this paper.

Water supply and sanitation in
Latin America

No reliable statistics exist showing the water supply and sanitation situation for the region as a whole at the beginning of the Decade. A recent survey conducted by the Pan American Health Organization provides estimates for some twenty countries which show considerable differences between countries but a common characteristic of a generally much lower provision of facilities to the rural population (table 2).

* Water Resources Unit of the Division of Natural Resources and Energy,
Economic Commission for Latin America and the Caribbean.

Table I

Level of service, December 1980

Region	Water supply		Sanitation	
	% population with service		% population with service	
	Urban (house connection)	Rural	Urban (sewerage connection)	Rural
Africa	51	31	30	18
Asia and the Pacific	54	31	13	12
Latin America	71	43	42	20
West Asia	62	41	37	29
All Developing Regions <u>a/</u>	64	33	33	13

Source: World Health Organization (WHO).

a/ Includes Europe (Malta and Turkey).

This discrepancy in the provision of water supply and sanitation services to the urban and rural population can be said to be a reflection of the institutional structure of the sector. In general, strong institutions have been formed in the region to provide urban water supply and sanitation services over the last twenty-five years. In many countries these institutions are organized at the national level, rather than on a municipal basis, but are concerned only with urban supply. On occasion, these institutions also provide services for the concentrated rural population, or a separate institution exists for this purpose. The dispersed rural population is in no case provided with a specific institution for water supply and sanitation services and normally falls under the responsibility of the ministry of health where water supply and sanitation must compete for funds with many other health programmes. The result of this competition is not always favourable and in few countries of the region are there vigorous rural water supply and sanitation programmes. Evidence for this is provided in the failure of one third of the countries surveyed by PAHO to have established targets for the provision of adequate water supply and sanitation to the rural population for the IDWSSD (table 3).

Policy direction in water supply and sanitation

The creation of uniform national services to replace or supplement existing municipal or state water supply and sanitation companies formed a central part of the policies adopted towards the sector in almost all countries of Latin America. The particular form has varied but the reform possessed a common set of characteristics, including the amalgamation of the provision of water supply and sewerage services under the responsibility of one institution, and the adoption of more vigorous management criteria with

Table II - Level of provision existing December 1980

	Drinking Water Supply				Sanitation		
	Urban		Rural		Urban	Rural	
	% House connections	% Public Tap	% House connections	% Reasonable access	% Sewered	% Septic Tank etc.	% Adequate
Argentina	61	4	n/a	17	32	57	32
Bolivia	24	45	3	7	23	14	4
Brasil	80	n/a	51	n/a	32	n/a	n/a
Colombia	74	26	n/a	79	61	39	4
Costa Rica	95	5	68	n/a	43	50	82
Chile	93	7	17	n/a	69	30	n/a
Dominican Republic	60	25	10	23	25	n/a	4
Ecuador	47	35	14	2	36	3	14
El Salvador	62	6	n/a	40	48	32	26
Guatemala	51	38	18	n/a	35	10	20
Guyana	90	10	n/a	60	27	73	80
Honduras	50		n/a	46	49		26
Mexico	62	2	n/a	43	50	1	12
Nicaragua	67	24	n/a	10	35	n/a	n/a
Panama	93	7	n/a	65	62	n/a	28
Paraguay	39	n/a	2	8	30	65	89
Peru	57	11	21	n/a	55	2	94
Trinidad & Tobago	100		n/a	93	24	71	88
Uruguay	90	7	2	n/a	15	45	60
Venezuela	67	10	n/a	50	60	30	70

Source: PAHO, Sector Digests, December 1982.
n/a = not available.

Table III - Targets for the IDWSSD, December 1980

	Drinking Water Supply				Sanitation		
	Urban		Rural		Urban	Rural	
	%	%	%	%	%	%	%
	House connection	Public Tap	House connections	Reasonable access	Sewered	Septic Tank etc.	Adequate
Argentina	80	20	80	19	70	n/a	50
Bolivia	60	31	20	40	40	40	60
Brazil	90	n/a	n/a	n/a	65	n/a	n/a
Colombia	90	10	60	35	80	20	35
Costa Rica	100	-	74	n/a	70	30	90
Chile	100	-	39	n/a	100	-	n/a
Dominican Republic	70	16	26	28	35	n/a	8
Ecuador	85	10	50	20	65	20	60
El Salvador	85	n/a	n/a	58	n/a	n/a	98
Guatemala	76	24	50	n/a	78	n/a	80
Guyana	100	-	n/a	95	22	78	95
Honduras	90		n/a	90	60		80
Mexico	83	n/a	n/a	58	62	n/a	26
Nicaragua	90	10	n/a	80	50	n/a	n/a
Panama	100	-	n/a	85	99	1	90
Paraguay	70	n/a	10	8	34	n/a	95
Peru	84	11	n/a	n/a	78	6	n/a
Trinidad-Tobago	99		n/a	98	67	33	90
Uruguay <u>a/</u>	95	n/a	4	n/a	15	n/a	n/a
Venezuela	90	3	n/a	85	99	n/a	n/a

Source: PAHO. Sector Digests. December 1982

a/ Targets for 1985

n/a = not available

an emphasis on self-financing. It cannot be claimed that the objectives sought through these policies have been entirely achieved. The policy did, initially, lead to an increase in both the quantity and quality of services and in some countries led to the creation for the first time, of continuing efficient institutions.

The policy also led to an emphasis on centralized piped water supply systems and water-borne sewerage systems with individual house connections of the traditional western type. This policy has much to recommend it in the large relatively high income metropolitan areas, makes sense even in provincial towns; and in some countries can even be successful in villages. Nowhere, however, can it be extended on the dispersed rural population, and too often excludes the very poor due to their inability to pay for even a minimum service.

Current preoccupation with sector policy focuses primarily on perfecting the superstructure necessary to support the large-scale centralized systems. Emphasis is placed on the necessity to generate sufficient financing, followed by the necessity to improve levels of operational efficiency - particularly through better maintenance of the installed infrastructure - and to increase the supply of skilled staff at all levels. Much less, or no concern is felt for the fact that current policies may never permit all the people of Latin America to enjoy clean water and sanitary excreta disposal.

It is undeniable that the present policies have improved and increased the access of the population to both protected potable water and to sanitation. This is particularly true in the urban areas and, in some countries, in rural villages. The most eloquent proof, perhaps, lies in the contribution that water supply and sanitation have made, and continue to make, to the reduction in the occurrence of diarrhoea among young children, considerably lessening the number of deaths (figure 1). A recent study in Chile confirmed the connection between water supply and the occurrence of diarrhoea in young children, showing four times the rate of visits to rural clinics for this reason in villages without water supply.^{1/} It is true that diarrhoea remains the major cause of death of children under 1 year old and that infant death rates are still very much higher in most countries of the region than they are in Europe or North America.

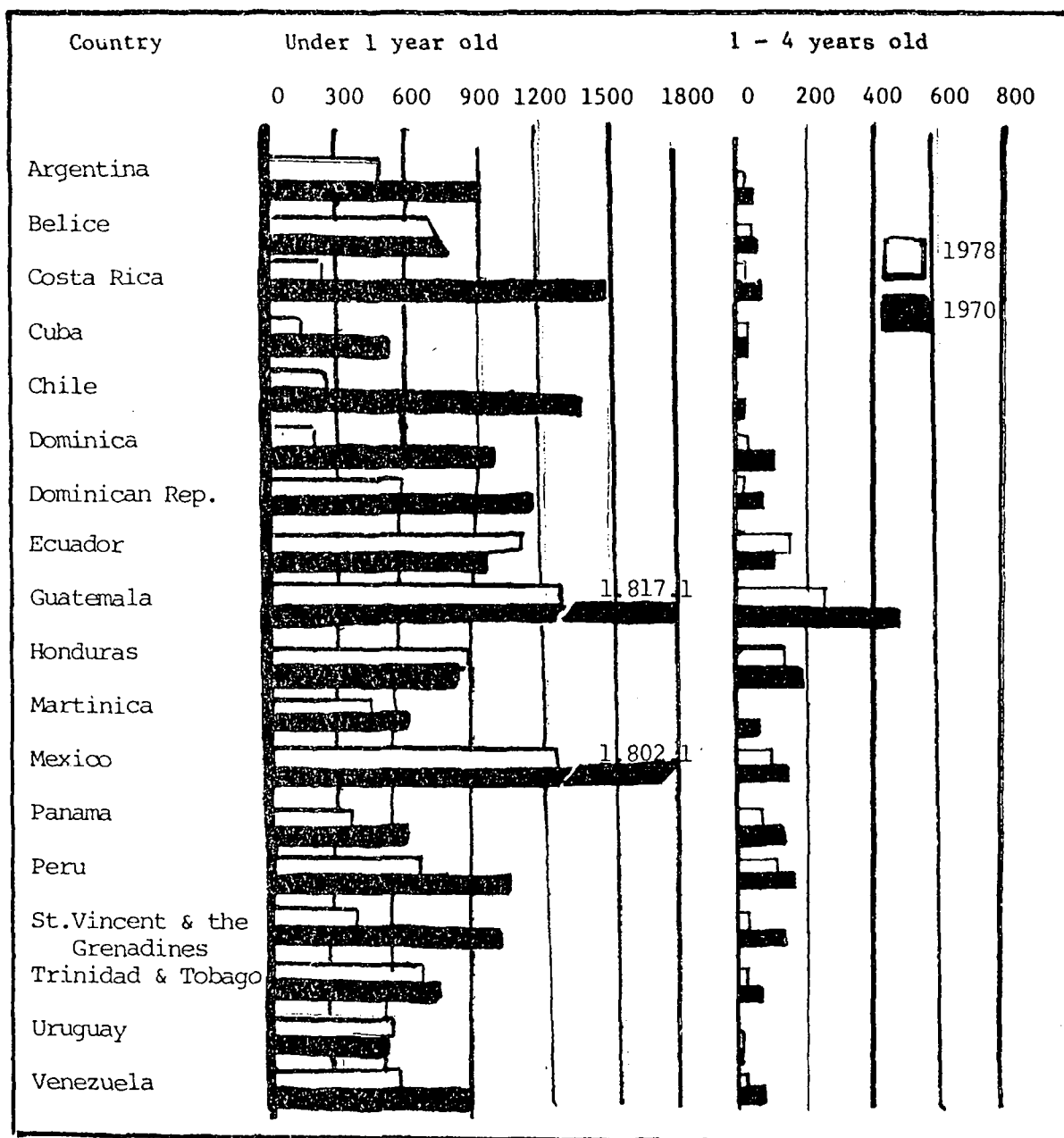
The continuation of high rates of infant mortality is of obvious importance to the women of Latin America. It is probably the most important of all the consequences of unsanitary living conditions for large numbers of the population. It is not, however, the only effect. Adults, too, suffer from water-borne and water-related diseases. In addition, the work of fetching water in Latin America, as elsewhere, is almost always women's work. The difficulties of living with limited water fall almost entirely on women as household tasks are affected most.

Some policy considerations

The basic objective of the IDWSSD is the provision of clean water and adequate sanitation to as many people as possible by 1990. It has been suggested that to achieve this objective, governments should place emphasis on providing service to the unserved low-income rural and urban-fringe

Figure I

Death rates due to diarrhoeic diseases in children under 1 year old and between 1-4 years old, selected countries, 1970-1979



Source: PAHO, Report of the Director, 1981.

population. The expansion of services planned for the IDWSSD will still leave at least two-thirds as many rural women and children without clean water and adequate sanitation in 1990 as in 1980, and the number of urban women and children without adequate sanitation will hardly change. It is only in the provision of drinking water in urban areas that a significant reduction in the numbers without service is planned.

These targets, of themselves, give rise to doubts whether country plans for the IDWSSD actually focus on provision for the urban and rural poor. Moreover, it can be expected that, as has already been mentioned, the increase in investment required to meet them is such that it cannot be realistically expected that they will be reached. With two exceptions, the levels of investment estimated as necessary to achieve the targets set are considerably above those of the late seventies, reaching 900 per cent more in the case of the Dominican Republic. 2/

The demanding investments are in urban water supply and sewerage systems. Only 17 per cent of the investments estimated to be necessary, in the reply to the PAHO Survey, were to be dedicated to rural water supply and sanitation. In part, this reflects the lower cost of providing clean water and sanitation in the countryside but, unfortunately, it reflects the poverty of the proposed programmes.

It is puzzling, at least on the surface, that the provision of clean water and sanitation to the rural, and to the urban poor, has not become a more central part of the IDWSSD programmes in most of the countries of the region. The provision of service in rural areas uses known and relatively simple technology, well within the technical capability of all the countries of the region. The explanation cannot be sought in the direct opposition of any particular interest group, nor in the lack of appreciation of the benefits to be obtained, nor in any change in the level of external assistance. The explanation appears rather to be in a particular combination of internal and external factors which have influenced policy towards the IDWSSD in Latin America.

The most significant internal influences appear to be the already discussed strong urban bias of water supply and sanitation institutions in the countries of the region, coupled with an absence of specific institutions for rural water supply and sanitation. In general, this has led to the adoption of what can be described as high technology solutions with a strong emphasis on efficiency.

Externally, the urban focus has been encouraged and even led by a strong emphasis on sector policies directed towards the development of water supply and sewerage systems so managed as to generate revenues in sufficient quantities to cover both operating and maintenance costs and to finance new capital investments. These concerns have overshadowed activities of international organizations directed towards rural problems. Moreover, there has been a tendency to neglect the rural water supply and sanitation problems of "middle-income" countries to concentrate on the problems of the poorest countries. This has weakened the impact of external advice in Latin America.

A means must be found to redress the balance so as to breathe new life into the Decade and make it possible to extend water supply and sanitation to the most neglected of the region's people. It is suggested that here is perhaps where women's organizations both national and international could direct their efforts. Strong advocacy is required for the establishment of water supply and sanitation institutions with solutions suitable for the country-dweller - hand pumps and latrines or other forms of individual or small group arrangements. Without an appropriate institutional framework it cannot be anticipated that any change will be achieved in the present focus of water supply and sanitation policies or any considerable progress be made in extending safe water and sanitation to the whole population of the region by the end of the century.

Notes

- 1/ Departamento de Agua Potable Rural, Servicio Nacional de Obras Sanitarias, Chile, "El agua potable: factor de la salud", Foro Mundial de la Salud, Vol. 4, No.2, 1983, pages 198-199.
- 2/ For a detailed discussion of the financial aspects of the IDWSSD in Latin America see, "The financial demands of the International Drinking Water Supply and Sanitation Decade in Latin America", in Drinking water supply and sanitation in Latin America 1981-1990, Estudios e Informes de la CEPAL, No.25, 1983.

Annex table 1

Latin America: Women and children without water, 1980-1990 a/

Country	Urban				Rural			
	1980 '000's		1990 '000's		1980 '000's		1990 '000's	
	Women	Children	Women	Children	Women	Children	Women	Children
Argentina	3,252	1,379	0	0	1,405	1,027	16	12
Bolivia	289	215	123	100	919	952	475	480
Brazil	5,918	3,806	4,145	2,463	13,235	12,788	10,537 ^{b/}	9,450 ^{b/}
Colombia	0	0	0	0	1,784	1,711	140	128
Costa Rica	0	0	0	0	128	110	115	94
Cuba ^{b/}	245	104	0	0	1,016	645	599	325
Chile	0	0	0	0	664	492	496	354
Dominican Republic	157	119	226	145	664	696	514	457
Ecuador	238	191	101	81	1,191	1,255	522	547
El Salvador	257	191	184	129	489	579	428	479
Guatemala	109	81	0	0	1,135	1,283	956	923
Haiti	462	306	436	300	1,496	1,442	1,666	1,640
Honduras	258	225	86	68	370	451	87	95
Mexico	5,841	5,007	4,107	3,091	4,365	4,634	3,636	3,412
Nicaragua	48	44	0	0	338	422	91	107
Panama	0	0	0	0	92	94	43	37
Paraguay	296	193	208	136	571	574	672	631
Peru	1,297	996	289	223	1,698	1,675	1,469 ^{b/}	1,474 ^{b/}
Uruguay	31	13	0	0	121	70	0	0
Venezuela	1,001	785	444	321	571	627	206	207
Latin America	19,698	13,653	10,348	7,058	32,251	31,527	22,671	20,854
%	23.0	24.0	8.7	9.5	77.3	76.7	49.2	49.1

Source: CELADE, Boletín Demográfico, Año XIV, No.28, July 1981: PAHO, Sector Digests, December 1982.

a/ Based on country targets.

b/ ECLA, Drinking water supply and sanitation in Latin America, 1981-1990. Estudios e Informes de la CEPAL, No.25, 1983.

Annex table 2.
Latin America: Women and children without adequate sanitation, 1980 and 1990 a/

Country	Urban				Rural			
	1980 '000's		1990 '000's		1980 '000's		1990 '000's	
	Women	Children	Women	Children	Women	Children	Women	Children
Argentina	1,022	433	3,251 <u>b/</u>	1,316 <u>b/</u>	1,151	841	825	583
Bolivia	588	437	274	223	980	1,016	475	480
Brazil	20,121	12,939	14,509	8,621	11,029 <u>c/</u>	10,656 <u>c/</u>	7,128 <u>c/</u>	6,392 <u>c/</u>
Colombia	0	0	0	0	2,635	2,527	1,823	1,658
Costa Rica	30	15	0	0	72	62	44	36
Cuba <u>c/</u>	191	81	335	117	440	280	649	352
Chile	36	18	0	0	88 <u>c/</u>	65 <u>c/</u>	0	0 <u>c/</u>
Dominican Republic	786	594	1,048	672	951	998	1,028	915
Ecuador	805	648	303	244	1,220	1,285	696	729
El Salvador	161	119	122 <u>c/</u>	86 <u>c/</u>	603	715	21	23
Guatemala	546	406	321	221	1,107	1,252	382	369
Haiti <u>c/</u>	556	368	576	396	1,421	1,370	1,177	1,159
Honduras	263	229	346	271	506	618	174	191
Mexico	7,950	6,815	9,180	6,909	6,738	7,155	6,406	6,012
Nicaragua	344	316	410	363	308	385	295 <u>c/</u>	348 <u>c/</u>
Panamá	156	97	0	0	189	193	29	25
Paraguay	24	15	458 <u>b/</u>	299 <u>b/</u>	70	70	41	38
Peru	1,742	1,339	921	716	129	127	1,592 <u>c/</u>	1,597 <u>c/</u>
Uruguay	419	176	0 <u>c/</u>	0 <u>c/</u>	63	37	0 <u>c/</u>	0 <u>c/</u>
Latin America	36,176	25,387	33,955	21,831	30,044	30,026	22,786	20,907
%	42.2	44.5	28.6	29.4	72.0	73.0	49.5	49.3

Source: CELADE, Boletín Demográfico, Año XIV, No.28, July, 1981: PAHO, Sector Digests, December, 1982

a/ Based on country targets.

b/ Excludes population served by septic tanks.

c/ ECLA, Drinking water supply and sanitation in Latin America, 1981-1990, Estudios e Informes de la CEPAL, No.25, 1983.

Q. Environmental sanitation and drinking water supply
in the Dominican Republic

Martha Olga García*

Introduction

The island of Santo Domingo is located in the centre of the Antilles Archipelago in the northern hemisphere. The island is shared by two countries - the Dominican Republic and the Republic of Haiti.

The Dominican Republic is located between 17°16' and 19°56' north latitude and 68°19' and 72°01' west longitude, with a territorial extension of 48,442.23 square kilometres.

Due to its geographical location, the climate in the Dominican Republic is tropical, with an annual average temperature of 25° centigrade and precipitation which varies from less than 450mm in some areas to more than 2,000mm a year in others.

The territory has a population of 5,647,977; 2,815,523 or approximately 50 per cent are women.

Water supply services

Coverage

In 1980, the country had 249 drinking water supply systems in operation, fulfilling the requirements of 15541 communities for house connections. About 175 of these systems were under rural administration and served urban as well as rural communities.

Furthermore, 74 rural administration systems supplied 143 locations of which 75 were urban:

Table 1. Drinking water coverage

Zone	Population	House Connections	Percentage	Access	
				Accessibility	Percentage
Urban	2,751.9	1,651.4	60.0	688.0	25.0
Rural	2,826.3	282.6	10.5	616.0	23.0
Total	5,578.2	1,925.4	35.0	1,340.0	24.0

Source: "Situation of children and infants in the Dominican Republic", (ONAPLAN), October 1983.

As of July 1980, the population served by house connections was 60 per cent. It was estimated that an additional one fourth of the urban population had access to this service from other sources, yielding a coverage of only 85 per cent of the urban population.

* Director National Division for the Advancement of Women.

As for the rural areas, only 10.5 per cent of its population is being served through house connections; 23 per cent has easy access. Therefore, the total coverage for the rural population is 33.5 per cent.

To summarise, we can state that the total population of the country with access to drinking water supply is 35 per cent, and with house connections 24 per cent. Thus total coverage is 59 per cent of the population.

It is important to point out that in Santo Domingo, the capital of the Republic, an estimated 72 per cent of the population is supplied through house connections.

Availability

Research on water availability with reference to consumer demand has been carried out by the National Institute of Drinking Water and Sewerage, INAPA, for the city of Santo Domingo. The data indicate that the total production of the system in 1981 was 4.61 cubic metres per second and average demand 5.43 cubic metres per second. If service breakdowns causing interruptions are taken into consideration, the deficit is much higher.

Another factor to be considered is water loss in its two forms: leakage and waste by the consumer. Leakage is estimated at 36 per cent of total production.

Sanitary sewerage and excreta disposal

There are no sewer systems in rural communities, and in the urban areas they are not very effective.

In early 1982, sewer coverage for the urban areas was 22 per cent employing such low technology solutions as filters, septic tanks, and so on.

Table 2. Government agencies providing sanitary sewer service and population served by each, 1982.

<u>Administrating Organisation</u>	<u>Population served</u>
INAPA	136,007
CASSO	400,000
COASSAN	<u>107,800</u>
TOTAL	<u>643,807</u>

Source: National Institute for Drinking Water and Sewerage.

In the rural areas, disposal of excreta is mainly latrines and in open fields. According to data from a survey carried out by the Ministry of Health and Welfare, in 1982 there were 54.2 latrines for each 100 houses. As a result of this survey, however, the actual coverage was determined to be 43.4 per cent, reflecting only latrines in good conditions. The actual deficit is thus 56.6 per cent.

Table 3. Relating number of latrines to number of houses in rural areas, 1982.

Houses	Latrines	Relative/percentage
563,865	305,832	54.2

Resources

The resources assigned to this sector are relatively low (less than 1 per cent of the National Budget). This makes for a difficult functional situation since the sector's 2,566 permanent posts fall under the Central Government Budgets.

Table 4. Staff per institution in the drinking water and sewerage sector, 1980.

Institution	Staff	Percentages
INAPA	1,433	56
CASSO	760	29
CORAASAN	279	11
UAPODAN (SESPAS)	50	2
LIGA MUNICIPAL	40	2
TOTAL	2,566	100

Source: "Situation of children and infants in the Dominican Republic". Secretariado Técnico de la Presidencia, October 1983.

A brief glance at the Central Government Budget shows that only 1.8 per cent has been allocated to this sector during the five year period 1975-1979.

Table 5. National Budget and National expenditures in drinking water and sewerage sector, 1975-1979

Year	General Government expenditures (in million pesos)	Government expenditures drinking water and sewerage (in million pesos)	Percentage
1975	1,927.0	29.64	1.5
1976	1,714.0	37.35	2.2
1977	1,878.6	44.92	2.4
1978	1,954.9	33.61	1.7
1979	1,871.5	36.86	1.3
Total period	10,256.0	182.38	1.8

Table 6. Public expenditures in drinking water and sewerage

Year	General Expenditures (in million pesos)	Percentage	Capital expenditures (in million pesos)	Percentage	Total
1975	5,490,785	19	24,146,719	81	29,637,504
1976	8,932,339	24	28,146,719	76	37,354,342
1977	7,436,174	17	37,479,560	83	44,915,734
1978	9,896,786	29	23,711,715	71	33,608,537
1979	11,737,822	32	25,121,646	68	36,859,468
<hr/>					
Total Period	43,492,906	24	138,881,679	76	182,375,585

Water supply and sanitation programmes related to women

Women's issues

To improve drinking water supply and sanitation services especially as they relate to women, the Dominican Government has undertaken an integrated development programme, which is currently being carried out in the south western region of the country.

The programme is sponsored by the United Nations Children's Fund (UNICEF), and is being implemented with multi-sectorial government participation, involving the Ministries of Public Health, Agriculture, Education and Defense, as well as such institutions as Agrarian Reform, Energy Policy Agency, National Forestry Directory and the Office of the National Division for the Advancement of Women, which functions under the Office of the President.

Goals for 1990

The goal for the next few years (to 1990) is to provide 52 per cent of the total population of the country with drinking water through house connections. Approximately 3.7 million people are anticipated to be served, necessitating an investment of some 525 million pesos. In terms of annual expense per inhabitant this amounts to 7.2 pesos.

The goals are to cover 25 per cent of the rural population through house connections involving the communities in the projects.

R. L'eau potable des rivières de la République du Panama **

Elvia Jaramillo de Guzmán*

Les premiers aqueducs et égouts de la République de Panama furent construits dans les villes de Panama et de Colon conformément au Traité du Canal conclu en 1903 entre les Gouvernements de Panama et des Etats-Unis, dans le but d'assainir la région tout entière, où devait être construite la voie interocéanique, et ce afin de sauvegarder la santé des employés nationaux et étrangers participant à ces travaux.

Le premier aqueduc entra en service le 4 juillet 1905 à Panama, et, depuis ce jour, il est alimenté par le barrage du fleuve Chagres, qui constitue un élément important des travaux de construction du Canal.

Le traité précisait d'autre part que les fonctionnaires de la zone du Canal administreraient le système d'aqueducs et d'égouts des villes de Panama et de Colon, ce qui ne se fit qu'à l'adoption de l'accord en douze points, lequel fut signé le 18 mai 1942 alors que les Etats-Unis acceptèrent de remettre ce réseau au Panama en 1957.

Le 28 décembre 1945 fut signé le document de rétrocession. Par conséquence, en 1945, le Panama devenait le propriétaire légal des canalisations et du système d'égouts des villes de Panama et de Colon. En fait, toutefois, la Compagnie du Canal continuait à les gérer et à les entretenir, comme stipulé dans le contrat, lequel comportait par ailleurs la formation du personnel panaméen qui devait se charger de ces tâches par la suite.

Cette situation dura jusqu'à 1952, date à laquelle s'effectua le transfert et à laquelle la République de Panama assumait la responsabilité de ces opérations. Cependant, il devint évident que le système ne serait plus en mesure de répondre aux besoins après 1970.

La société française Chagel proposa alors au Gouvernement panaméen de retenir les eaux du fleuve Laja dans le but de fournir une source d'alimentation en eau pour la ville de Panama, et, d'après ses calculs, le coût de production devait être inférieur à 7 cents par pied cubique (environ 27 cents par mètre cube), selon le rapport présenté à la fin de 1956 par la Direction de la voirie, des caniveaux et des aqueducs.

C'est à ce moment que fut créée la commission des aqueducs et des égouts de Panama chargée de l'étude des plans d'élargissement et de la construction du système de distribution des 18 aqueducs de la ville de Panama avec l'aide de la firme Wansen.

En ce qui concerne l'intérieur du pays, les trois premiers aqueducs furent construits entre 1914 et 1920 dans les villes d'Aguadulce, de Las Tablas et de Pese, et tous trois furent le fait d'initiatives privées. Par la suite, les capitaux nécessaires étant venus à manquer, les entrepreneurs ne purent réaliser les agrandissements nécessaires et le Gouvernement se

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** Presented in French as written by the author.

trouva obligé d'acquérir ces installations. Cela se fit grâce à la participation du Ministère de la planification et de la politique économique, de la direction générale et administrative de la Présidence, du Service cartographique du Ministère des travaux publics, de l'Institut du logement et de l'urbanisme et du cadastre rural de la direction de la réforme agraire du Ministère du développement agricole, et de l'Agence internationale pour le développement, du génie civil de la construction, de la Division du Canal de Panama, de Force et Lumière et, enfin, de Greley et Sansen qui avança les fonds nécessaires.

D'autre part, le Département de la santé publique du Ministère du travail, de la prévision sociale et de la santé publique se chargea de la construction, de l'inspection des opérations d'entretien des systèmes d'aqueducs et d'égouts de Colon et de l'intérieur du pays.

Le 28 novembre 1956 fut créée la Commission des aqueducs et égouts nationaux en tant qu'entité autonome chargée de l'entretien et de la construction des aqueducs et des égouts de toute la République. Cette institution, en tant qu'entité juridique avec capital propre et autonomie de fonctionnement, commença les travaux le 1er janvier 1962.

Conformément à la communication adressée en 1965 par les autorités de la zone du Canal par l'intermédiaire de la chancellerie, dans laquelle elles indiquaient que la station d'épuration de Miraflores ne pourrait fournir à la ville de Panama que 30 millions de gallons d'eau par jour, autrement dit qu'elle atteindrait sa capacité de rendement maximum en 1970, l'IDAAN, par l'intermédiaire de la direction régionale de la planification et de l'administration de la présidence chargea, pour la somme de 54,000 dollars, la Société Greeley et Hansen de faire une série d'études sur la construction d'une station autonome. Cette somme fut fournie par l'Alliance pour le progrès. Le contrat fut signé le 4 janvier 1966 et comprenait une étude des diverses solutions visant à suppléer aux besoins d'eau de la ville de Panama jusqu'en l'an 2020.

La firme G et H présenta son rapport sur les études relatives aux diverses options le 9 mai 1967, et procéda à la préparation d'un avant-projet de demande de crédits à l'AID pour la dite construction, demande d'un montant de 15 millions de dollars, pour compléter le financement de l'ouvrage. Pour sélectionner la société que l'on devrait charger de la construction, on créa une commission composée de spécialistes compétents. Le 16 mai 1970 fut signé un contrat pour la construction de la station d'épuration des eaux avec le Consortium "CONSAGUA", composé des firmes américaines "METCALFE AND EDDY AND VITIN" et la firme panaméenne d'ingénieurs associés.

L'étude détaillée du projet débuta le 1er mai 1970. Un rapport sur sa conception d'ensemble fut soumis le 1er septembre 1970. Les plans finaux, les dispositions spécifiques et les documents annexes du contrat furent présentés le 15 novembre 1971. Tous les contrats relatifs à la construction furent signés le 26 avril 1972 et la construction des ouvrages commençait le 4 septembre 1972. Le 1er octobre 1974, l'ouvrage était inauguré.

La population du pays atteint 1,830,175 habitants au total le 11 mai 1980, selon le recensement effectué à cette date par la section du Bureau des statistiques du contrôle général de la République. D'après les chiffres

préliminaires publiés par le bulletin de recensement d'août 1980, la population urbaine atteint 890,701 habitants au total, ce qui représente 49 p. 100 de la population de l'ensemble du pays, alors que secteur rural n'en représente que 51 p. 100.

Parmi les 46 centres de population considérés comme urbains, 42 disposent d'adducteurs placés sous la responsabilité de l'IDAAN. Parmi les quatre communautés restantes un puits profite de l'adduction de la municipalité, une autre vallée bénéficie d'un adducteur administré par une entreprise privée et les deux dernières reçoivent leur eau de la compagnie "Banani United Fruit" (Chan Guinola et Bocas del Toro). Il faut remarquer que l'IDAAN distribue l'eau potable aux 97,7 p. 100 de la population urbaine.

Il faut tenir compte du fait que cette population croît au rythme annuel de 2,25 p. 100 et qu'il faut estimer l'investissement nécessaire pour faire face à la demande à un total de 1,500,000 de dollars et plus par an, calculé sur la base de 60 dollars per capita en paiement des constructions requises.

En ce qui concerne le secteur rural qui doit faire face aux problèmes qu'entraînent une très grande dissémination démographique, on a planifié son alimentation en eau potable en établissant un système d'adduction conçu sur la base de réseaux privés pour 500 à 2,000 habitants, l'IDAAN étant chargé de leur construction et de leur administration. En ce qui concerne les communautés de le Ministère de la santé avec la collaboration des communautés intéressées et dont l'administration relève des comités locaux sous la responsabilité de la section sanitaire dudit Ministère. Pour les localités isolées de moins de 200 habitants, le Ministère a prévu des puits tubulaires profonds fonctionnant avec des pompes manuelles à raison d'un puits pour 50 habitants. Le Ministère de la santé et l'IDAAN fournissent ainsi de l'eau potable à 250 communautés rurales de 500 à 2000 habitants.

Nous sommes heureux qu'en dépit du problème que présentent la dissémination démographique rurale et les difficultés dues aux problèmes d'accès et de communication, les efforts conjoints de l'IDAAN et du Ministère de la santé ainsi que du secteur privé, se reflètent dans les bons résultats obtenus, 47,5 p. 100 de la population rurale dispose d'eau courante potable, chiffre très proche de l'objectif fixé de 50 p. 100 fixé par le Conseil du Ministère de la santé publique américain.

En ce qui concerne les égouts, il y en a 17 au total qui, pour des raisons évidentes, se trouvent dans les secteurs urbains ou ils fonctionnent pour 60 p. 100 de la population. Pour la ville de Panama les égouts mélangent les eaux usées et les eaux de pluie dans un système mixte à l'embouchure du canal, et celles-ci sont déversées dans la baie de Panama, où la marée baisse considérablement, créant ainsi un sérieux problème de pollution et un obstacle évident au développement touristique.

On a pensé aux moyens d'assainir le vieux quartier et les plages de la capitale et on a réalisé des études préliminaires à cet effet. Mais étant donné le coût élevé de ces travaux, l'IDAAN a suspendu leur exécution pour mettre en œuvre d'autres programmes d'assainissement considérés comme prioritaires.

En général, tous les systèmes d'égouts de l'intérieur du pays ont besoin de collecteurs principaux plus importants, aux réseaux plus étendus et de différents systèmes d'évacuation des eaux usées complètement.

Il faut observer que les anciens réseaux sont en parfait état de conservation mais que leur capacité est insuffisante. Malheureusement, et à part de rares exceptions, les recherches de financement extérieur sont restées infructueuses, mais l'IDAAN, qui jouit de la confiance des agences internationales en raison de son haut niveau technique et de son respect fidèle envers ses obligations financières, est persuadé qu'il sera bientôt en mesure de poursuivre son programme d'assainissement au bénéfice de la communauté panaméenne.

La République de Panama est à l'avant-garde, avec les nations développées les plus puissantes du continent américain en ce qui concerne la distribution d'eau potable, et elle est heureuse des bénéfices tangibles procurés à la communauté qui reçoit de l'eau de bonne qualité dans ses foyers.

S. Pertinent research:

Generalizations and linkages
drawn from a preliminary review
of the literature on
women in water and sanitation

Mary Elmendorf*

Literature search

This paper is a report on a preliminary search of the literature on women's roles in water supply and sanitation. During the preparatory phase of the UNDP Project INT/83/003, "Promotion and Support for Women's Participation in the International Drinking Water Supply and Sanitation Decade (IDWSSD)", "a collection of relevant material especially in community participation and health education was carried out. These documents included published and unpublished theses, reports etc. from various institutions including the World Bank, PAHO, WASH, (Water and Sanitation for Health), USAID, IDRC, ATI (Appropriate Technology International), AED (Academy for Educational Development) and from several specialized women-in-development libraries. This latter group included: EPOC (Equity Policy Center), TC (Trans Century Foundation), OEF (Overseas Education Fund), CEPA, ICRW (Women's International Center for Research on Women) and several universities. There is more material which has been reviewed at project headquarters from UN agency documents, especially WHO and UNICEF, which has not yet been incorporated into this collection and is an addition to two previous bibliographies.

a) An annotated bibliography on Participation and Education in Community Water Supply, Bulletin No.13 prepared by IRC (International Reference Center for Community Water Supply), 1979;

b) A three-part unannotated bibliography Women's Roles and Community Participation in Water Supply and Sanitation, Technical Report 18 prepared by WASH (Water and Sanitation for Health) USAID, 1982.

Both of these existing bibliographies are focused very specifically on water and sanitation, and as such are valuable contributions to the IDWSSD in that they point out the importance of the "software" aspects of water supply and sanitation. In some selections on community development and education women are referred to indirectly. In a few specific documents women are singled out and listed in the indexes under women. Christine Van Wijk/Sijesma of IRC prepared an excellent summary of the findings of the 1979 IRC bibliography in Participation and Education in Community Water Supply and Sanitation: A Literature Review, Bulletin IRC No.12. This document is still a basic reference for planners, researchers and programmers who are concerned with the human dimension of the Water Decade, especially as women are increasingly recognized as the forgotten or ignored human resource.

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As a contribution to the IDWSSD and to INT/83/003 WASH has just completed a working bibliography entitled Women's Roles in Water Supply and Sanitation in Developing Countries using part of the newly assembled documents as an update to their Technical Report 18. This preliminary bibliography, just as the earlier ones, is primarily limited to those documents referring specifically to water supply and sanitation.

Linkages

Since project INT/83/003, as noted in the project document, is based on the premise that increased involvement of women will improve the impact of the IDWSSD activities on the health and welfare of families in the more disadvantaged sectors of the population (and by implication, the well-being of the women themselves), we need a broader focus. We need to identify linkages between women, water and sanitation with other sectors of wider interest. We need to look to existing studies and reports to recognize women's actual problems and see how women's participation has been obtained, can be increased, and how to measure beneficial impacts to women and their communities. We need to look at impact in broader terms than health or income. We need specific case studies and careful project evaluation. We can look for some of our answers in a number of closely related fields which have sprung up during the last decade in which women's studies have been given new importance as illustrated in figure 1. We can thus select useful concepts, methodologies and findings on which we can build our own action research and projects. In some of the assembled materials water and sanitation may not be mentioned specifically but relevant approaches or techniques can be immediately useful or may need modification to fit the culture and/or the project.

The last category of figure 1, Women, health and development, is the most integrated approach and if interpreted broadly can encompass most of the sectors where water and sanitation are or should be included as an integral part of planning with women acting as the key planners. In the last few years a number of agencies, including WHO, PAHO and research institutions have moved in this direction with policy and strategies being tested.

Relevant sectors

Among the most important relevant sectors with strong linkages to water and sanitation are those listed in figure 2.

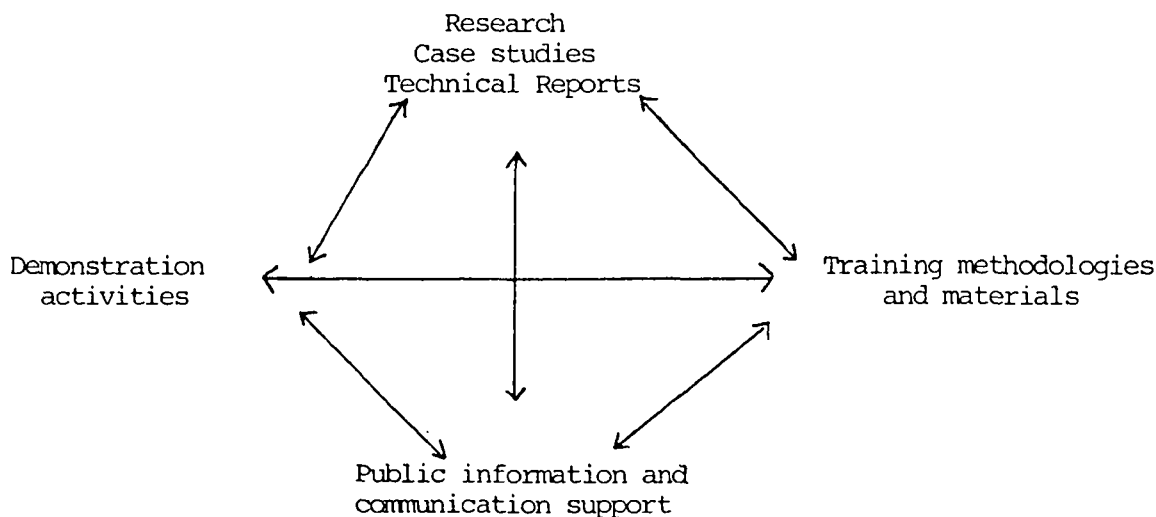
I will review some of the material in our literature on women which was not specifically focused on water supply and sanitation but was included in the WASH bibliographies to indicate how some of these documents can be useful to us. I also want to refer to some of the material which was omitted to point out its importance and relevance. Then I will make some generalizations about how women, water and sanitation can be a key to health and integrated development, a missing element in much other sector planning.

Before discussing some of the new documents which relate to the various sectors or fields it seems important to think about how the material in the existing bibliographies might fall into the three foci of the seminar: health,

science and technology, and socio-economic development. There are real difficulties in separating problems, issues and solutions into these areas. Undoubtedly there will be overlapping in the sessions but this is understandable. In fact, it is important that we maintain a holistic view.

Interdependence

As pointed out in the project document and in Sarah Timpson's excellent summary of the first six months of work, "a final element of the (project) strategy is the fundamental interdependence of activities undertaken under each of the four project components with each contributing to the other and constant feedback and exchange needed". The following diagram illustrates this interdependence.



This interdependence of components related to another strategy of INT/83/003 which has been stressed since the beginning - integration into existing or planned actions rather than undertaking separate "women's activities".

Approach

A carefully thought-out diagram indicating the importance of this kind of integrated approach was developed in Thailand, where women, water and sanitation are seen as key parts of community action for the delivery of basic services.

Figure 1. Fields of women's studies
related to water and sanitation

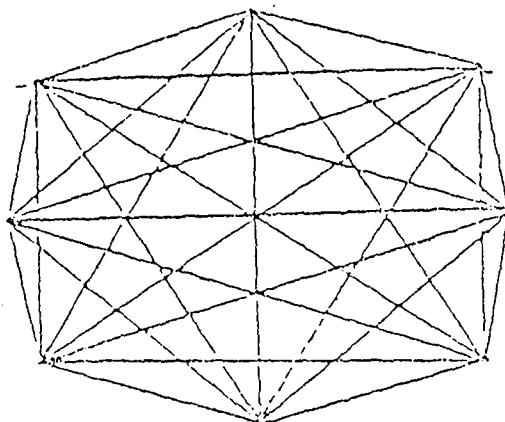
<u>Field</u>	<u>Findings/methods/technique</u>
Women & development	Roles, status decision-making Time-use allocations
Women & health	Primary health care Maternal child health Diarrhoea prevention & cure Oral rehydration therapy Hygiene education Environmental health Nutrition
Women & technological change (to meet basic needs)	Diffusion Acceptance Adaptation
Women & education/communication	Demonstrations "Learning by doing" Participation, planning action and evaluation
Women & community participation	Defining felt needs Appropriateness Involvement
Women, health & development	Combining the above approaches.

Figure 2. Water and sanitation and related sectors

<u>Sectors</u>	<u>Content</u>
Housing	Use of space Personal hygiene Environmental health
Nutrition	Wastage Mal absorption } Diarrhoea Spoilage
Food and Agriculture	Changing old patterns of work, storage, preparation. Time Energy
Irrigation/human welfare	Domestic uses of water Re-use of water and excreta
Employment/income generation	Labor Income generating Productivity
Technology	Technically appropriate Socio-culturally acceptable Affordable financially
Education	Communication Community participation Training

Figure 3.

Community action
for the delivery
of basic services



Source: Community Development, Ministry of Interior, Thailand,
Annual Report, ASEAN-WID. July 1982.

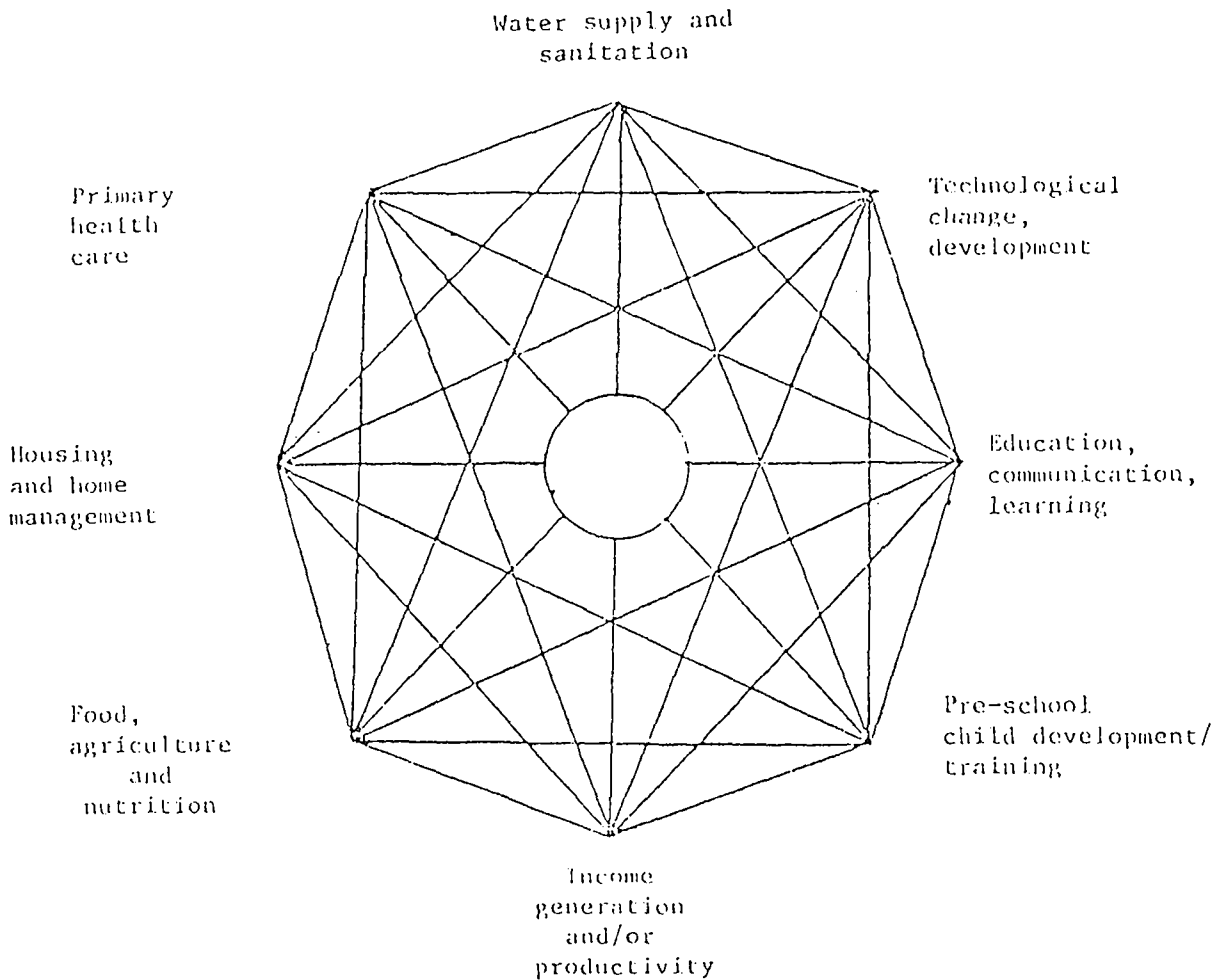
In this diagram the intra-inter-relationship of women to the basic services is clear. Dr. Pairat Decharin of the Thai Community Development Department explained that in the 1960's the emphasis of their program had originally been on training and nutrition and home economics for women, including personal hygiene and sanitation. After a very slow start they realized that income-generating projects were necessary to stimulate greater response from women and to accelerate their progress in the other areas. This concept is confirmed by other women-in-development (WID) and agency experience.

For our review it would be interesting to take this diagram on Thailand and put women as the focal point, where all the sectors interlock - in reality the role most rural and many urban women play in their homes and communities. Using this as a model we can discuss where/how our projects relate to others and what we can learn/share.

Various people such as Titi Memet, UNICEF Director for Asia and the Pacific and Vinitha Jayasingh, Director of the Women's Bureau (now Ministry) in Sri Lanka have observed that efforts to improve sanitation and health can be more successful if preceded by income-generating activities. As a response to this concern a booklet called Navamaga: Training Activities for Group Building, Health and Income Generation 1/ was developed, field tested and

Figure 4.

Community action for the delivery of basic services



published in 1983. Specific personal hygiene and sanitation messages are interspersed with the instructions on cash producing activities.

There are however few longitudinal studies which address this issue at the subsistence or near-poverty level where most of the IDWSSD projects will be concentrated. In Nepal such data has been collected, analyzed and a summary publication, *Women and the Subsistence Sector: Economic Participation and Decision-Making in Nepal*,^{2/} even though it is not focused on water and sanitation, is included in our preliminary bibliography. In this article Acharya and Bennet noted:

The need to use income generation as an entry point can hardly be over-emphasized. For most women participation in traditional programs in health and family planning, education, nutrition and child care, etc., is a luxury they cannot afford. Unless the time women spend away from household and agricultural chores can bring in some visible contribution to family income, neither they nor their households will feel that the time is justified. Time is in fact a crucial issue for women. With an average female work burden of 10.81 hours per day (compared to 7.51 for men) rural women have no "spare" time. Hence, workload of women, as well as the seasonal variation in their work loads and their daily activity schedule should be kept in mind and efforts to develop labor-saving village technologies should be intensified...

This is the crucial point at which more accessible water, as a time and labour-saving technology, can make a difference to women's status, roles and health but there is very little research to document this. When income-generating activities are made available in combination with the introduction of labour-saving village technologies time and energy can be channelled into more productive activities. Acharya and Bennett also pointed out that "women's increased visible contribution to the household especially if it is in the form of cash, usually brings them greater decision-making power in domestic allocations of funds" which means that women potentially can influence spending of money for operation and maintenance of water supply and sanitation systems. Not only are their findings relevant to our problems but the excellent research tools and techniques they developed are equally useful. More information on the approach can be found in various reports including Employment and Income Generation for Women prepared by ICRW which is also included in the bibliography.

Problems and solutions

Since two of the primary objectives of the seminar are to indicate the cause of the problems confronting women in water supply and sanitation and to reach a consensus on the most meaningful approaches to address these problems with a view to reaching possible solutions, it seems that we must start with the assumption that women must have more time and energy if they are to be front-line health workers in primary health care programs, managers of their households and trainers of their families. As increasing recognition is given to the important roles of women in the performance of their multiple roles in home and community, equal recognition must be given to the time and energy needed to carry out these roles. In fact the possibility of carrying out income generating activities - even of obtaining training and/or funds - is often impossible without time and/or energy.

Nutrition

Better nutrition is often seen as a strategy to improve health and energy. As was pointed out at a 1982 symposium "Women, Health and International Development" 3/ introducing improved diets, more and better food often does

not bring about the desired improvements in nutritional status because of the continuing burden of infections and infestations. Many of the researchers and field project personnel working in food and agriculture would welcome co-operative projects with INT/83/003 since they are aware of the "water supply-nutrition linkages." They have developed relevant field techniques for testing improved nutrition but a very significant variable which skews their results is continued diarrhoea often water-related.

Elmendorf and Isely used a theoretical framework developed by Chen^{4/} to show how improvements of water supplies could affect nutrition and/or energy availability through various mechanisms. Increased household food can become available through home gardens, animal husbandry, or by cash income. With more accessible water sources, women can use their time saved for more efficient household management or storage, processing, distribution of food and more attention to child feeding. Energy expended by women and children in water drawing and carrying could be reduced by more accessible water sources. Last, but not least, the reduction of chronic and acute infections and infestations could reduce the wastage of nutrients with resulting lowered energy availability.

The magnitude of the nutritional effects will vary widely depending on many variables including the socio-cultural characteristics of the community, geographic and climatic conditions, systems of water improvements and parallel programs in sanitation and health education. Of significance are the mediating effects of savings in women's time and energy and increases in food production/assimilation occasioned by these improvements.

Chen's article and similar material from the nutrition sector offer new insights and approaches and should be added to an enlarged bibliography.

Diarrhoea

Closely related to the linkage is the diminution of water-related diseases especially diarrhoea which results in part from scarce water for personal hygiene. Women who care for young children have been shown to have increased numbers of pathogens on their hands, making them at risk for disease transmission to both themselves and their families. Dysentery, gastroenteritis, roundworm infections, and hepatitis are among the most frequent of the water-washed diseases.

Whether through excess energy and time expenditures in water seeking or through infections acquired in water contact, water consumption, and through lack of water for personal hygiene, multiple health constraints on the ability of women to contribute to the economic and social well-being of their families and communities arise.

This linkage is especially clear to the on-going research and programmes in the field of diarrhoeal diseases control. For instance, the 1983 International Conference on Oral Rehydration Therapy (ICORT) had four days of sessions primarily on curative approaches to dehydration with women as the administrators of the curative salts. Little attention was given to combining

preventive messages with the instructions or considering the time being required of women to spend if this global project to combat the greatest killer of children - infant diarrhoea - is to succeed. How INT/83/003 can create a positive link to this opportunity is a challenge to all of us.

Even though closely linked with women, water and sanitation, the ORT literature is not included in the bibliography. There is a wealth of material available at WHO, UNICEF, IDRDCR - the bilateral agencies, and NGOs such as AED. The excellent journal "Diarrhoea Dialogue" has many relevant articles.

Among specific articles in the collection which were not included in the bibliography are several which look at hygiene habits, food handling, attitudes toward excreta, and communications:

Maria de la Luz Alvarez Dr. Zanaica R. Uy Waltana Pratoomsindk	Hygienic habits/food preparation Sociocultural context of defecation Food and nutrition program for rural development at Prince of Sorykla University, Patlani, Thailand
Eide, Wench Barth Skjønsberg, Elsie	Women in food production, food handling and nutrition with specific emphasis on Africa
Dr. J. Fernando Jorstad, Mette	"Helminths, Soil and Man" "A social scientist's view of strategies in order that water development..."
Dennis R. Foote	"Evaluating the Impact of Health Education Systems"
Srinivassen, Lyra	"Bridging the Gap: A Participatory Approach to Health and Nutrition and Education"
Booth Ashley	Mass media and health practices "The Diarrhoea Disease Control Programme in Jamaica"

Housing

Poor housing with its often accompanying poor sanitation and water supply is a concern of the IDWSSD. Several conference proceedings, including the 1983 Bangkok Seminar on Human Waste Management for Low Income Settlements and the report of the Asian Pacific Center for Women and Development on Environmental Issues affecting Women with Particular Reference to Housing and Human Settlements, are pertinent. Several papers from this report are included in the new bibliography, such as:

George, May	"A Radial Design Concept in 'Sites and Services' to Facilitate the Development of the Urban Poor, Especially Women"
Iwaski, Shumsuke	"A Working Memorandum on Issues Relating to Women with Reference to Housing, Transport and Human Settlements"

Mathur, G.C.

"Development of Women - Key Issues
Relating to Housing, Community Facilities
and Public Utilities"

Several relevant papers for the Bangkok seminar, including Elmendorf's "Women as Managers of Human Waste: Retraining for Old Roles and Training for New Roles" and Ain Bakhteari's report on the Baldia slum upgrading project in Pakistan were not included. This paper is a follow-up to an earlier case study presented at the 1981 WEDC conference in Loughborough (WASH 1982, No.25).

Even though the very thorough "Evaluation of Sites and Services Projects: The Experience from Lusaka, Zanitra", World Bank Working Paper #548 by Bamberger, Sarryal and Valverde was in the collection it was not included in the bibliography. This study is only one of many country-specific documents which are useful for basic background information and methodology.

Technical Change/Development

All improvements in water supply imply technological and behavioral change. Since some of the greatest needs of the IDWSSD are those involving portage, storage and improvements in utilization of water along with behavioral changes in defecation patterns, "appropriate technology" must not be left completely with the engineers and planners. To ignore discussion of "appropriate technology" and women's roles in relationship to its design and use would be negligent. Appropriate is the process not just the technology. It is not a type of technology but a kind that fits the local needs - and local needs must be articulated. Real need moves from desire to demand. Articulation of need and participation define appropriateness. Access to channels of knowledge facilitates articulation. And two-way communication, or dialogue, is necessary to assure that the technology fits the local specifications - physical, ecological and cultural.

Some of the early studies in the 1982 WASH bibliography - Elmendorf and Buckles (98), Carr (46), Feuerstein (114), Perrett and Leatham (280), Salber (314), Simpson-Hebert (330), Tonon (349), Kebede (187) point out clearly the need for appropriate process in defining technological needs, but most of these are left out of the 1984 bibliography. Most but not all appear in its annex.

There are several articles in the collection which are not included in the new bibliography which could definitely add to the subject. Simpson-Hebert's carefully designed Methods for Gathering Socio-Cultural Data for Water Supply and Sanitation Projects contains clear instructions in using social scientists' methods of data gathering to help in determining "appropriateness." It was written primarily as a guideline for engineers or for social scientists working with engineers. More emphasis could be given to the importance of including women as informants/communicators, etc. but the process suggested includes the community.

Other more technically oriented articles such as the "Bamboo-Reinforced Concrete Rainwater Storage Tank" published by the Community Based Appropriate

Technology and Development Group in Thailand should be included. As pointed out by the President of the Federation of Women, females do more than 50 per cent of the construction work in Bangkok - and should be informed about and given training in such technologies as the cistern, stoves etc.

Below is a list of some of the other articles in the collection not included in the bibliography.

Raffoul's	<u>Solar Sterilization</u>
Fortmann, et al	<u>The Water Points Survey</u>
Guggenheim	<u>Shared Technology: A Project for Water Storage and Irrigation...</u>
UNICEF	<u>Appropriate Village Technology for Basic Services</u>
IDRC	<u>The purification of water on a small scale</u>
Pedessan	<u>Teknologi Tepat Guna</u>
Verzosa	<u>Handpump/Manual</u>
Mahoney	<u>Field Methods for Training in Water Utilization</u>
Utterback	<u>Appropriate Technology: Women's Responses to the Chitedze Hand Operated Maize Sheller</u>

Domestic Uses of Water in Irrigation Schemes

Closely related to our discussion of technological change is the phenomenon of irrigation schemes where the major emphasis is on increased agricultural production - often for income rather than food production. During recent years there has been increased concern with the impact of these resettlement projects on the human welfare of the resident populations. Often irrigation schemes considered financially successful have caused negative impacts on the household economy. Jane Hanger's excellent 1973 analysis, "Women and the Household" in Mwea: An Irrigated Rice Settlement in Kenya, is included in the 1984 bibliography. So is Jennie Dey's "Gambian Women: Unequal Partners in Rice Development Projects?" However, a number of other collected articles not included are:

Yoder	"Non-Agricultural Uses of Irrigation Systems: Past Experience and Implications for Planning and Design"
de los Reyes	"Process Documentation in the NIA Participatory Communal Irrigation Program"
Jones	"Non-Agricultural Uses of Irrigation Systems: Household Water Supplies"
Martin & Yoder	"Community Managed Irrigation in the Hills of Nepal: Some Preliminary Findings and A Case Study"

It is interesting to observe the increased awareness of the non-agricultural, especially domestic uses - of irrigation water. Several workshops including a recent one at Rutgers University and earlier conferences sponsored by the

Agricultural Development Council and the Ford Foundation explored the ways domestic water supply and sanitation could be piggy-backed to or integrated with large irrigation schemes. Reports on the proceedings of these meetings could add depth to any collection even though women are just beginning to be considered.

In Sri Lanka the Zonta/UNICEF project in the Mahaweli Scheme is focused on improving domestic water and sanitation with women as participants and beneficiaries. When the Women's Bureau started organizing the female settlers in 1980 the lack of sanitary facilities and the use of polluted irrigation water for domestic purposes was noted. Kathleen Cloud's well-reasoned 1982 article "Women and Water Management: Understandings Gained from my Asia Trip" is included in the new bibliography.

Conclusion

In concluding I want to make it clear that I fully realize that this bibliography is select, representing my own interests and biases. Each of you will hopefully have new titles to add and may wish to eliminate some I've included. I do however want to come back to the importance of linkages.

By suggesting that we place the literature search of INT/83/003 within a broad contextual framework of women in development and within new approaches to research on community participation and communication, the project research will hopefully be able to demonstrate particular linkages of women's roles in water supply and sanitation to: better nutrition, improved health, better housing, increased energy and higher quality of life with sustained economic productivity.

The thrust of the literature selected and suggested methodology is to enable women to identify needs, surmount problems and make decisions based on information about choices. By an integrated approach to community-defined needs women, in groups and singly, will be motivated to adopt new patterns of behaviour and attitudes so that the active and passive layers of women's participation in various sectors will be strengthened. Peer support will serve to help establish new attitudes and behaviour/activities which synergistically will improve the health and welfare of women and their families in the most disadvantaged section of the population.

Notes

- 1/ Svendsen, Dian Seslar and Wijetilleke, Sujatha, Overseas Education Fund Washington, D.C. 1983.
- 2/ Acharya, Meena and Lynn Bennett, World Bank Staff Working Paper No.526 World Bank, Washington, D.C.
- 3/ Aguwa, Margaret I - Women, Health, and International Development: Proceedings of the Conference, 1982
- 4/ Chen, L. - Evaluating the Health Benefits of Improved Water Supply Through Assessment of Nutritional Status in Developing Countries, 1980.

T. Water supply and sanitation in California, United States of America

Carole Onorato*

Abstract

The physical setting: wide variations in climate, including high desert, mediterranean, high mountain and valley lowlands. Rainfall ranges from less than 1 inch per year to 90 inches per year.

Demographics: several large urban centers, including the "super-metropolis" of Los Angeles-Orange County-San Diego. Also extensive agriculture. Population around 25 million, large segments of black, hispanic, Vietnamese and Asian communities.

Water system and use: highly developed water system; most of the population lives in the southern portion of state, most of the water is in the northern half. Agriculture uses 85 per cent of water used in a state, industry and population use the remainder. Major sources include ground water, rivers, over 1100 dams, extensive aqueducts and pipelines.

Wastewater disposal sanitation: ninety-five per cent of population served by sewage treatment plants. Five per cent on septic tanks systems. Of those served by sewage treatment plants, 70 per cent have or will shortly complete facilities that provide secondary (85 per cent removal) treatment. Remainder have primary (50 per cent removal) or better.

Water quality problems: Few cases of water borne bacterial contamination. Major threats are from toxic chemicals such as pesticides and industrial solvents.

Water quality programmes: strong federal control programme for surface waters, but ground waters not covered. State programme covers ground waters, but aquifers serving almost 1 million (of 25 million) Californians have been polluted.

Federal Environmental Protection Agency seeking to expand ground water protection. Other programmes include extensive public health programmes at local level, regular testing of drinking water by service districts, hazardous waste disposal regulation, pesticide regulatory programme and water quality planning. Polluters can be fined up to \$10,000 for each day of pollution-causing activity and they must pay for all clean-up activities.

Current Issues

I. Toxics in ground waters, and a need to assess chemicals for damage to environment and damage to human health. An increasing number of California ground waters are contaminated by:

- (a) Pesticides migrating into ground waters (DBCP, EDB, others);
- (b) Hazardous waste site that do not properly isolate wastes;
- (c) Leaking underground tanks used to store chemicals.

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II. Adequate sewage treatment: (California has spent \$5 billion in last ten years to upgrade waste water treatment).

- (a) Goal of secondary treatment (national goal);
- (b) Strong support from Federal Government (75 per cent funding);
- (c) Federal programme slowing, less money available, grants dropping to 55 per cent;
- (d) Biggest gap is in rural areas where low population density and rugged terrain increases per capita cost;
- (e) Many of the waste waters are reclaimable for non-drinking water purposes.

III. Waste water reclamation: (extending the current water supply).

- (a) Conducting scientific study on long-term impact on using reclaimed water on food crops;
- (b) Encourage reclamation for non-consumptive uses;
- (c) Frees high quality water for home use.

IV. Sea water intrusion: (losing aquifers to overuse).

- (a) Along coastal areas overpumping ground water may result in sea water being drawn into basin;
- (b) Most coastal aquifers regulated by local authorities to prevent increased degradation;
- (c) Common solution is to pump water into the zone between fresh and saline waters to form a barrier.

V. THMs: (chlorination by-products).

- (a) Formed in water after chlorination;
- (b) Include chloroform, a suspected carcinogen;
- (c) Trade-off between benefits of chlorination and risks.

VI. Setting standards.

- (a) Based on one-in-a-million cancer risk level;
- (b) Risk not determined for many substances;
- (c) Fish and wildlife important early warning system.

VII. Non-toxic substances.

VIII. Alternative waste water systems.

Problem

Ground water contamination with pesticides and other synthetic organic chemicals is an emerging problem in California and elsewhere in the United States. For instance, over two thousand wells in the Central Valley of California have been found to be contaminated with DBCP (1,2-dibromo-3-chloropropane), a pesticide used to control nematodes. Other pesticides found in ground waters of California are EDB (ethylene dibromide), aldicarb, 1,2-dichloropropane and simazine.

Although ground water is an important natural resource, very few monitoring programmes exist to evaluate the quality of ground water other

than for traditional pollutants such as bacteria, salinity and nitrates.

The major concern has been on the quantitative aspects of ground water (i.e., overdraft, water recharge) for good reasons. Nearly half of the United States population relies on ground water as a source of drinking water. California is the nation's largest user of ground water, accounting for more than one fourth of the amount of ground water pumped in the nation.

Since California is also one of the nation's leading agricultural states, it is the largest user of agricultural pesticides. Over 700 million pounds of pesticides were sold in California during 1981, more than half of which were for agricultural use.

Threat to public health

The human health impacts of pesticides in drinking water cannot be completely evaluated since very few epidemiological studies have been conducted. Data from laboratory animal test studies can be extrapolated to assess human health impacts.

Pesticides found in drinking water (such as EDB and DBCP) are known animal carcinogens. These chemicals can also cause mutations, reproductive disorders and birth defects.

According to one estimate, 85 per cent of the pesticide chemicals do not have a complete set of tests done on them as required by the current law governing their registration and use.

Health effects of impurities, "inert ingredients" and metabolic or degradation products of pesticides have not been evaluated. Familiar examples: (1) dioxin contamination in phenoxy herbicides (2,4,5-T and 2,4-D); (2) vinyl chloride and dichloroethylene (breakdown products of TCE (trichloroethylene) and PCE (tetrachloroethylene) in ground water are more potent carcinogens than parent compound and (3) Chlorination of river water containing ordram and bolero (rice herbicides) produces bitter quinine-like taste in drinking water supply.

Human health impacts of mixtures of toxic chemicals found in drinking water are not known (additive or synergistic).

Cause and effect relationship of chronic exposure is hard to establish. Usually it takes more than 10 years for any obvious clinical symptoms to develop. Some effects (such as cancer) may go unnoticed for a long time unless carefully examined.

Programmes

There is no single federal law designed to protect ground water quality.

Drinking water standards exist for only six out of hundreds of pesticide chemicals in use.

In California, SWRCB is one of the lead agencies responsible for

controlling ground water pollution. The Board's studies of several pesticides have led to restrictions or recommendations for restrictions on use (i.e. toxaphene, endosulfan, EDB, D-D).

Ground water decontamination, though theoretically possible, is extremely expensive. Mitigation strategies include:

- (a) Aeration (for volatile pollutants such as TCE at Aerojet);
- (b) Carbon absorption technology;
- (c) Dilution (recharge with clean water).

Prevention is the key, and can be achieved by:

(a) Judicious use of safe non-persistent pesticides or non-chemical alternatives such as biological control agents. According to one survey in Nebraska, one third of pesticide applicators used faulty equipment or techniques;

(b) No use of mobile pesticides (high water solubility and vapor pressure) in areas with hydrogeological conditions conducive to ground water contamination (e.g. sandy soil, shallow ground water table). Aldicarb use was suspended in Del Norte County of California for these reasons.

In conclusion, ground water contamination with pesticides remains a problem for regulation as well as a challenge for monitoring and control. If this problem is not tackled promptly, some people will lose their water supply (examples of well closure and bottled water alternative) and farmers will have to give up some pesticides (examples EDB and DBCP).

Hazardous waste sites

Problem

California currently has only 7 permitted unlimited hazardous waste disposal sites. Over 200 hazardous waste disposal sites have been identified by the U.S. Environmental Protection Agency. These 200 range from on-site (i.e. plant facility) to permitted sites which can accept only a limited number or type of hazardous waste. A great number of unlimited, limited, and on-site hazardous disposal sites are known or suspected to be leaking. Such leaks have the potential to adversely affect the quality of California's ground water.

Threat to public health

Leaking hazardous waste disposal sites pose a threat of contaminating not only public water supplies but also agricultural and other water supplies. Such effect on the purity of California's ground water could have far reaching economic impacts. Forty per cent of the state is underlain by ground water. Ground water provides 40 per cent of the state's total water needs (agricultural, municipal, domestic, and industrial). The current annual demand for ground water in California is 18 cubic kilometres (15 million acre feet). The total usable ground water storage capacity in California is 175 cubic kilometres (143 million acre feet). With the ever increasing need to dispose of hazardous wastes, this very valuable resource is being increasingly threatened.

Programmes

(a) An abandoned acid pit complex 80 kilometres (50 miles) east of Los Angeles (Stringfellow); located in a canyon in fractured bedrock with only a thin veneer of alluvium. Impervious barrier was constructed across the mouth of the canyon. Accepted only liquid hazardous wastes. The site had an inadequate drainage system. Ponds occasionally overtopped after intense rainfall. Liquid wastes were carried out of the area in drainage water. Pervious zones were found under barrier during cleanup exploration. Liquid wastes had been carried under barrier. Downstream wells in residential area had become polluted thus endangering domestic supplies. Extensive cleanup and reconstruction of barrier was necessary to protect nearby usable ground water.

(b) An operating hazardous waste disposal site 30 kilometres (18 miles) east of Los Angeles (BKK): located in a canyon in bedded sediments which originally were thought to be nearly impermeable. Site has accepted refuse and hazardous wastes (liquid and solid). An impervious barrier was constructed across the mount of the canyon. Pollutants have been discovered moving outward past and under the barrier, in fractures in underlying bedrock, and through previously unidentified permeable sands. Owner is now conducting expensive programme to understand nature of underlying rock, define extent of contaminant plume, and design cleanup operation. The programme is being supervised and directed by federal and state agencies (USEPA, DHS, RWQCB, SWRCB).

Conclusions

Inadequate understanding of site conditions (hydrology, geology, etc.). Inadequate design of containment features. Insufficient quality assurance and quality control during construction of containment features. Inadequate government regulations and supervision at the time that the containment features were designed and constructed.

Underground tanks

Problem

Over two years ago, it was discovered that leaking underground tanks were polluting ground water in several areas of California. The evidence indicated the major source of contamination was industrial chemicals leaking from underground storage tanks.

Ground water degradation is considered by many people to be California's most serious water quality problem.

Ground water is the source of 40 per cent of the water used in California. It is used primarily for municipal, agricultural, and industrial purposes. When ground water aquifers become polluted, it is very, very difficult, if not impossible, to clean them up. It is also very expensive, and it takes a long time - several years at least. Sometimes businesses prefer to "close their doors" and walk away, rather than correct the ground water problems created by their operations.

Threat to public health

The more common classes of pollutants leaking from underground tanks are industrial solvents such as TCE and motor fuels such as gasoline. These pollutants impair the beneficial uses of ground waters in a variety of ways - most are carcinogenic and present other health hazards to humans as well.

Programme

In conjunction with local agencies, the Board undertook a vigorous programme to detect leaking tanks and to clean up the pollution caused by the leaks. Meanwhile, the legislature passed two bills to inventory and regulate underground tanks. The bills were signed by the Governor and became law on 1 January, 1984. The main provisions of the bills are:

1. Inventory

- (a) Inventory of all underground tanks containing hazardous substances;
- (b) Tank owners must file inventory information by 1 July, 1984;
- (c) Fee of \$10 per tank; except gasoline stations which are \$5 per tank;
- (d) Failure to file and pay fee by 1 January, 1985 subjects the owner to fines of \$500 to \$5,000 per day;
- (e) Submission of false information is subject to fines of \$2,000 to \$20,000 per day.

2. Regulatory

- (a) This bill provides for a regulation programme that is administered primarily by the counties and cities;
- (b) The State Board is required to develop regulations for the programme by 1 January, 1985;
- (c) The local agencies issue permits good for five years. The inventory form is used also for the permit applications;
- (d) Local agencies inspect tanks periodically - at least once every three years;
- (e) All new tanks installed after the regulations become effective must provide for secondary containments;
- (f) The State will initiate any enforcement actions necessary if leaks are detected and will act on any requests for site-specific variances from design, construction, or monitoring standards.

The intent of the legislation is to prevent degradation of ground water from leaking underground tanks. Two key elements of the regulatory programme aimed at accomplishing this objective are:

- (1) All new tanks installed must provide for double containment. This generally means either double-walled tanks or tanks set in concrete vaults;
- (2) All tanks, both existing and new, must have a monitoring system to detect leaks. Any evidence of a leak must be reported to the authorities within 24 hours.

It is estimated that California has well over 100,000 underground tanks storing hazardous substances, including gasoline, and maybe as many as one-half million.

Sewage treatment

The operation, maintenance, and replacement of sewage treatment works has historically been the responsibility of our individual communities. As our population grew, local budgets became strapped to meet the explosive growth in California after World War II. Replacement and upgrading our treatment facilities began to lag and our surface waters became more polluted. It became increasingly obvious in the 1960's that local communities were not doing the job and that something had to be done on a national level to restore the nation's waters to fishable and swimmable conditions.

In 1972, the Congress of the United States of America passed landmark legislation calling for an end to discharge of pollutants into surface waters. The law mandated that all publically owned waste water treatment works meet a minimum level of treatment defined as secondary treatment, where the discharge shall not exceed 30 mg/l of any oxygen demanding materials. The law also has the goal of eliminating the discharge of pollutants into surface waters. This goal was to be met by 1985.

The Federal Government also recognized that this massive upgrading of treatment works could not be handled with existing local resources. The legislation provided \$20 billion over a four year period to provide 75 per cent federal grants to bring publically owned treatment works in compliance with the Federal Act.

In 1970, the State of California also recognized the growing need in the state to upgrade sewage treatment facilities. In November 1970, the state's voters approved a \$250 million bond issue for the purpose of providing a 12.5 per cent grant for constructing needed treatment facilities. As of today, \$4.5 billion of state, federal, and local funds were spent to upgrade the state's treatment plants. Approximately 95 per cent of the population is served by a treatment plant. The remaining 5 per cent are served by individual septic tank and leachfield systems.

California has nearly completed the task of upgrading its municipal treatment plants. The major effect in the future will be to provide sewage treatment facilities to serve population growth and to address the treatment needs of the 5 per cent of the population without sewer facilities.

The progress made over the last decade and a half in California has been significant. However, the federal programme is slowing and fewer monies are now available to meet the remaining needs. The grant level will drop to 55 per cent next year and we anticipate that the federal grant programme will end in five or six years. The gap left by a federal pullout will increase the burden on state and local taxpayers to raise the needed funds. We are currently looking at a number of financing alternatives, from low-interest loans, private ownership and operation of treatment facilities, and a tax on each individual sewer bill to increasing sewer service charges. The final solution may involve a combination of all these methods. Regardless of the source, California will need about \$5.6 billion by the year 2000 to meet its treatment needs.

The primary objective of this project is to generate quantitative, unbiased and authoritative answers to questions, such as:

(a) Is irrigation with reclaimed water safe for consumers and for farm workers from the perspective of:

- virus survival on crops and in soil?
- cadmium and other trace elements in edible crops?
- bacteria survival on crops and in soil?
- aerosol transmission of bacteria and viruses?

(b) Is irrigation with reclaimed water harmful to soils because of accumulation of heavy metals and salts or because of impaired permeability?

(c) Does reclamation affect yield, quality, or growth of crops?

(d) Will consumers buy the crops irrigated with reclaimed water when faced with a choice of crops grown with fresh water?

(e) Is irrigation with reclaimed water feasible and economical?

This project will be completed in 1986 after five years of field evaluation.

Waste water reclamation

The State of California has long recognized the value of reusing reclaimed waste water and for many years has encouraged such reuse where public health is not compromised. Advances in waste water treatment technology now allow the safe use of effluent for several purposes when reasonable precautions are taken.

Health assessment

Most waste water reclamation and reuse operations clearly impose some risk of exposing public or worker to pathogenic organisms or toxic substances which may be present in waste water. In general, the health concern is in proportion to the degree of human contact with the waste water, effluent water quality, and reliability of the treatment process,

The contaminants in reclaimed waste water that are of health significance may be classified as biological and chemical agents. Historically, the biological agents (pathogens) have been the ones receiving the closest attention in California, and water quality standards are properly directed at these agents. The California Waste Water Reclamation Criteria (1978) are intended to assure an adequate degree of health protection from disease transmission.

Potential substitution for fresh water withdrawals

Although a number of factors affect waste water reclamation and reuse decisions, historically, the impetus for waste water reuse has resulted from five prime motivating factors:

- (a) Desirability of establishing comprehensive water resources planning, including waste water reuse and water conservation;
- (b) Increasing cost of fresh water development;
- (c) Availability of high quality effluent;
- (d) Avoidance of costly tertiary treatment facilities required for the discharge into receiving waters;

(e) Environmental ethic and good public policy.

The categories of a planned, direct reuse of reclaimed waste water include agricultural and landscape irrigation, industrial processes or cooling, recreation, and ground water recharge. In addition, direct, potable reuse of reclaimed waste water is possible, but further research and demonstration of long-term safety is required before such implementation can be seriously contemplated.

Use of reclaimed water for agricultural and landscape irrigation

Approximately 184,000 acre-feet of reclaimed waste water are used annually for agriculture and landscape irrigation in California. This reliable source of water is particularly valuable during drought years and may free limited fresh water supplies for municipal purposes. We have been evaluating the safety and feasibility of irrigating raw consumed food crops with reclaimed water at Castroville, California (Monterey Waste Water Reclamation Study for Agriculture Project).

Sea water intrusion

California ground waters: extremely valuable. About 40 per cent of California overlies ground water basins. The usable storage capacity of these basins is approximately 143 million acre-feet. California uses about 15 million acre-feet of ground water each year, which comprises roughly 40 per cent of the state's yearly needs. Annual average overdraft each year is 2.2 million acre-feet.

Coastal ground water basins: ground waters stored in 262 basins facing the Pacific Ocean. Most are small valley-fill areas less than five square miles, shallow in depth, generally yielding small quantities of water to wells except where coarse sand and gravel aquifers are encountered near base of valley-fill. Alluviums are probably in direct contact with sea water. Several large coastal basins occur which contain large sources of fresh ground water. Large yielding wells have been developed in most of the basins. Most basins have permeable recharge areas, high transmissive aquifer systems, and thus are ideally designed for conjunctive operation of surface and ground water. The basins have been heavily pumped for many years. Several basins have well established patterns of sea water intrusion.

California's authority over ground water: unlike most western states, California has very limited statutory authority over ground waters in the state. The state's main authority is to protect the quality of ground waters. Existing legislation is narrowly written to deal with specific local problems. To date, local ground water problems have been resolved in courts by local authorities. A recent threat of state action resulted in a co-operative effort with local authorities to develop a solution to stop sea water intrusion in a major coastal basin.

Solutions employed to stop sea water intrusion: Case I - Overpumping during the past three decades allowed sea water to migrate inland into a major coastal ground water basin. Continued pumping would have rendered the basin ground waters unusable for municipal, industrial and agricultural needs. To stop the intrusion, existing extraction wells were relocated, a

pump trough pipeline system was constructed to supply water to the overdraft area, diversion and spreading ground facilities were improved and a basin wide water conservation plan developed and implemented. The total cost of the project was approximately 15 million dollars of which 8 million were provided by the state.

Case II - sea water intrusion was stopped in a major basin in Los Angeles County using a hydraulic pressure ridge. The ridge was developed along an 11 mile coastal front using 93 injection wells. The project requires 35,000 acre feet of injection water annually. The completed barrier cost \$6 million. It is successfully controlling sea water intrusion.

Other threatened coastal basins are presently being studied which will require similar solutions to stop sea water intrusion.

THMs (Trihalomethanes) chlorination byproducts

Problem: To prevent the spread of infectious disease, chlorine is frequently added to drinking water to kill pathogenic organisms. However, this process can create potentially hazardous substances, such as trihalomethanes. The main source of trihalomethanes (THMs) in drinking water is the interaction of chlorine, added for disinfection, with the commonly present natural humic and fulvic acids.

Threat to human health: Because disinfection of drinking water by chlorine in the presence of natural organic matter creates THMs, there is a potential threat to human health. Several THMs are on the EPA list of 129 priority pollutants: chloroform, bromoform, dichlorobromethane, and chlorodibromethane. IARC (International Agency for Research on Cancer) has stated that there is "sufficient evidence" for carcinogenicity of chloroform in animals and that chloroform is "probably carcinogenic to humans". EPA has set a maximum concentration limit of 100 ppb for THMs in drinking water. EPA has estimated a one in a million lifetime cancer risk if an individual drinks two litres of water a day containing chloroform at a concentration of 0.19 ppb.

Programmes: There are three alternatives to reduce THM levels in drinking water:

- (a) Use a disinfectant that does not produce THMs;
- (b) Treat water prior to disinfection to remove precursor organics; or
- (c) Remove THMs after formation.

Alternative disinfectants include:

<u>Disinfectant</u>	<u>Advantages/disadvantages</u>
Ozone	Expensive, no residual so potential biological growth after treatment
Chlorine dioxide	Chlorate and chlorite formed may also be health risks
Chloramines	Weak disinfectant for bacteria, viruses, and protozoans; potential health risks.

Precursor removal methods include: aeration; coagulation; ion exchange resins; powdered activated carbon; granular activated carbon; and off-line raw water storage.

Setting standards - risk assessment of toxic substances

Problem: the process of setting criteria for toxic pollutants requires careful analysis of available scientific information, an effort frequently hampered by both uncertainties and inadequate data.

Discussion: standard setting is basically a two-step process: (1) establishing criteria for a substance based on the available scientific information (risk assessment) and (2) setting an actual standard, based on technological, economic, social, and political feasibility in addition to the scientific criterion (risk management). Some of the factors considered in setting standards are listed below.

In the United States, water quality criteria are typically set for protection of human health and for protection of aquatic life. Standards (water quality objectives in California) are usually set for a designated use of a particular body of water, such as drinking water, agricultural, recreational, or industrial use.

For many compounds, there is not enough information available to determine an exact criterion, and estimates must be made from a limited set of scientific data. Currently, it is common to declare one type of criterion for carcinogenic substances and a second type for non-carcinogenic compounds.

An initial step in establishing a criterion for a given substance is to determine if the compound is a suspected carcinogen. Results of epidemiological studies, animal cancer bioassays, and short term screening tests for carcinogenicity and mutagenicity may be used. The International Agency for Research on Cancer (IARC), a part of the United Nations World Health Organization (WHO), provides lists of known or suspected human and animal carcinogens. A large fraction of the scientific community believes that there is no threshold level for onset of cancer: thus, there is no safe dose. Instead, a number is estimated for concentration of the compound at which the risk of contracting cancer is a certain level. A commonly proposed value is one-in-a-million (10^{-6}) level of increased risk. It is then a function of risk management to determine if an increased risk of 10^{-6} for a concentration of a given chemical is acceptable.

If the chemical in question is not a carcinogen, then a criterion is typically set based on the lowest "no observable effect level" plus a safety factor that may range from 10 to 1,000. For example, if the lowest dose at which no effect of compound X observed in animal tests is 100 ppm, and a safety factor of 100 is used, then a criterion for a "safe" level will be set at 1.0 ppm.

Non-toxic substances

Problem: Many substances that are considered relatively non-toxic may affect aesthetic qualities (i.e. odour, colour, taste) relating to the public acceptance of drinking water. These substances include chlorides,

sulfates, foaming agents, and nitrates. Some of the "non-toxic" substances, particularly nitrates, can cause health problems at high concentrations.

Threat to public health: chlorides, sulfates, foaming agents, and nitrates can originate from a variety of sources which may contaminate drinking water. Main sources of chloride include naturally occurring minerals and agricultural and industrial waste. Foaming agents in drinking water commonly come from detergents. Sulfates can occur naturally in water and can also occur in drinking water from leaching of abandoned coal mines, oxidized organic matter, and industrial waste. Sources of nitrates which are not usually abundant in natural waters include excessive fertilizer application, and waste from chemical fertilizer producing plants and from septic tank effluents. A study of ground water contamination in Fresno focused on septic tank leaching as a major source of nitrates. In the Central Valley, nitrates in the ground water are thought to be caused by agricultural return flows. In the Santa Ana River basin, high nitrates are found in ground water beneath citrus orchards.

Programmes: EPA and the State Department of Health Services have set secondary drinking water standards based on aesthetic considerations for chloride (205 milligram per litre), sulfates (250 milligram per litre), and foaming agents (0.5 milligram per litre). These standards are based on threshold effects. A primary drinking water standard for nitrates has been set at 10 milligram per litre as N which is based on toxicity to infants (methemoglobinemia). Many more substances are being investigated as possible additions to the drinking water standards.

A safety factor is used both because there is no guarantee that a no observable effect level from an animal test can be extrapolated to humans on a one-to-one basis and because some segments of the population are more sensitive to chemicals than the population at large.

Fish and wildlife can serve as important early warning systems for potential damage to human life. The pesticide DDT was thought to be safe for heavy use until its effect was noticed on bird populations. Fish kills in waterways can alert the population to the potential presence of toxic substances.

Decision making structure

I. Institutions

A. Federal

1. United States Environmental Protection Agency
 - (a) Regulates all discharges into surface waters;
 - (b) Sets standards for toxic substances;
 - (c) Regulates hazardous waste site cleanups;
 - (d) Funds sewage treatment plants (US\$2.4 billion per year);
 - (e) Regulates water supply agencies, sets standards;
 - (f) Protects fish and wildlife values as well as human health;
 - (g) Turns over major portion of programme to those states that have an effective programme.

B. State

1. California Water Resources Control Board
 - (a) Regulates all waste discharges (surface or ground waters);
 - (b) Sets water quality goals for each body of water in state;
 - (c) Channels federal sewage treatment funds to local agencies, adds state funds;
 - (d) Enforces cleanup orders against both private and public polluters;
 - (e) Controls toxic chemicals threatening water quality.
2. Department of Health Services
 - (a) Sets standards for drinking water;
 - (i) Can only be more stringent than federal standards;
 - (ii) Also can regulate taste and odour problems;
 - (b) Cleans up dangerous hazardous waste sites;
 - (c) Maintains extensive testing labs;
 - (d) Sets waste water reclamation standards.
3. Department of Water Resources
 - (a) Constructs major water projects to deliver water to communities.

C. Local and Regional

1. Regional Water Quality Control Board
 - (a) Works under State Water Board;
 - (b) Day to day enforcement of water quality standards, discharge limits;
 - (c) Establish water quality plans for each basin.
2. County health officers
 - (a) Protect drinking water supply;
 - (b) Work closely with regional boards.
3. Local sanitation district
 - (a) Owns and operates sewage treatment plants.
4. Local water district
 - (a) Treats and distributes water to homes and industry.

II. Citizen's Role

- A. Extensive public hearings open to public before decisions made;
- B. Funding often submitted for voter approval;
- C. Strong support for both safe drinking water and high level of sewage treatment.
 1. Recent poll showed 93 per cent of citizens wanted clean water law retained or made stronger;
 2. California voters approved every request for more funds for sewage treatment facilities.

III. Women.

- A. Many women in official positions.

1. My predecessor as chair of California WRCB was a woman;
2. Many serve on regional boards, water and sanitation district boards.

B. Many serve as public interest advocates

1. Penny Newman in Riverside County
 - (a) Has led fight to clean up an abandoned hazardous waste site;
 - (b) Mobilized neighborhood;
 - (c) Forced government to take action;
 - (d) Problem only partially resolved.
2. Janis Heple in Sacramento
 - (a) Co-ordinates a citizens group with a broad range of interests;
 - (b) Makes sure government hears from citizens on key issues;
 - (c) Organized public pressure on decision makers.
3. Arliss Ungar
 - (a) Represents California League of Women Voters on many water issues;
 - (b) Often serves on advisory committees established by government agencies;
 - (c) Helps make sure voters are informed about bond issues and other ballot measures.

Factors considered in setting standards

- A. Scientific factors (risk assessment)
 - (1) Aquatic toxicity;
 - (2) Human health toxicity;
 - (3) Bioconcentration potential;
 - (4) Adequacy of data base.
- B. Environmental factors (risk assessment)
 - (1) Site-specific variables;
 - (2) Occurrence in ambient waters;
 - (3) Occurrence in waste water treatment plant discharges;
 - (4) Persistence and degradability.
- C. Technological factors
 - (1) Level of control using "best available technology";
 - (2) Availability of control technologies;
 - (3) Availability of detection technologies.
- D. Economic factors
 - (1) Cost of treatment;
 - (2) Cost of monitoring.
- E. Other factors
 - (1) Past regulatory actions on a compound;
 - (2) Other regulatory mechanisms more appropriate than water quality standards (e.g. BMP's for pesticide application).

U. The River Nile and its impact on Egyptian agriculture

Mohammed Abou Zeid*

The Egyptian civilization of some 5000 years ago is still the wonder of mankind today. Many influences contributed towards its creation - religion, brilliance, a high degree of human discipline and devotion, among many other factors. But the principal ingredient which enabled this civilization to develop was the River Nile, which brought, and still brings, water and fertility into a country which would otherwise be a barren desert.

Egypt has practically no rain and its agriculture depends on irrigation from the Nile. In no country in the world does a single waterway play so important a role in the economic and social development of a nation as does the River Nile in Egypt.

The total area of Egypt is about 100 million hectares, only a little over 2.5 million are now cultivated. With multiple cropping, the cropped area reaches about 4.75 million hectares per year.

Despite advances in industrialization and increased urbanization Egypt is still largely agricultural. The agriculture sector accounts for 47 per cent of employment, about 30 per cent of the gross national product, and 80 per cent of export earnings.

However, Egypt now faces the major challenge of increasing the rate of growth of agricultural production to meet the future food requirements of its population which is increasing at the very high annual rate of 2.5 per cent. The population, which was about 20 million in 1952, is now estimated at 40 million and is expected to be 70 million by the year 2000.

The share of cultivated land per capita has dropped from 0.163 hectares in 1930 to 0.071 in 1978. Although about 0.42 million hectares have been reclaimed since 1952, an area exceeding 250,000 hectares has been lost to industrial and urban uses.

To uphold the present standard of the per capita share of cultivated land, new areas amounting to about 62,500 hectares per annum must be reclaimed.

The River Nile

The River Nile is one of the most remarkable geographic features of Africa. Its catchment area covers 2,900,000 square kilometres. It extends from latitude 4°S to latitude 31°N, and is exposed to a great variety of climates. The vegetation within the Nile basin is varied. It includes alpine flora in the higher elevations, dense tropical forest, tall elephant grass, savanna forest, thick tropical swamps, thorny forests and the scanty vegetation of desert country. And, there are the dense crops

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grown on irrigated lands.

In general, the Nile basin may be divided into four main sub-basins:

- (1) The White Nile whose head waters rise south of the equator. Its runoff is 29 per cent of the total Nile runoff, and its water is clear;
- (2) The Atbara River which rises in North Ethiopia. This river is prone to flash floods during the rainy season but is dry for the rest of the year. Its runoff is muddy and constitutes 14 per cent of the total Nile runoff;
- (3) The Blue Nile which rises also in North Ethiopia. Its runoff equals 57 per cent of the total runoff of the Nile. The flow is muddy during the rainy season;
- (4) The Main Nile which flows northward to the sea. The river is the longest in the world, about 6,700 kilometres. Its source is at an altitude of 5120 metres above mean sea level in Central Africa. Its mouth is on the Mediterranean Sea. Its course traverses the countries of Uganda, Kenya, Tanzania, Rwanda, Burundi, Zaire, Ethiopia, as well as, of course, the Sudan and Egypt.

Extending from Aswan, 24°N latitude, to the north, the Nile valley takes the shape of a long and narrow strip of land until it reaches the apex of the delta, 30°N latitude, a distance of nearly 900 kilometres. The maximum width of the valley hardly exceeds 25 kilometres. It is enclosed by arid and desert plateaus which extend on one side to the Red Sea and on the other to the Egyptian-Libyan border across the Sahara.

A few kilometres north of Cairo is the great Nile delta, or Lower Egypt, which is composed of three parts. The first, the delta proper, is formed between the two branches into which the Nile divides.

The two branches - the Rosetta arm on the west and the Damietta arm on the east - are the only two now remaining of the seven ancient distributaries. The five other branches have been modified and included in a system of irrigation canals. The delta forms a triangle with a height of 160 kilometres and a base of 140 kilometres.

The second part of the delta lies to the west of the Rosetta arm, shaped like an elongated triangle whose apex is a little below the separation of the two arms of the Nile and whose base extends along the sea for about 70 kilometres.

The third part of the delta stretches to the east of the Damietta branch. It also forms a triangle whose base along the sea is 160 kilometres.

"Egypt is the gift of the Nile" said Herodotus, the ancient Greek historian. The river may bestow goodness, when it floods one year, while

in another bringing nothing but drought and privation.

In flood time, the river's flow is more than abundant; but in summer, it is always stingy, unable to satisfy Egypt's needs.

The annual Nile flood varies considerably from one year to the other. Its yield may reach 151×10^9 cubic metres, as in 1978, or may drop to 42×10^9 cubic metres, as in 1913. The flood usually occurs in summer, from August to October, and during this period may vary from 36×10^9 cubic metres to 7×10^9 cubic metres.

Losses from the Nile channel may differ depending on the water level in the Nile and the adjacent groundwater levels in the valley's aquifers, which are hydrologically connected to the Nile bed and its banks. When the groundwater levels are higher, water seeps to the Nile and is considered a gain. Studies recently conducted in Egypt indicate that the net value of losses and gains of the river channel between Aswan and the delta (about 1,000 kilometres) represents water revenue of about 1.5×10^9 cubic metres.

Egyptians in ancient and modern times have always looked upon the nature of the river with anxiety and worry. But when they discovered the sources of the Nile, they were better able to understand the river's nature and characteristics, and apprehension lessened.

Engineering efforts to control the Nile began in the pharaonic epoch, when King Mina, who ruled Egypt in the First Dynasty, constructed the left bank to protect urban areas. He then proceeded to establish canals and bridges to carry the Nile water to lower lands behind the newly constructed bank.

During the Twelfth Dynasty, Sesostris continued what Mina had started. He constructed the right Nile bank and transformed Lake Morris into a reservoir to divert the flood water to reduce its violence and to protect the delta lands. The lake is now the flourishing governorate of Fayoum. More recently, in 1933, the idea emerged to construct two main barrages, on the Damietta and Rosetta branches to raise the water level high enough to permit feeding main branch canals upstream.

The concept of annual storage, the retention for later use of part of the autumn floodwater after the flood peak is reached, was first introduced to the Nile system in 1888. The construction of the old Aswan Dam began and was completed in 1902. The dam has a storage capacity of 1×10^9 cubic metres, sufficient to provide water during the following summer when the Nile yield decreases. This system is repeated year after year. Because of the variability of the annual flood the filling of the reservoir is not ensured in every year. Indeed, in some years it may not be filled at all.

The Asyut and Zifta Barrages were constructed in 1902, followed by the Isna Barrage in 1906.

In 1912, the Aswan Dam was raised to increase its annual storage capacity to 2.5×10^9 cubic metres. A second raising of the dam took place in 1913, increasing the annual storage capacity to 5×10^9 cubic metres.

In 1920, Egypt convoked a joint committee, comprising representatives of the Egyptian Government, the British Government and the International Consulting Bureau, to study the basin and propose a plan for meeting the irrigation requirements of Sudan.

In 1929, the Egyptian and British governments concluded the Nile Water Agreement (on behalf of the Nile Basin countries) based on the joint committee's recommendations.

The Agreement prohibits the construction of any works on the river, its tributaries or its sources that might obstruct the flow of the Nile and affect Egypt's right to exploit such water for her benefit.

The Agreement also regulates the distribution of Nile water between Egypt and Sudan.

In 1932, a further agreement was concluded between Egypt and Sudan, according the right to construct Gabal El Awlia Reservoir in Sudan for storage of 3.5×10^9 cubic metres of water and to use annually 2.5×10^9 cubic metres at Aswan to irrigate 250,000 hectares during the summer.

The agreement included the reclamation of 170,600 hectares of land in Lower Egypt, the reclamation and conversion of 218,500 hectares in Upper Egypt, and the guarantee of rice cultivation covering an area of between 80,000 and 146,000 hectares per year.

For different reasons, these programmes were amended from time to time. For example, circumstances during World War II required expansion in the production of cereals and food products.

In 1947, a technical committee of senior irrigation officials met to re-study the river control project and plan an agricultural expansion programme that would cover the period up to 1975. The committee submitted a comprehensive plan that was adopted by the Government in 1949.

The plan suggested long-term storage in the equatorial lakes and Lake Tana, in addition to other projects to minimize water losses in the swamps region of Sudan (estimated at about 50 per cent of the natural yield reaching the region), to convert some lands from basin to perennial irrigation, and to reclaim about 0.75 million hectares of land.

As the Ministry of Public Works was preparing for the execution of the major projects in the plan, the 1952 Revolution adopted the concept of long-term storage at Aswan, necessitating the creation of an artificial lake on the river that would hold the surplus water of the high flood years and release only what was needed to meet the deficit of low flood years. This lake would have to have additional capacity to absorb silt sedimentation.

Thus, due to the Revolution, construction of the High Dam south of the Aswan Reservoir took priority in the series of river control projects. In the meantime, the Sudan outlined a plan for agricultural expansion in El Gezira, including the construction of El-Roseires Reservoir on the Blue Nile.

Talks held between Egypt and Sudan concerning the redistribution of Nile water resulted in an agreement in November 1959 on the full utilization of river water. The agreement states that for the remaining years of this century the net benefit from the High Dam shall be calculated on the basis of the average natural river yield at Aswan, estimated at 84×10^9 cubic metres per year. The acquired rights of the two countries (48×10^9 cubic metres for Egypt and 4×10^9 cubic metres for Sudan), and the average losses from High Dam storage are to be deducted from this yield; and the balance, or net benefit is to be divided between them. The benefit ratio is 14.5×10^9 cubic metres for Sudan and 7.5×10^9 cubic metres for Egypt. The annual storage losses at the dam are estimated at 10×10^9 cubic metres. Adding those new shares to the acquired rights will give the Sudan 18.5×10^9 cubic metres and Egypt 55.5×10^9 cubic metres.

The agreement also establishes a joint technical authority for the study, planning and approval of any future development of the Nile in Sudan and Egypt.

Indeed, this agreement has become a successful model of co-operation between countries sharing the same basin of one river. More African Nile basin countries are encouraged to join.

V. International Drinking Water Supply and Sanitation
Decade and women in the ECWA region

United Nations*

Introduction

The world-wide concern for meeting the ever increasing demands for water of a continuously rising population, precipitated the organizing of the United Nations Water Conference held in Mar del Plata, Argentina, March 1977, to be followed by the launching of the International Drinking Water Supply and Sanitation Decade (IDWSSD) by the United Nations General Assembly in 1980. This concern was totally justified considering the limited availability of safe water, especially for the developing world, where women spend long hours hauling the daily supply of water for their families.

Very often, the water acquired by so much hardship and sacrifice is of poor quality, or unsafe to drink, rendering the users susceptible to various water-related diseases. In many areas, the washing of clothes is done in contaminated water, similarly exposing the women to water-borne illnesses.

The launching of the Decade should be considered a very positive move in increasing awareness and in calling for urgent action to cope with the problem of providing adequate quantities of safe drinking water and sanitation to all urban and rural populations.

Water supply and sanitation systems are an integral part of the infrastructure in any country. Not only do these systems constitute the basis for promotion of public health and the conservation of manpower, but they also play a significant role in overall economic development. However, the rapid increases in population, particularly in urban areas, partly due to emigration from the countryside and to increases in living standards, have created problems, especially in arid and semi-arid areas, by placing increasing demand on limited water supplies and sanitation systems. The demand is being met developing new sources of water, or by application of non-conventional water development techniques, and by installation or expansion of sewerage. However, the costs of water supply and sanitation schemes are placing increasing burdens on many countries, especially in the developing world where the financial resources are limited.

IDWSSD Activities in the ECWA * region

The First ECWA Regional Water Meeting held in Baghdad in December 1976 proposals concerning community water supply were among the endorsed recommendations. Later, the United Nations Water Conference in 1977, in its

* Economic Commission for Western Asia

* ECWA (Economic Commission for Western Asia) Region comprises the following member countries: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, People's Democratic Republic of Yemen (PDRY), Saudi Arabia, Syria, United Arab Emirates (U.A.E.), Yemen Arab Republic (Y.A.R.).

resolutions and recommendations regarding community water supply and sanitation called for improved co-ordination at the country level, and for regular consultations among governments, international and non-governmental organizations. Accordingly, ECWA undertook a review of the drinking water supply and sanitation activities of its member states in 1981-1982, in co-operation with the United Nations Development Programme (UNDP) and in consultation with the World Health Organization Eastern Mediterranean Office (WHO/EMRO) in Egypt. 1/

In summarizing the regional activities in the water supply and sanitation sector, it should first be noted that in the 1970s the region experienced rapid industrialization, followed by urbanization, which was not paralleled by infrastructure development at the same pace, resulting in an overload for public utility services. In recent years, extensive efforts have been focused, especially in the oil-rich countries - on making the water supply and sanitation sector compatible with the newly-achieved economic status and with the raised standard of living.

Nearly all of the ECWA region consists of arid and semi-arid areas, characterized by scarce rainfall and limited ground water resources. Only three countries possess sufficient surface water in the form of large rivers (Egypt, Syria and Iraq); and only in locally limited areas and at higher altitudes is precipitation high enough for ground water recharge (Lebanon, Oman, Syria, the U.A.E. and the Y.A.R.). With the exception of these countries, the region depends basically on ground water for its supplies, which is often not sufficient for meeting the total demand of densely populated areas. To meet the increasing demand, new water sources have to be identified. In most cases, ground water has to be pumped from remote areas over long distances to the distribution points requiring large investments and incurring high energy costs (in Amman, Aden, Riyadh, for example). Some oil producing countries (Kuwait, Qatar, Bahrain, Saudi Arabia, the U.A.E. and Oman) are increasingly resorting to sea water or brackish ground water desalination.

All governments are seeking to achieve complete service coverage in as short a time as possible. For the most part, priority is given to the expansion and restoration of the urban water supply systems, particularly in the capital cities which are severely affected by high population densities and high population growth rates, partly due to rural emigration. In most of the capitals, modern sewerage with treatment plants is in the stage of planning or construction.

Remarkable progress has been achieved, as shown in tables 1 and 2, through national economic development programmes. By the early 1980s, well over 90 per cent of the urban and over 50 per cent of the rural population in the ECWA region was supplied with safe water. Due to lack of relevant data on sanitation in most of the countries, a more complete presentation for this sector is not possible. According to the available information, and considering the programmes in hand, it appears that the goals of the Decade will be achieved in nearly all urban areas of the region. Services in rural areas will also be expanded considerably by the target date, but full coverage will probably be reached later, by the year 2000. It follows that special attention should be given to the requirements of rural areas.

Efforts are being made in all countries to set up closed distribution systems between the place of extraction and the consumer. Water authorities are also exerting every effort to provide enough safe water at all times with adequate service pressure. Such systems are now operating in all ECWA countries. However, although located mainly in cities they do not always serve all city areas. Suburbs and new development areas are often not connected because of lack of proper co-ordination between housing project and infrastructure. House connections are often installed by house owners themselves.

In many areas people are served by public standposts, guaranteeing safe water up to the tap. The transport of water from there to the house and storage of drinking water in houses increase the risk of contamination. Only a properly operated closed water supply system can guarantee safe water.

Experience indicates that water tanker service is the most effective method of overcoming shortages due to incomplete or defective water supply systems. Such service is used in almost all the countries of the region, either to support a weak urban piped system or to serve unpiped urban areas and small remote rural settlements. In Qatar, for instance, people prefer the tanker service to metered water because there is no charge. In Egypt and Yemen water vendors sell water to the public.

It is very difficult to obtain reliable data on consumption rates because metered house connections are not ubiquitous, the water meters may be poorly maintained and records for metered water are lacking. Estimates indicate that the highest average urban per capita rate of water use is 480 litres per day in Qatar and in parts of Bahrain. The average per capita rate is estimated to be higher than 250 litres per day in Iraq, Kuwait, Saudi Arabia, and the U.A.E. In Egypt, Lebanon, Syria, and Y.A.R. the average lies between 100-250 litres per day. The per capita rates are less for Jordan, Oman and P.D.R.Y.

The water losses in the distribution systems are known to be considerable in the region due to various reasons, many reaching up to 40 per cent of the total supply. The per capita extent of loss can not be determined exactly.

Water tariff systems have been introduced in the region and plans are under way for the improvement of existing systems.

The sanitation sector is not usually assigned the same importance as domestic water supply in the region. Nevertheless, numerous sewerage systems are operated, mainly in urban areas, and some of these are equipped with treatment plants. However, generally speaking, sanitation is neglected in the rural areas, mostly because:

- (a) sanitation is given very low priority by the rural population;
- (b) basic health education, public awareness and proper institutional frameworks are lacking in some countries;
- (c) many rural areas are isolated, and many localities have poor accessibility;

Table 1 - Population Served by Safe Drinking Water in the ECWA Region

Country	Percentage Coverage of the Population in the Year								Remarks
	Urban				Rural				
	1980	1983	1990	2000	1980	1983	1990	2000	
Bahrain	100	100	100	100	100	100	100	100	
Egypt	97	98	100	100	74	n.a	90	100	
Iraq	97	98	100	100	22	45	95	100	
Jordan	95	95	100	100	55	60	n.a	n.a	
Kuwait	75	80	100	100	-	-	-	-	All urban
Lebanon	90	n.a	n.a	n.a	85	n.a	n.a	n.a	
Oman	70	80	100	100	10	30	90	100	
Qatar	90	100	100	100	-	-	-	-	All urban
P D R Y	68	72	82	100	23	n.a	47	50	
Saudi Arabia	65	n.a	83	100	20	n.a	n.a	100	
Syria	90	93	100	100	55	65	100	100	
United Arab Emirates	88	98	100	100	50	90	100	100	
Yemen Arab Emirates	42*	n.a	100	100	5*	n.a	n.a	n.a	* in 1975

Percentages for 1980, 1990, 2000 are as given in Report "United Nations Economic Commission for Western Asia, the International Drinking Water Supply and Decade Activities in the ECWA Region, Baghdad 1983."

Percentages for 1983 are based on various sources and estimated (n.a.: not available).

Table 2 - Population Served by Sanitation Services in the ECWA Region

Country	Percentage Coverage of the Population of the Year								Remarks
	Urban				Rural				
	1980	1983	1990	2000	1980	1983	1990	2000	
Bahrain	100	100	100	100	100	100	100	100	
Egypt		60*	100	100	5	5	70	100	*1981 estimate
Iraq		n.a	100	100	n.a	n.a	n.a	100	
Jordan		95*	100	100	35	n.a	n.a	n.a	*1981 estimate
Kuwait		100*	100	100	-	-	-	-	*1981 est., all urban
Lebanon		60	n.a	n.a	n.a	n.a	n.a	n.a	*1981 estimate
Oman		61*	100	100	n.a	n.a	n.a	n.a	*1981 estimate
Qatar		75*	100	100	-	-	-	-	*1981 est. all urban
P D R Y		10*	n.a	n.a	0	n.a	n.a	n.a	*1981 estimate
Saudi Arabia		n.a	n.a	100	n.a	n.a	n.a	100	
Syria	70	n.a	n.a	n.a	15	n.a	n.a	n.a	
United Arab Emirates		50*	100	100	n.a	n.a	100	100	*1981 estimate
Yemen Arab Republic		44*	100	100	0	0	n.a	n.a	*1981 estimate

Percentages for 1980, 1990, 2000 are as given in Report "United Nations Economic Commission for Western Asia, the International Drinking Water Supply and Decade Activities in the ECWA Region, Baghdad 1983".

Percentages for 1983 are based on various sources and estimates (n.a: not available).

- (d) no allowance may have been made for sanitation facilities in the construction of dwellings, making subsequent installations difficult.

Constraints in the water supply and sanitation sector
in the ECWA region

As mentioned above, all countries have achieved considerable progress in the sector, especially with regard to project identification, preparation of feasibility studies, and planning. Excepting the oil-rich states of the region, however, all countries have encountered severe financing problems. Other factors affecting the development of the water supply and sanitation sector have been identified as 2/:

- (a) the high rate of population growth and accelerated rates of urbanization;
- (b) lack of water resources, which affects about 30 per cent of the population in the region, and inadequate knowledge about the water potential in most of the countries;
- (c) lack of qualified manpower at all levels;
- (d) insufficient local capacity for sector construction and installation work, including the provision of certain materials;
- (e) lack of basic data and basic planning, such as a water resources master plan and sector master plans (comprehensive long-term development programme);
- (f) sector fragmentation in most countries, the lack of adequate information systems for effective sector planning and lack of co-ordination of activities among authorities dealing with water;
- (g) the rural population's insufficient awareness of the importance of safe water and adequate sanitation for health and the poor accessibility of many rural localities;
- (h) lack of national standards on basic data collection, design criteria factors, equipment, construction and service levels (especially for rural water supply and sanitation);
- (i) difficulties in adjusting water tariffs to reflect rising costs and to achieve a balance between costs and revenues.

Although the countries in the ECWA region have come a long way towards achieving the goals of the International Drinking Water Supply and Sanitation Decade, a hard task is still ahead for most of them in securing safe water supplies for all of their population, and in providing adequate sanitation systems.

ECWA and women's programmes in the region

As a result of the momentum created by the world conference, held in Mexico City in 1975 as the focal point of the International Women's Year, The Voluntary Fund for the UN Decade for Women was established by the United Nations General Assembly. ECWA submitted its first set of women's project proposals to the Voluntary Fund in September 1978, and implementation began in 1979. As the number of projects increased (totalling 40), their nature, scope and target groups diversified. All regional projects, which consist

of either training workshops, case studies, or need-identification research, are implemented by ECWA. National projects extending from one year to three years are executed either by UNDP or ECWA. Between 1978 and December 1983, Western Asia received 2,160,000 US dollars for technical assistance to women's projects covering three main areas of specialization: human resource development - now focused on strengthening and supporting the leadership of women's organizations - income-generating activities in urban and rural areas, and development planning which includes operational research for identification of needs for planning purposes.

The approved projects (40) can be categorized as follows:

A. Executing Agency

32 executed by ECWA

8 executed by UNDP/TCD

B. National, regional, sub-regional

23 national projects, specifically in Lebanon, Oman, PDRH, Bahrain, YAR, Jordan, Egypt

17 Regional and Sub-regional

C. Type of project

17 workshop/seminar

5 operational research

18 technical assistance field project.

Of special interest is the project in Oman, entitled Project for National Community Development which has been under UNDP umbrella since 1974, with substantial input from UNICEF and ECWA. In 1973, the Ministry of Social Affairs and Labour of Oman, in co-operation with UNICEF, undertook the first study on the beliefs and practices related to health, nutrition and rearing of children in two areas - Nizwa and Sohar. Upon recognizing the need for basic health requirements, and in view of the limited resources of Oman in 1974 and the gravity and challenge of its problems in the predominant rural areas, a Sultanate Decree was issued in that year establishing an Inter-ministerial Planning Committee for Community Development. The Decree also established local committees at the Wilayah level, leading to the current prevalence of local village committees in all 150 villages of the project. As part of the integrated community development and self-help approach, special attention is focused on the issue of health, especially in terms of water and sanitation. Reconstructing the "falajes" not only required expenditure and great effort but also brought credibility to the community development approach and united the village efforts with those of the government. Reconstruction of the "falaj" and continuous maintenance provide the villages with clean water supply. In addition, and

keeping with the cultural context of the villages, washing areas were constructed on the "falaj" to give women, in particular, privacy for personal cleanliness as well as that of their children, and to provide clean water for washing clothes and household items. Special village committees were also set up to ensure the proper functioning and maintenance of these facilities.

Linked to the above area is the disinfection of wells, a pressing issue at the village level. Access to clean and safe well-water through chlorination brought new impetus to the project and secured close co-operation between the government and the village people. The cost of installation of water pumps - one piped main outlet in the centre of each village - was shared.

Some villages have taken it upon themselves to share the costs of installing water pipes near homes to facilitate handling and ease the burden of the daily chores of women in the household. Some men, when asked about the reasons that motivated them to install such pipes, pointed out that they saw an improvement in the health of the children as safe water became available in larger quantities. They also indicated that their women were able to improve the quality and condition of the inside of the house, and finally that the women themselves appeared more attractive, smelled nicer, and seemed less tired compared to the days when they had to walk miles to fetch limited amounts of water. The women's response was similar to that of the men except for the comment that the availability of clean running water in the village allowed them to implement easily and more effectively the advice offered by the health and social workers of the community development project.

The project has been extended to communities of newly settled bedouins. Here the response was encouraging as well. The literacy classes for women and the provision of water pipes in the settlements, were pointed to by the people themselves as the two most important activities. An encouraging aspect is the willingness of the men to undertake manual labour required for extending the water pipes from the main outlet at one end of the settlement to the doors of their homes.

The Voluntary Fund for the UN Decade for Women has provided \$US 482,684 over four years for a mobile team of eight female social and health workers and their male counterparts to serve groups of villages.

One can continue to speak with admiration of the people's desire, will, and effort to improve their living conditions. However, a large percentage of the population, not only in the region, but also in the world, is still deprived of the basic right to clean drinking water. The issue is far from solved. Here, then, lies the importance of the Decade and the activities that could result from it.

Notes

- 1/ Document produced is: United Nations Economic Commission for Western Asia, The International Water Supply and Sanitation Decade Activities in the ECWA Region, Baghdad, 1983, 232 pages.
- 2/ The International Water Supply and Sanitation Decade Activities in the ECWA Region, p.209.

W. The Egyptian concept

Egyptian Academy of Scientific Research
and Technology

Introduction

The lack of adequate access to clean water and sanitation remains the single greatest barrier to health for the majority of the world's population. It was out of recognition of the extraordinary role that the provision of clean drinking water and of appropriate sanitation could play in the lives of poor people throughout the world, that the United Nations Conference on the Human Environment, convened in Stockholm in 1972, emphasized the importance of the protection of water resources from pollution and of management of waste water. HABITAT, the United Nations Conference on Human Settlements (Vancouver, 1976) and subsequently, the United Nations Water Conference (Mar del Plata, 1977) called upon the United Nations to establish a decade-long programme with a goal of providing clean drinking water and sanitation for all.

The launching of the International Drinking Water Supply and Sanitation Decade (1981-1990) by the General Assembly of the United Nations on 10 November, 1980, symbolized the beginning of a major effort to provide humanity with these two essential services, the absence of which has long been responsible for human tragedy on a large scale. The main goal of the IDWSSD is to provide clean drinking water and sanitation for all, and in that context the IDWSSD will be an important determinant of the progress in striving towards the achievement of health for all by the year 2000 (the global strategy launched by the World Health Assembly in 1979).

The International Development Strategy for the Third United Nations development decade on 1 January, 1981 reaffirmed the importance of the goals of the International Drinking Water Supply and Sanitation Decade. Furthermore, the IDS called for the implementation of the recommendations adopted at the World Conference of the International Women's Year, Mexico City, 1975 and at the World Conference of the United Nations Decade for Women, Copenhagen, 1980.

To understand the magnitude of the problem, reference must be made to the data collected by the World Health Organization (WHO) in preparation for the United Nations Water Conference (Mar del Plata, Argentina, Spring 1977). Half the population of the world (excluding China) lives in developing countries, the majority of which, approximately 70 per cent, in rural areas. Only 22 per cent of the latter (in 1975) had access to reasonably safe water and 15 per cent to sanitary excreta disposal facilities. Of the urban population, 77 per cent had access to piped water (57 per cent through house connections and 20 per cent through stand-pipes) and 75 per cent sanitary excreta disposal facilities (25 per cent by sewer connections and 50 per cent by household systems).

Such figures were considered rough estimates, and as grossly underrating the many public and private water and sanitation facilities that had fallen into disuse or disrepair.

Lack of water and poor sanitation share the responsibility for diseases, disability and death. The World Health Organization (WHO) estimates that 80 per cent of all diseases in the world are water related. Hundreds of millions of people suffer from these illnesses. At any given time, for example, there are about 400 million human beings with gastroenteritis, 200 million with schistosomiasis, 800 million with malaria and 30 million with onchocerciasis (river blindness). Diarrhoeal diseases are a major cause of death, specially among infants and young children. About 15 million children under five years old die each year. Twentynine out of every 30 of those are from the developing world. Their death is directly or indirectly attributable to contaminated water. Furthermore, half of the hospital beds in the world are filled with people suffering from water-borne diseases. It is estimated that if everyone had access to safe drinking water and sanitation, infant mortality could be cut by 50 per cent.

Women and water and sanitation

The lack of adequate access to clean water and sanitation remains the single greatest barrier to good health for the majority of the world's population. However, it is not only the health consequences of inadequate water and sanitation which seriously afflict the life of billions of people living in absolute poverty. In most countries it is those members of the family least physically capable, the women and children, who walk three to five or more miles to collect a gallon or two of water each day for the family's survival. The limited energy of already malnourished people is unnecessarily expended for this purpose, and hours of time that could be put into other more productive activities are squandered every day.

For women, the availability of water can mean a great improvement in life-style. For the woman in the developed world and urban areas of the third world, where piped water is taken for granted, water may not be conceived of as so vital to life. A mere turn of the tap brings the precious resource within reach. However, for the rural women in developing countries water can never be taken for granted. She may have to spend the major part of the day walking to a well to fetch water, and in drought conditions there may hardly be any water available, even within walking distance. To the rural women, as to her industrialized counterpart, water is basic to good health and satisfactory living standards.

In the home, field and factory, women and water are closely linked. Women mainly handle water for cooking, washing and other domestic activities. particularly in Africa and Asia, women predominate in agricultural occupations where water is the main resource for cultivating and processing of crops.

Women are burdened most by lack of accessible water and adequate sanitation and will benefit most from their availability.

On the one hand, achievement of the goals of IDWSSD will have a strong impact on the quality of life of women; on the other, women can play an active role in meeting the IDWSSD objectives.

Achieving the goals of the IDWSSD requires several kinds of action, with special focus on rural areas:

- (a) Education and awareness of the public as to the importance of clean water and sanitation to maintain an adequate standard of health;
- (b) Training national personnel to plan, build and maintain water supply and sanitation systems. From policy makers, to surveyors, economists, sociologists, engineers, and mechanics, an estimated one million men and women must be trained during the Decade. Particular emphasis should be placed on programmes for village-level workers.

Water resources in Egypt

Historical preamble

The Egyptian civilization of some 5000 years ago is still the wonder of mankind today. Many influences contributed towards its creation - religious impulses, brilliant brains, a high degree of human discipline and devotion among many other factors. But the principal element which enabled this civilization to develop was the Nile River, which brought, and still brings, water and fertility into a country which would otherwise be barren desert.

There is hardly a people on earth so dependent and so deeply awed by a river as were the Egyptians by the Nile. Nor did any river in the world occupy a similar position in a people's contemplative and spiritual life as did the Nile. The Egyptians were so profoundly enchanted by the river that they raised it to a status of worship and composed beautiful hymns in its praise.

The waters of the Nile have been, and still are, of deep concern to the Egyptians. The annual inundation that took place between June and September was a matter of life and death to them. The dissolution of the central government has always been connected with the failure of the Nile waters to rise. Measurement of the height of the inundation every year became of vital importance to the central government at Memphis. On this measurement was based the estimate of the harvest in the coming season and the rate of taxation to be fixed accordingly. Nilometers were used for measuring; The best of these were at the house of inundation near Old Cairo, and another was on Elephantine island at the end of the first cataract.

The importance of the national economy in ancient Egypt is well illustrated in New Kingdom religious literature. The dead had to defend themselves in the hereafter against sins, among which were reducing the arable area, falsifying its boundaries, damming up of basin, and selfish infringement on water and land rights to the injury of a neighbour.

The pharaohs were well aware of the fact that the prosperity and welfare of Egypt depended on water and a sound irrigation system. They took good care of projects that controlled the flood waters of the Nile to secure

arable land and villages against destructive floods. To extend the time during which waters of the inundation could be made available for productive agriculture, they built dikes and dammed up basins to hold the flood waters.

Engineering efforts to control the Nile began in the pharaonic epoch, when King Mina, who ruled Egypt in the First Dynasty, constructed the left bank to protect urban areas. He then established canals and bridges to carry the Nile water to lower lands behind the newly constructed bank.

During the Twelfth Dynasty, Sezostris continued what Mina had started. He constructed the right Nile bank, then transformed Lake Morris into a reservoir to divert the flood water to reduce its violence and to protect the delta lands. The lake is now the flourishing governorate of Fayoum. More recently, in 1933, the idea emerged to construct two main barrages on the Damietta and Rosetta branches to raise the water levels to feed main branch canals upstream in the delta.

The concept of annual storage, the retention of part of the flood water after the flood peak, was first introduced to the Nile system by Egyptians in 1889. The construction of the old Aswan Dam began and was completed in 1902. The storage capacity of the dam was 1×10^9 cubic metres.

The Asyut and Zifta Barrages were established in the year 1902, to be followed by Asna Barrage in 1906.

In 1912, the Aswan Dam was raised to increase its annual storage capacity to 2.5×10^9 cubic metres. A second raising of the dam took place in 1913 to increase the annual storage capacity to 5×10^9 metres.

On January 9, 1960 work on the Aswan High Dam was begun, and the first stage completed by the middle of May 1964, when the Nile flow was diverted through the side canal. The project was finally completed in July, 1970.

Present water supply and sanitation situation in Egypt

Egypt now has a population of about 46 million (about half are women) and is expected to have about 65 million by the year 2000. About 38 per cent of the population in 1960 lived in urban areas; in 1980, the percentage reached 46, i.e. urbanization increased by some 21 per cent over 20 years. Such high rate of urban growth has been confined and is attributed to migration of the rural population to urban centres, seeking better jobs and improved socio-economic conditions. This "unplanned" migration creates a variety of urban problems. Paralleling the creation of transitional settlements (slums, shanty areas, etc.) on the borders of major towns, is a sudden increase in demand for water supply and sanitation. The already existing water supply and sewerage cannot cope with the increase. In many areas water shortages and breakdowns in sewerage lines have resulted.

The state of water supply in Egypt

Potable water is drawn mainly from two sources: underground water from

artesian wells, and surface water directly from the Nile and irrigation canals. According to a Who-World Bank survey, about 80 to 90 per cent of the urban population is adequately served with safe drinking water. In the rural areas, however, the percentage of those having access to clean water is 50 per cent. The potable water distribution systems are often old and underdesigned, leading to heavy leakage along with poor plumbing and waste due to thoughtless use. The total loss due to waste and leakage has been estimated at 40 per cent, i.e., only about 60 per cent of the total production capacity is actually used.

Rapid urbanization and increases in the socio-economic standard of the urban population have been most marked in the great increase in per capita water consumption. Table 1 illustrates the point.

Table 1. Per capita water consumption in urban areas (litres/day)

	<u>1936</u>	<u>1950</u>	<u>1970</u>	<u>1982</u>
Large Cities	69	125	210	300
Provincial Cities	45	56	120	130

The state of sanitation in Egypt

The state of sanitation in Egypt is far worse than that of the water supply situation. In urban areas not more than 60 per cent of the houses are connected to sewerage (this is an average figure which varies from one city to another). And even then, most systems are old and cannot cope with the increasing load. The same is true of the sewage treatment works in most urban centres. Table 2 compares capacity of some plants to loads received.

Table 2. Capacities of some sewage treatment works

<u>City</u>	<u>Capacity (m³ /day)</u>	<u>Actual Amount Received (m³ /day)</u>
Cairo	415,000	1,400,000
Giza	220,000	600,000

At present, it is estimated that 80 per cent of the sewage is discharged without treatment into surface waters. In Alexandria, all waste water is discharged into the sea without treatment. This situation has had a number of environmental impacts and has created health hazards. Typhoid, paratyphoid, infective hepatitis, dysentery and diarrhoea are common water-borne diseases in Egypt.

There are no sewer systems in rural areas. Each rural dwelling has its

own method of sewage disposal, such as latrines, septic tanks, cesspools etc.

Health and sanitation in Egypt

Although Egypt has a dynamic water resource management policy, water quality management has not received parallel attention.

Pollution of the Egyptian water sources is now a grave problem; not only because it poses a danger to health, causes imbalance in delicate ecological cycles, and destroys aesthetic and recreational opportunities, but also because it will drastically reduce the supply of useable water required by nearly every segment of the Egyptian economy.

General inadequacy of water supply and sanitation services results in a high incidence of water-borne and water-related diseases, which are still the prime cause of illness and death through Egypt.

As for parasitic water-borne diseases, the most common is schistosomiasis with its two types: haematobium affecting the urinary tract and Mensoni affecting the intestinal tract. Both are human parasites that pass as eggs from the patient to the waterways where they find the intermediate host, a snail, then pass from the snail in the infective stage to man when he comes into contact with infested water. This cycle cannot be broken except by keeping human excreta away from the waterways and by making purified water available for domestic uses. Attempts at eradicating the snails and treating the patients have resulted in an improvement in morbidity, but the radical solution rests with change of behaviour (which can be effected by health education) is to make available an alternative, that is, provide safe water and efficient sanitation.

Social profile

Obtaining water, making it readily available for domestic use, is recognized as one of the major elements of physical labour imposed upon women and children in Egypt. Women's role as household managers means that in food preparation, washing and bathing, they are the primary users and mediators between water source and household. A number of field studies conducted in Egyptian villages revealed that water fetching, a task almost invariably carried out by women, consumes one to two hours of woman's labour over the course of a day. In a number of rural areas women have to walk very long distances to draw their water from standpipes. Nearly 30 per cent of women have to walk more than 60 minutes to satisfy their water needs.

The main sources of domestic water in Egyptian villages are standpipes, canals, or private connections. In a few areas where adequate ground water is available, handpumps are the primary source. Water for drinking and cooking obtained from standpipes is carried to the dwellings in cans, ranging in volume from 1.5 to 20 litres. Water carried on the head is generally in a plastic container. Young girls carry smaller containers. In some villages, women make two trips to the public water system, in the morning and in the afternoon.

It has been observed that perception of water supply as limited, or as unavailable is reflected in people's practices with respect to water consumption. The general attitude, that nothing should be wasted, was observed in many Egyptian rural communities. Multiple water uses were directly related to scarcity of water and to the hard task of transporting it. This attitude is very similar to that of villagers in other rural communities in developing countries. Water for laundry is saved for later use to clean floors. Water used to wash dishes, or clean vegetables, or soak corn is used to feed poultry and other domestic animals. It is not surprising, therefore, to state that abundance and proximity are the two factors most appreciated in a source of water supply.

Most villagers desire greater accessibility to water through the installation of more taps. It was noticed that taps located at a long distance from the houses encouraged peasants to resort to the nearest canal, especially in unsuitable climatic conditions. Peasants also tend to use the canals when the tap is not accessible.

Awareness of health consequences

Many field studies undertaken in rural Egypt indicate that the majority of villagers, in different rural communities, did associate disease with water quality. Villagers in the governorates of Beheira and Kafr El-Sheikh are generally aware of the importance of potable water and its impact on health. The majority of people attribute ill health directly to the use of non-standpipe water. Most of them recognize bilharzia as a main source of ill health, and that stomach complaints are caused by the use of non-potable water. This awareness is reflected in people's widespread willingness to pay for improved and reliable water supply.

Villagers in Menufiya in the delta region, and in Assyut in Upper Egypt, are also aware of the importance of potable water in relation to their health. They know that bathing in canal water can cause bilharzia. In a study on formal and informal health practices in Babel Wa Kafr Hammam, most of the interviewed women were aware that bilharzia results from contact with contaminated water either by drinking canal water, bathing in it, or walking bare-footed near it. Some women recognize that contaminated drinking water causes intestinal diseases.

World-wide cross-cultural studies on water supply and sanitation in rural sectors reveal that women do understand the need for improved water for domestic consumption. Women may not be aware of the direct relationship between improved water supply and health, or of the germ theory of disease, but once safe water is readily available, they tend to evaluate the benefits in terms of improved health.

Villagers in Egypt, however, fail to grasp the relationship between specific sanitation problems and disease. They do not understand, for example, that the poor sanitary condition of zir-stored drinking water is responsible for transmitting various parasitic and bacterial infections, or that dipping utensils or the fingers into the zir when taking water permits transmission of infection.

In some rural communities, people could not perceive health problems resulting from contact with feces, flies, or water contaminated with urine. Neither could they see that feces were a major source of water contamination. This lack of awareness may be attributed to the traditional use of human excreta as a fertilizer in rural Egypt. In some villages, human feces is composted like animal dung and added to the piles of animal nature. There is also a general perception, as in many cultures, that children's feces are harmless and are not germ-laden carriers of disease.

Future plans and activities to the year 2000

Water

To improve the situation of drinking water in Egypt, the National Five-Year Plan (1981/1982 to 1986/1987) aims at increasing the capacity of water works and distribution systems to achieve an average national coverage of 85 per cent of the population. It is also planned to increase the rate of per capita consumption to 350 litres/day in large cities and 200 litres/day in provincial towns. Long-term plans foresee access to clean drinking water for 100 per cent of the population by the year 2000. It is also planned to reduce the losses of water through adequate maintenance schemes and through increased public awareness. In this regard, the public should be educated to understand the difficulties and the costs involved in providing safe drinking water, to appreciate the meaning of water conservation and to fully participate and co-operate in the efforts made by the Government to improve the situation.

Sanitation

To improve the deteriorating situation of sanitation, the Five-Year Plan (1981/1982 to 1986/1987) has established a number of targets, the most important of which are: renovation and extension of existing sewerage in main urban centres (especially those with a population exceeding 40,000), rehabilitation and expansion in sewage treatment works, and more important, arrest of discharge of sewage in the surface waters or onto land without adequate treatment. Several studies have been carried out on the management of waste paper in Alexandria, and a decision will be made on the selection of the most appropriate option in the near future (either discharge into the sea after appropriate treatment or recycling and use of treated effluents in agriculture, or both).

Financial implications

In order to achieve the goals of the International Drinking Water Supply and Sanitation Decade, considerable investments are needed. Over the five years 1981/1982 to 1986/1987, about 2858 million Egyptian pounds (about 3000 million \$US) in addition to 590 million pounds in loans and grants have been earmarked for water supply and sanitation projects in Egypt. It is estimated that an additional amount equal to the first will have been allocated by 1990. Thus, the total investments foreseen for the IDWSSD amount to about 6000 million \$US.

Training

In 1981, a pilot training programme was set up by the Ministry of Health of the Egyptian Government in co-operation with WHO, UNICEF and UNDP.

The objectives of this programme were:

- (a) To assist the Arab Republic of Egypt to accelerate its plans and programmes to improve access to safe drinking water supply and adequate sanitation facilities for its rural and fringe urban population;
- (b) To strengthen the capacity of existing training centres to develop and carry out such programmes and train selected personnel at local levels.

The ten courses of this programme were all completed in 1982 as planned. The two hundred trainees were from Cairo, Abu-Hommos, Fayoum and Aswan.

Conclusions

What clearly emerges from the above review is that the introduction of water and sanitation technology in Egyptian rural communities cannot be considered in isolation from the social, organizational, and cultural modes within the village.

Prime consideration must be given to women since they play an important role in water fetching and use. Planners, therefore, should incorporate and consider women's priorities, needs and wishes.

To maximize health benefits in rural communities, water supply and sanitation technologies should be appropriate to the needs, conditions and beliefs of the people. Design and implementation should be based on community participation. Health education programmes are necessary to guarantee the success of the newly introduced technological packages.

Surveying local conditions is essential to assess social and cultural variations in water-related beliefs and practices in different rural communities. Such surveys would help identify available water sources, patterns of water use, defecation practices, hygiene practices, health problems, skills of local personnel, available local materials, and sociocultural community structures.

Recommendations

1. The supply of safe, potable water should be extended to as many people as possible. It is very important to make water palatable and agreeable in appearance so that people are encouraged to use it. Thus, treatment to achieve clarity and to reduce those constituents (such as excessive iron and manganese) which make water unpalatable, needs to be regarded as a highly desirable part of providing safe water for public consumption. Treatment of this kind may not always be practicable, especially in the case of small ground-water supplies. Therefore, the priority assigned to treatment for

palatability, in any particular case, must depend upon an assessment of local public reaction to the water, and on the kind of alternative and less safe source the public would use if it were unwilling to avail itself of the public supply.

In addition to maintaining water quality and palatability standards, it is important that water be available when required and at a pressure adequate to reach all consumers connected to the system. Many of the existing systems operate for only a few hours a day, or are unable to serve consumers farther away from the source-works due to inadequate capacity or excessive leakage, or consumer wastage, causing low system pressure.

2. Most water treatment processes in use today were not designed to remove toxic substances. In cases where gross contamination of a water supply has been observed, an alternative supply has generally been developed. The supplies involved have generally been small. In the case of a major water supply system, however, it is not generally economical, even if possible, to develop a major new water supply source. Due to increasing concentration of organic and inorganic micropollutants, or owing to the development of more stringent standards, it is significant to realize what removal might be required from water passing through existing treatment facilities. By knowing the approximate concentrations of these toxic substances, optimal use can be made of existing units by designing pre-treatment or post-treatment facilities to most required standards. Therefore, research should be directed to this area.

3. Access of households to acceptable sanitary facilities should be increased, better drainage and emptying of existing sanitary facilities should be provided, and employees and the rural population should be educated to make better use of the facilities which are available.

Egypt has been placed into a particularly advantageous position at the start of the Water Decade by the recent completion of detailed country-wide studies on the problems of rural water supply and sanitation and the preparation of rural water supply and sanitation and the preparation of outline projects in these sectors by many individual governorates. Thus, for many areas of Egypt, preliminary design and implementation schedules of projects to meet both the needs of under-served communities and to rehabilitate existing systems have already been established.

X. A pilot training programme: Women and the
International Drinking Water Supply and
Sanitation Decade

Ahmed Amin El-Gamal*

BACKGROUND

In 1981, a pilot training programme designed to further the aims of the National Drinking Water Supply and Sanitation Decade (NDWSSD) was developed jointly by the Ministry of Health of the Egyptian Government, WHO, UNICEF and UNDP. Initial planning and discussion culminated in a joint proposal incorporating the necessary funding from the four agencies participating. A Steering Committee composed of representatives of the four agencies was established to oversee and guide the implementation of the programme.

After analysis of all the factors involved, the Steering Committee decided to contract for the necessary services to accomplish the requisite training. After issuing invitations for proposals and evaluating the responses, a Special Service Agreement between WHO, as the executing agent for the project, and a private firm of engineering and management consultants experienced in health resources development was executed.

Initial activity consisted of a survey of training needs and training facilities conducted in late 1981. The document was to serve as a guide in the development of course curricula and the selection of prospective trainees.

Half of the total of ten courses called for were conducted in the first half of 1982 as Phase I of the project while the remainder were conducted during the last half of that year as Phase II. Course curricula were developed in advance of each scheduled course as well as materials to be distributed to the trainees. Course evaluations at the end of each course were obtained from the trainees on an anonymous basis and subsequently evaluated.

Progress reports were submitted to WHO - four progress reports and a final report for each of the two phases of the total training programme.

At the conclusion of the planned activities, a consultant was engaged to evaluate the project and to make recommendations towards possible future activities along the lines of this pilot programme.

Objectives

As described in the joint project proposal, objectives were classified as (a) developmental and (b) immediate.

(a) The development objective relates to the cooperative action between the government and the three international agencies. It is stated as follows: "... to assist the Arab Republic of Egypt to accelerate its plan and programmes to improve access to safe drinking water supply and adequate

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sanitation facilities for its rural and fringe urban population, in the context of the ... (IDWSSD)". The purpose of this project is to provide active support to build national capabilities to develop and implement water supply and sanitation projects throughout the Decade period (1981-1990).

(b) The immediate objective is stated to "...aim at strengthening the capacity of existing training centre (s) to develop and carry out such programmes and training to selected personnel at local levels".

The training, utilizing differing curricula, to be provided for three different levels of personnel, viz:

- (1) professional, e.g. engineers, chemists;
- (2) technical, e.g. plant operators;
- (3) administrative or accounts staff.

The personnel selected for training would be drawn from staff engaged directly or indirectly in the community water supply and sanitation sector in rural and fringe urban areas. Their "...training would allow them to carry out their respective functions more efficiently and with a better understanding of the mechanism of programme preparation and implementation and the relationships between community health, hygiene promotion and the provision of sanitary facilities".

This would assist the government in developing the special skills needed at provincial and local levels by providing guidelines towards the establishment of a "...dynamic training programme of a practical and applied nature." It would also provide support to the planning and implementation of immediate activities of the UNICEF-supported project for increasing drinking water supply and sanitation facilities in selected rural areas, at present with emphasis on Upper Egypt in four governorates (see table 1).

Schedule and Enrollment

The ten courses of this programme have all been completed according to the schedule. The schedule and enrollment is shown in table 2.

Attendance

The initial intended attendance of 200 trainees was 84.5 per cent fulfilled. This was largely due to the difficulty of releasing trainees from work sites for enrollment in the four courses on project administration, human resources development and maintenance. However, trainees were virtually 100 per cent punctual and absenteeism was nil. All fulfilled required entry levels and only a few did not show special interest in the programme.

Teaching staff

Instructors were chose from"

- (a) Sub-contracted firm: for management and some technical subjects;
- (b) Universities and institutes: for academic subjects;
- (c) Public utilities: for technical subjects;

Table 1. Coverage by governorate

Governorate	Planned Coverage	Planned Deletion	Actual Coverage	No. of Trainees
Matruh	-	+	-	-
New Valley	-	+	-	-
Red Sea	-	+	-	-
N. Sinai	-	+	+	4
S. Sinai	-	+	+	2
Port Said	-	+	-	-
Damietta	+	-	-	-
Dakahlia	+	-	-	-
Kafr-el-Sheikh	+	-	-	-
Behera	+	-	+	38
Alexandria	-	+	-	-
Gharbia	+	-	+	13
Munufia	+	-	+	6
Sharkia	+	-	+	1
Kalyubia	+	-	+	6
Ismailia	+	-	+	3
Suez	-	+	-	-
Cairo	-	+	+	36
Giza	+	-	+	2
Fayoum	+	-	+	1
Beni-Duef	+	-	-	-
Mena	+	-	-	-
Assint	+	-	+	13
Suhag	+	-	+	14
Qena	+	-	+	19
Aswan	+	-	+	11
Total	17	9	15	169

Table 2. Course schedule and enrollment

Ser.No.	Course Title	Location	Period	Enroll.
1	Environmental Health	Aswan	30.1.82 24.2.82	19
2	Water Supply	Aswan	30.1.82 24.2.82	20
3	Human Resource Development	Cairo	13.3.82 7.4.82	11
4	Project Administration	Cairo	13.3.82	10
5	Construction Supervision	Cairo	24.4.82	24
6	Pipe Fitting	Abu- Hommos	3.7.82 23.8.82	22
7	Maintenance I (Water Supply)	Cairo	28.8.82 22.9.82	15
8	Maintenance II (Sewage Disposal)	Cairo	28.8.82 22.9.82	9
9	Pump Operation, Maintenance and Repair	Cairo	20.11.82 15.12.82	21
10	Integrated Rural Development	Cairo & Fayoum	16.10.82 10.11.82	18
Total				169

- (d) The Ministry of Health (the Public Health Development, Rural Health Department): for health subjects and industrial safety;
- (e) Government officials: for current problems;
- (f) The Organization for Reconstruction and Development of Egyptian Villages (ORDEV): for rural development subjects;
- (g) Other visiting staff: for miscellaneous subjects.

Training materials and visual aids

Trainees received all printed matter relevant to the curricula in addition to selected published references in Arabic.

Visual aids were provided. They included films, slides, transparencies, objects and models.

Trainee response and evaluation

Generally speaking, all 169 participants showed great interest and

satisfaction with the programme. Their evaluation was recorded on specially designed forms, filled out anonymously. An analysis of the responses was provided in progress reports. Most trainees gave a performance rating above 90 per cent.

Difficulties encountered

Generally speaking, the difficulties centered around the following:

(a) Recruitment: release of some manpower categories proved to be somewhat difficult, e.g. project managers and maintenance supervisors. Recommended: resort to workshop training in future programmes, i.e. joint work/training on-the-job programmes.

(b) Trainee's stipend: trainees' stipend may have been sufficient for those residing in the course locality. But out-of-town participants may not find it up to present day cost of living standards. Provision of residence for participants in future may prove to be more effective and would ease discomfort of travel to and from the location where the courses are to be held.

(c) Course duration: Even though care was taken to enroll well qualified and experienced trainees, course duration was hardly sufficient to impart a wide variety of skills. And though the programme was considered successful, and so regarded by the representatives of all agencies concerned, it is recommended that duration in future programmes be extended to two months.

Conclusion

The Ministry of Health and WHO, UNICEF and UNDP have entered into a new agreement to extend the training project for four more years, with a total budget of \$300,000 equally shared by the international organizations. The Ministry of Health will provide the training centre as well as supporting staff and facilities.

Y. Women and the International Drinking Water Supply and Sanitation
Decade: water supply and sanitation in Egypt

Ahmed Fouad El-Gohary*

The lack of adequate access to clean water and sanitation remains the single greatest barrier to good health for the majority of the world's population. The launching of the International Drinking Water Supply and Sanitation Decade (1981-1990) by the General Assembly of the United Nations on 10 November 1980, symbolized the beginning of a major effort to provide all of humanity with these two essential services, the absence of which has long been responsible for human tragedy on a large scale. The main goal of the IDWSSD is to provide clean drinking water and sanitation for all, and in that context, the Decade will be an important determinant of progress towards the achievement of health for all by the year 2000 (the Global Strategy launched by the World Health Assembly in 1979).

Egypt now has a population of about 46 million (about half are women) and is expected to have about 65 million by the year 2000. About 38 per cent of the population in 1960 lived in urban areas; in 1980, the percentage reached 46 per cent, i.e. urbanization increased by some 21 per cent over 20 years. This high rate of urbanization is confined to major cities, especially to Cairo and Alexandria.

Table 1 illustrates the growth of the Greater Cairo area since 1907.

Table 1. Past and future growth of Greater Cairo

<u>Year</u>	<u>Population in Cairo</u>	<u>Percentage of total population in Egypt</u>
1907	1,133,000	10.2
1927	1,676,000	11.8
1947	2,962,000	15.6
1967	6,113,000	20.3
1976	8,000,000	21.3
2000	15,900,000	26.0

Such rapid urbanization is mostly caused by high rates of migration of the rural population to urban centres seeking better jobs and socio-economic conditions.

This "unplanned" migration creates a variety of urban problems. Besides creating transitional settlements (slums, shanty areas etc.) on the outskirts of major towns, there is a sudden increase in demand for water supply and sanitation. The already existing water supply and sewerage cannot cope with the increase. Many areas have suffered water shortages and break-downs in

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sewer lines.

The state of water supply in Egypt

Potable water is drawn from two sources: artesian wells, or directly from the Nile and irrigation canals. According to a WHO-World Bank survey, about 80 to 90 per cent of the urban population is adequately served with safe drinking water. In the rural areas, however, the percentage of those having access to clean water is 50 per cent. The drinking water distribution systems are often old and under-designed, and consequently there are heavy losses through leakage as well as waste due to thoughtless use. Total waste has been estimated at 40 per cent which means that only about 60 per cent of the total production capacity is actually used.

The consequences of rapid urbanization and raised socio-economic standards of the urban population are most marked in the great increase in per capita water consumption. Table 2 illustrates the point.

Table 2. Per capita water consumption in urban areas (litres/day)

	<u>1936</u>	<u>1950</u>	<u>1970</u>	<u>1982</u>
Large Cities	69	125	210	300
Provincial Cities	45	56	120	130

To improve the situation of drinking water in Egypt, the National Five-Year Plan (1981/1982 - 1986/1987) aims at increasing the capacity of water-works and distribution systems to achieve an average national coverage of 85 per cent of the population. It is also planned to increase the rate of per capita consumption to 350 litres per day in large cities and 200 litres per day in provincial towns. Long-term plans call for access to clean drinking water for 100 per cent of the population by the year 2000. There are also plans to reduce the losses of water through adequate maintenance schemes and through increased public awareness. In this regard, the public should be helped to understand the difficulties and the costs involved in providing safe drinking water, to appreciate the meaning of water conservation and to fully participate and cooperate in the efforts made by the Government to improve the situation. The understanding and full-co-operation of housewives is, therefore of extreme importance since they are the main users of domestic water supplies.

The state of sanitation in Egypt

The state of sanitation in Egypt is far worse than that of the water supply situation. In urban areas no more than 60 per cent of the houses are connected to sewer systems (this is an average figure and varies from one city to another). An even when service is provided most systems are old and cannot cope with the increasing demand. The same is true of the sewage treatment works in most urban centres. Table 3 illustrates the capacities of some plants as compared to loads received.

Table 3. Capacities of some sewage treatment works

<u>City</u>	<u>Capacity (m³/day)</u>	<u>Actual Amount Received (m³/day)</u>
Cairo	415,000	1,400,000
Giza	220,000	600,000

At present, it is estimated that 80 per cent of the sewage is charged into surface water without treatment. In Alexandria, all waste water is so discharged into the sea. This situation has created a number of environmental problems and health hazards. Typhoid, paratyphoid, infective hepatitis, dysentery and diarrhoea are common water-borne diseases in Egypt.

In the rural areas there are no sewer systems. Each rural dwelling has its own adequate sanitation and the almost total lack of awareness of consequences for health is causing many health problems. Soil and water contamination by human excreta is considered the leading factor in the spread of prevalent parasitic diseases, such as schistosomiasis, ascariasis and hookworm, as well as of typhoid, dysentery and other infectious diseases. More than half of the high infant mortality in Egypt (120 per 1000 live births) is attributed to gastroenteritis and diarrhoeal diseases.

To improve the deteriorating sanitation situation, the Five-Year Plan (1981/1982) to 1986/1987) has established a number of targets. The most important are: renovation and extension of existing sewer systems in main urban centres (especially those with a population exceeding 40,000); rehabilitation and expansion in sewage treatment works; and, most important, to stop discharge of sewage into surface waters or onto land without adequate treatment. Several studies have been carried out on management of waste water in Alexandria. A decision will be made in the near future on the selection of the most appropriate option (either discharge into the sea after appropriate treatment, or recycling and use of treated effluents in agriculture, or both).

Financial implications

In order to achieve the goals of the International Drinking Water Supply and Sanitation Decade, considerable investments are required. Over the five years 1981/1982 to 1986/1987, about 2858 million Egyptian pounds (about 3000 million \$US) have been earmarked for water supply and sanitation projects in Egypt. Allocation of a second amount equal to the first is likely by 1990. Thus, total investments in connection with the IDWSSD amount to about 6000 million \$US.

Z. Women and the International Drinking Water and Sanitation Decade: focus on technical systems and training

Sayed El Wardani*

Rationale and background

The facts listed below make it obvious that women are not only an integral and essential human resource for active participation in the development of water supply and sanitation (WSS) projects, but also a compelling force for the development of simple WSS systems for nations with limited choice of technology.

(a) Women are the bearers and carry primary responsibility for the development of our children. According to the United Nations, one out of three families is headed by a women;

(b) Traditionally women are the carriers of water in the developing sector of our globe and spend a significant portion of their life interacting with water;

(c) High correlation coefficients exist between mortality rate and water supply quantity and quality as well as sanitary conditions and practices;

(d) A very high percentage (over 75 per cent) of all illnesses in the developing countries can be traced to water supply and sanitation problems;

(e) World Health Organization estimates indicate that the loss of working days in developing countries due to water-related diseases is staggering;

(f) Women constitute half of the world's population, but are responsible for two thirds of the world's work hours.

The above facts clearly demonstrate the critical position of water supply, water quality and sanitation issues to the health, socio-economic, and overall welfare of developing nations. Practical solutions to problems related to women and water supply and sanitation are complex and multi-faceted. It is therefore essential to define the controlling issues in order to shrink the problem to a manageable size that responsible agencies can handle.

To help achieve practical objectives during the IDWSSD, we need to focus on isolate common denominators of the many varied components making up the overall system illustrated in figure 1.

Technical systems

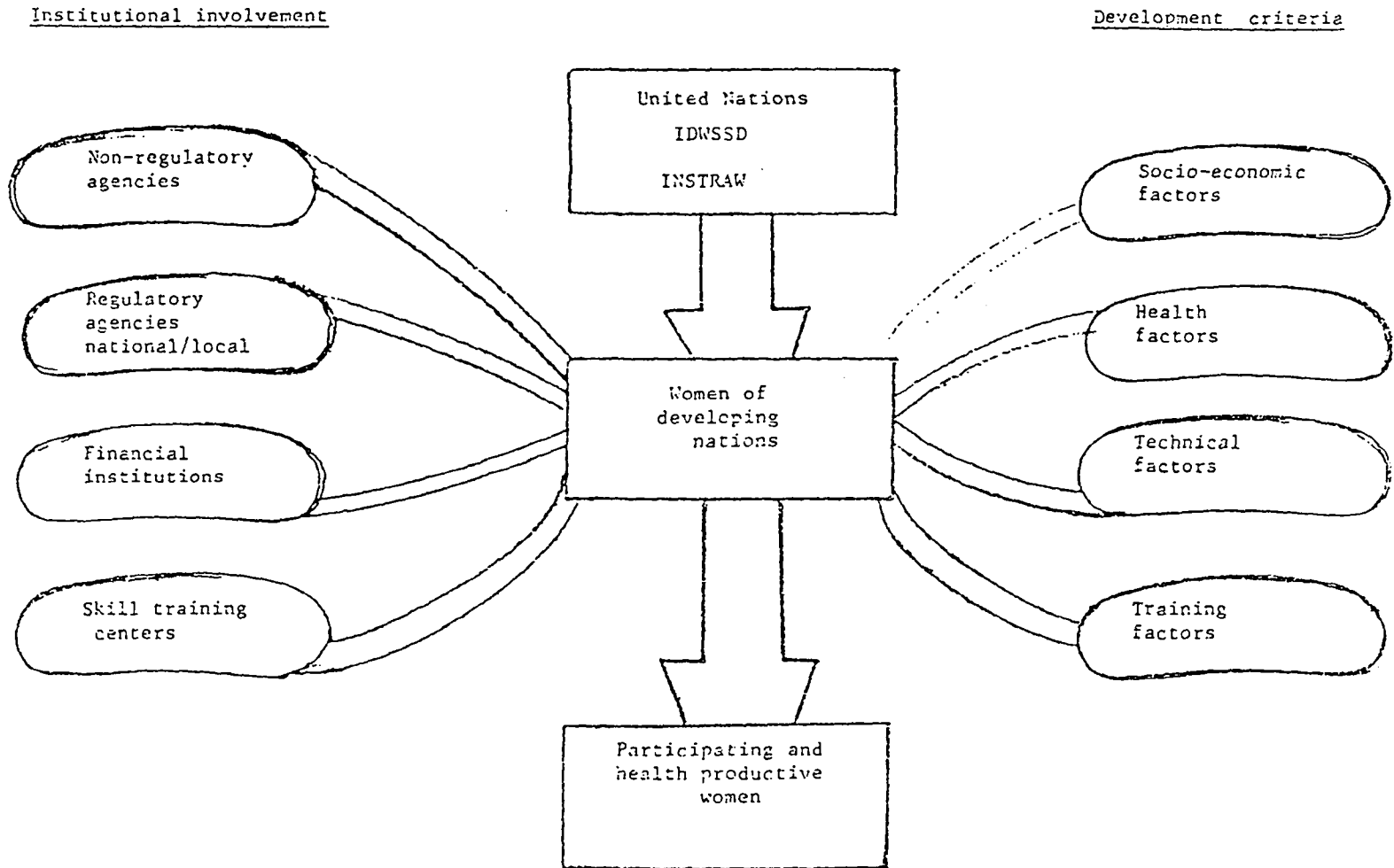
The scientific and technical base of water supply and sanitation systems are broad in scope and lend themselves to accomodating specific local planning,

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Figure 1.

Women and water supply and sanitation

A systems rationale



design and operational requirements. Water supply and sanitation systems vary from simple to complex, depending upon application and level of available technology. Taking into account the ambitious objective of the IDWSSD to involve the majority of women in the planning, design and operation of such systems, we need to consider the current state-of-the-art of and focus on simple, manual, or semi-automated systems. To simplify dealing with the large and varied array of technical considerations and plausible systems, I would like to group them into two categories:

(a) Family systems: systems that can be developed and operated by one or a few women;

(b) Co-operative systems: systems that can be developed through joint effort by the women of a village or villages.

Family systems

Let us define family systems as simple water and sanitation structural systems that can be readily installed, operated and maintained by the women of the family, or members of a few families, not to exceed 20 to 30 families. Assuming five members per family, such systems would serve 100 to 150 people per unit. All family systems discussed must be considered interim until operational hookups to a permanent system become available. Even today, simple family systems are not uncommon in remote areas and small isolated communities in developed nations. There are small communities in the United States for example, where permanent and large municipal systems are not justifiable. Simple sanitation facilities are provided for small, remote Indian and Eskimo communities. Organizations such as the United States Public Health Service and the Pan American Sanitary Bureau for North and South America, who are concerned with such matters, have developed guidelines and handbooks for family-operated systems.

Pit Privy

A pit privy is a vault "holding hole" constructed in the ground with wood, or probably concrete lining, topped with the privy for seating, and covered by a simple housing. Such a system is simple to erect and maintain. The family or families using the pit privy must be made aware of the following constraints:

(a) The pit privy must be at a safe distance from sources of potable water, especially wells, to avoid contamination;

(b) Fly control must be instituted. Flies are primary disease vectors along with rodents. Women must develop awareness of the fly breeding problem and the importance of preventing contact of mature flies with the fecal matter;

(c) The pit privy must be fly and rodent proofed. This can be accomplished by a housing, which provides privacy and aids in the control of vermin. Spreading of lime, and adding lime to the vault, not only controls odours but also deters flies and rodents:

(d) When the pit privy is moved to another location, the vault may be

doused with gasoline and burned, buried, and covered with soil. Preferably, however, the vault should be pumped empty and the raw sewage conveyed to a co-operative landfill site where it is incinerated and mixed with soil, or, alternatively, to the co-operative hyacinth systems discussed later.

Again, it needs to be emphasized that such a system presents an interim solution until permanent municipal rural systems are developed. It must also be stressed that such a system can be dangerous in areas of high population densities because of potential ground water contamination.

Driven and dug wells

The use of dug wells and a drop bucket is an ancient and simple technique for obtaining drinking water. A series of dug wells at some distance from rivers and canals can make an effective source of drinking water to meet community needs. The wells are simple to dig, particularly where ground water is shallow.

A driven well consists of a series of connected lengths of pipe driven by repeated impact into the ground to below the water table (figure 2). Such wells could serve a population of 5,000 to 20,000 depending on the size of the joint systems and the extent of co-operative and outreach efforts by the women of the village or villages. Such systems as well would be classified as interim to semi-permanent until municipal systems can be developed or co-operation expanded and strengthened to cope with growth and the application of technology.

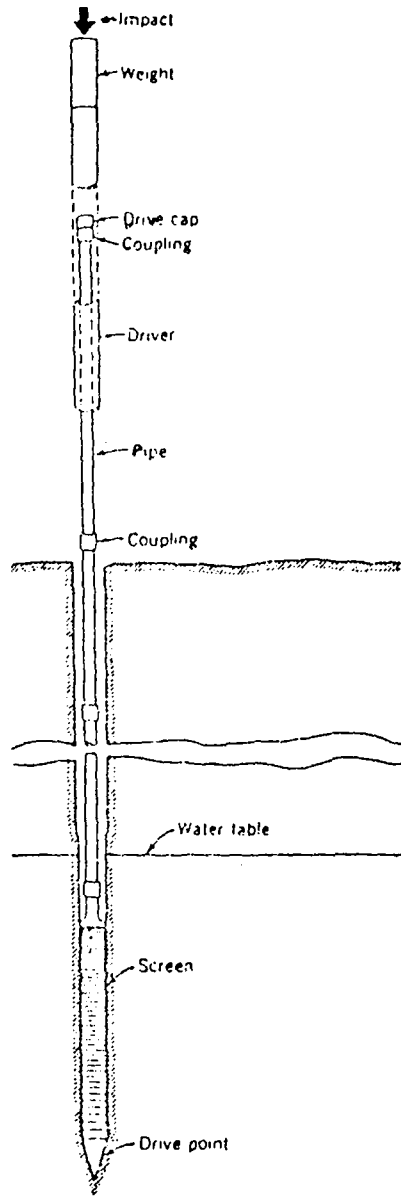
There is a limit to the size of a network of wells and pit privies within a given area before serious ground water and nearby canal and river contamination threatens and health hazards multiply. This danger level would develop even if the network incorporated pumping and conveyance to landfill sites for incineration and burial, lime treatment, and/or soil mixing.

For co-operative systems, the potential of vascular aquatic plants, such as water hyacinths, in solving water and sanitation problems should be considered.

Hyacinth systems

Hyacinths have been studied extensively in connection with extended space exploration and proved to be effective in solving such problems as providing high-quality water, removing pollutants, treating waste water and even fulfilling needs for food and energy. Today, hyacinths are used for treatment of waste water and sewage, and even for production of potable water. Provocative models and operational treatment facilities are now being used in the United States. Hyacinths grow uncontrolled and dense in tropical and semitropical bodies of water. Many of the Nile distributory canals, for example, are heavily populated with hyacinths. This heavy growth is considered a nuisance. The farmers and authorities dredge the plants frequently and pile them along the banks of the river to use as soil conditioner or for animal feed.

Figure 2.
Driven wells



It is interesting to note that vascular aquatic plants grow with particular abundance in the tropical and semi-tropical zones where the water supply, sanitation and public health issues are of greatest concern. In the natural state, water hyacinths are considered a major pest rather than a resource due to their tremendous growth rate and extreme hardiness. However, when harvested they can be used for animal feed and human food in the form of concentrated protein. Moreover, under controlled conditions water hayacinths can provide efficient, inexpensive and simple systems for filtration and disposal of toxic materials and sewage. The plants remove toxic heavy metals such as lead and mercury from water. Hyacinths also assimilate nutrients and remove excess nitrates and phosphates from sewage. The flowers thrive on a sludge diet in their natural state.

A co-operative hyacinth system for water and sanitation is made up of a simple network of ponds dug in the ground. Few acres are needed for such a system. Hyacinth systems not only treat sewage but can also be used to turn raw sewage into drinking water of a quality equal to, if not better than, water produced by extensive and technically sophisticated systems.

Table 1 compares the quality of secondary and hyacinth treated effluents.

Table 1. Treated effluent characteristics

<u>Property</u>	<u>Secondary effluent</u>	<u>Aqua-culture effluent</u>
Biological oxygen demand, mg/l	30	20
Suspended solids, mg/l	30	2-7
Ammonia, percent removal	50%	97-99%

Table 2 compares micronutrient levels and indicates that the heavy metal content of hyacinth treated water falls below the maximum standard set by the World Health Organization.

Table 2. Comparative micronutrient levels

<u>Source</u>	<u>Nutritive content</u>		
	<u>Chromium</u>	<u>Copper</u>	<u>Zinc</u>
Average daily food consumption	0.0140	0.1540	0.6900
Sewage, raw, (mg/l)	0.0200	0.2300	1.9300
Sewage, treated, (mg/l)	0.0400	0.1800	0.5200
Drinking water (mg/l)	0.0005	0.0012	0.0027
	0.0020	0.0420	0.0500
World Health Organization. Minimum human nutrition, (mg/day)	0.002	2.1	15
	0.05		

A vascular plant sewage treatment facility need not be complex. They can be fairly rudimentary to begin with and elaborated after experience and technical know-how have been gained by the women operating and maintaining the systems. Aqua-culture systems require hardly more than nursing of the vascular plants and controlling their atmosphere. In time, as women and family members progress in their nurturing role they will find themselves wanting and capable of growing plump shrimp and fish, and of extracting cattle fodder, soil fertilizer, and, eventually, methane gas to satisfy part of their energy needs.

Operation of the hyacinth system is simple. The raw sewage is conveyed to the site in truck tanks. The sewage enters pre-treatment ponds where gross solids settle out. The waste water then flows into a series of ponds in which hyacinths grow. The hyacinths remove most of the toxic materials such as the metals, and metabolize pollutants in the waste water. After completion of the first treatment stage, the treated water might be suitable for irrigation or to be returned to raw water sources. It is preferable to delay mixing with raw potable sources until after the second stage of treatment is completed in which the water flows into a second pond of hyacinths and the plants absorb and metabolize pollutants not picked up in the first phase.

Now the treated waste water is safe for crop irrigation or to be returned to the raw water canal. The sludge can be mixed with soil for fertilizing, and the process is essentially complete.

Further treatment is essential, however, if the co-operative wishes to grow and culture fish, shrimp etc., or even to produce potable water that may be used directly or blended with other drinking water drawn from wells. After completion of the first phase of this second cycle, shrimp and one or two varieties of fish may be raised. In the second and third phases, the water is free of any virus that might be harmful to fish or man. This is further assured by ozone application. The water then passes through sand filters for clarification.

To obtain pure drinking water and to meet international standards for drinking water, some technology must be incorporated at this stage. Demineralization of the purified water, through reverse osmosis, is followed by carbon absorption of the last traces of organic material. However, the water purified by sand filtration is often already of much better quality than the canal and river water commonly used for drinking and cooking by women in many parts of the developing world.

The abundance of solar energy in many of the developing countries should help boost the temperature in the ponds, thus increasing the rate of natural decay as well as the hyacinth growth rate. At the high temperatures prevailing in tropical and semi-tropical zones, one to three acres of hyacinth ponds are estimated to be sufficient to treat and produce one million gallons, or about 3.8 million litres of water a day. This would provide a population of approximately 10,000 to 20,000 with per capita consumption of 40 to 20 litres of water per day, respectively. By-products would include about 500 pounds per day of dry plant material for animal feed.

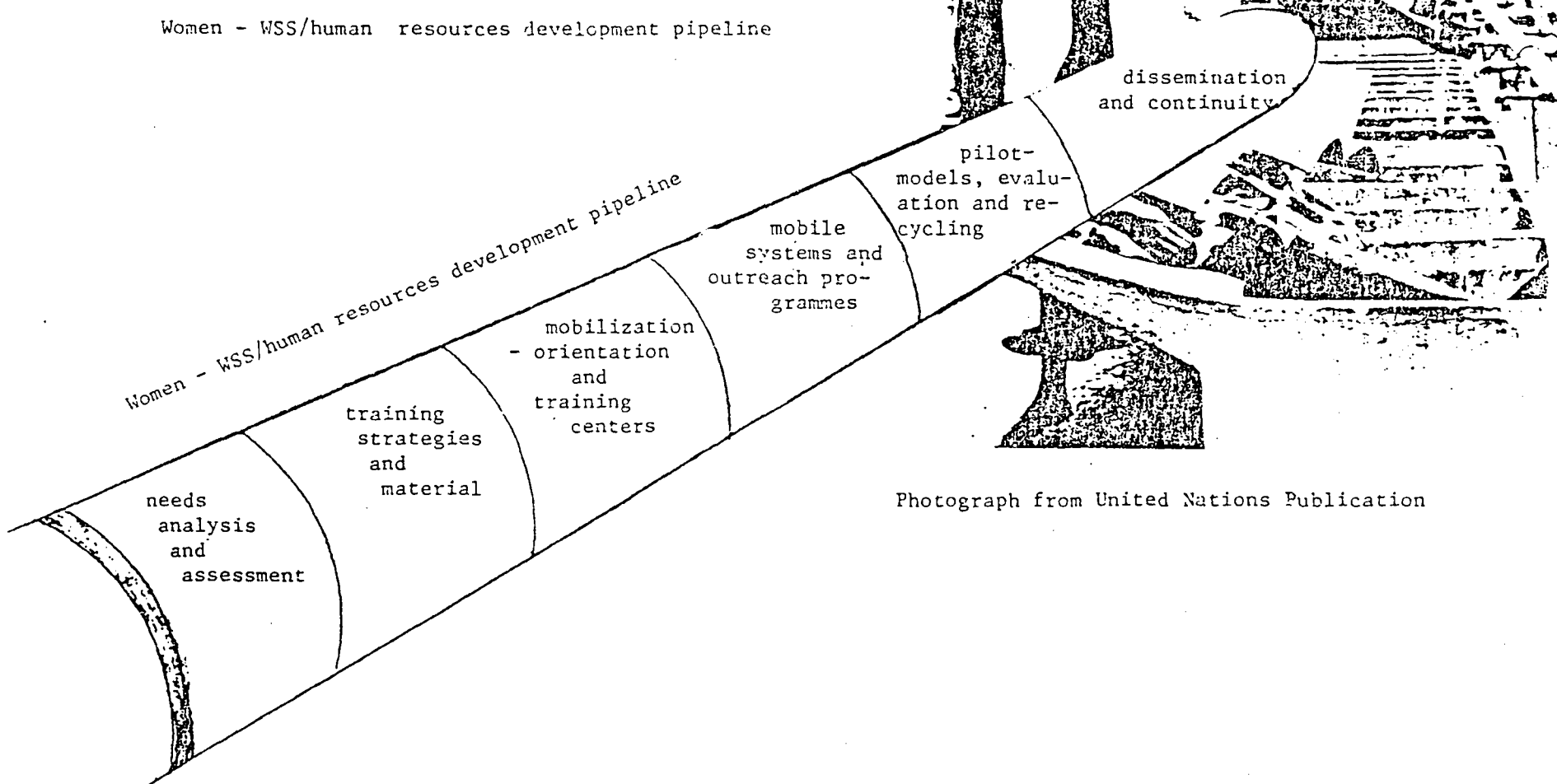
Training needs

None of the already identified technical systems or others yet to be developed, would be very effective unless women were made aware of and developed a deep concern for the seriousness of public health issues. Experience gained by the author in several developing countries indicates a high level of willingness and positive attitudes by women and youth to learn about what is clean and what is infested. If this attitude is not exploited and women of the developing nations will not become aware, will not know how to recognize and distinguish unhealthy, infected water from clean, and how to maintain sanitary conditions, then all efforts to enhance the health and welfare of women and of developing nations will be in vain. Education and training are crucial if the IDWSSD is to resolve problems related to women and water supply and sanitation. Given such training, women have the ability to excel in this area and be most effective because of their multiple roles within the family and the community.

The basic components of a training programme are depicted in figure 3.

Figure 3

Women - WSS/human resources development pipeline



Photograph from United Nations Publication

AA. Women and the International Drinking Water Supply and Sanitation Decade: health and environmental aspects

Fatma Abd El-Hamed El-Gohary*

Background

The 1976 United Nations Conference on Human Settlements focused attention on the need for safe water supply around the world, and proposed an internationally supported programme to provide clean water in every settlement. It was anticipated that such a programme would cost about 3 billion US dollars per year over a ten-year period.

The Conference subsequently adopted a series of resolutions, including a call for the adoption of "...programmes with realistic standards for quality and quantity to provide water for urban and rural areas by 1990, if possible". There was strong support for this goal and members of the United States Delegation indicated interest in investigating the feasibility of considering the proposal during the March 1977 United Nations Water Conference in Mar del Plata, Argentina, and the WHO/UNICEF International Conference on Primary Health Care (Alma-Ata, U.S.S.R., 1978).

On 10 November 1980, the Decade (1981-1990) was launched by the United Nations General Assembly. The Decade's goal is to focus world attention and action on the needs of 2 billion people in developing countries for safe accessible drinking water and adequate sanitation.

Reaching this goal requires several kinds of action, with special focus on rural areas:

Educating and informing local communities, to create awareness of the importance of safe water and proper sanitation, and to enable people to assume responsibility for decision-making in this area.

Training national personnel, to plan, build and maintain water supply and sanitation systems. From policy-makers, to surveyors, economists, sociologists, engineers, and mechanics, an estimated one million men and women must be trained during the Decade. Particular emphasis needs to be placed on programmes for village-level workers.

Introducing adapting and developing technologies, for tapping, pumping, transporting, storing, purifying and delivering water, and for effectively disposing of wastes. Requirements differ widely. Therefore, countries need to be made aware of available water and sanitation technologies, given an opportunity to choose "appropriate" systems and acquire them on reasonable terms, supported by research programmes where the development of new technologies is essential.

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Dimensions of the problem

All population has some form of access to water for drinking, a basic requirement for sustaining life. However, in many places, drinking water is unsafe due to bacteriological and other contamination, variable in quality and quantity, and not readily accessible to all citizens, especially the very poor. Consequently, people not served by a safe, accessible water supply resort to a variety of alternatives to obtain water, including carrying over long distances, purchasing from vendors, and taking untreated water from nearby ponds and ditches which are often highly contaminated.

To understand the magnitude of the problem, one need only consult the data collected by the World Health Organization (WHO) in preparation for the United Nations Water Conference. These rough estimates show that half the population of the world (excluding China) lives in developing countries and that of the approximately 70 per cent of the latter living in rural areas, only 22 per cent (in 1975) had access to reasonably safe water and 15 per cent to sanitary excreta disposal facilities. Of the urban population, 77 per cent had access to piped water (57 per cent through house connections and 20 per cent through standpipes) and 75 per cent to sanitary excreta disposal facilities (25 per cent by sewer connections and 50 per cent by household systems.^{1/}

For women, the availability of water can mean a great improvement in lifestyle. For the women in the developed world and urban areas of the third world, where piped water is taken for granted, water may not be perceived as so vital to life. A mere turn of a tap brings the precious resource within reach. However, for the rural women in developing countries, water can never be taken for granted since she may have to spend half the day walking to a well to fetch water. In drought conditions there may hardly be any water available within walking distance. To the rural women, as to her industrialized counterpart, water is basic to good health and satisfactory living standards.

In the home, field and factory, women and water are closely linked. In the home it is mainly women who handle water for cooking, washing and other domestic activities. In field and farm, particularly in Africa and Asia, it is mainly women who predominate in agricultural occupations where water is the main resource for cultivating and processing of crops.

Women are burdened most by lack of accessible water and adequate sanitation and will benefit most from their availability.

Water supply requirements

No one can deny the vital importance of water for the improvement of life. Indeed it has to be available, if life is to continue. Because of this, all living things, including disease organisms must have it. Without water the physiological processes in living cells slow down and cease. All living things die within days if deprived of water. The demand for water not only involves consideration of its quantity but also of its quality. From a planning and management viewpoint, quantity, without any reference to quality, is a meaningless term.

Water for domestic purposes is taken from different sources: rivers, lakes or ground water. Raw water sources fall into three categories according to the quality of their waters and the treatment necessary to attain the standards required. These are given in table 1. Although this list does cover some important parameters, it should not be taken as a set of criteria because of the absence of other important water quality parameters, e.g. toxic chemicals, and because of the variation in the efficiency of treatment processes for removing different contaminants. It offers, however, a quick initial classification of water as to its desirability as domestic supply.

Various types of water quality standards exist, one of the most important is that concerned with the quality of drinking water. This standard may differ according to the economic and technological capabilities of the various countries concerned. However, the International Standards for Drinking Water, established by the World Health Organization (WHO), contain proposed minimum standards considered to be within the reach of all countries at the present time (table 2)

Domestic waste water disposal

Secondary to an adequate supply of potable water, is the sanitary disposal of human wastes. Inadequate facilities for excreta disposal reduce the potential benefits of a safe water supply by transmitting pathogens from infected to healthy persons. Over fifty infections involving excreta can be transferred from a diseased person to a healthy one by various direct or indirect means.

Improvements in excreta disposal practices are crucial to raising levels of public health. They have, however, lagged well behind recent advances made in water supply and are likely to remain so at the current rate of effort and financing. Yet excreta disposal is an essential part of the environmental health services package. Water supply alone cannot provide full health benefits. In some cases, owing to the lack of adequate facilities for excreta disposal, increased water supply may even cause the spread of disease. This is relevant to developing countries, where high population densities may cause particular difficulties in the disposal of waste water.

Pathogenic organisms discharged by persons harbouring intestinal parasites, or suffering from infectious diseases, particularly typhoid, paratyphoid, dysentery and other gastro-intestinal infections, or excreted by carriers of these diseases, are always potentially present in domestic sewage and render it dangerous.

To prevent pollution of water sources, domestic sewage must be subjected to treatment before it is discharged. Treatment technology is well established. The choice of treatment method depends on many factors, such as the intended re-use, the size of the receiving water body and its water quality, availability of qualified personnel and the economic situation.

Health hazards from water pollution

Water pollution is a relative concept. To a certain degree, all water is "polluted" with virtually every material through which it passes. The question

Table 1. Raw water sources of domestic water supply

Constituent	Excellent source of water supply, requiring disinfection only	Good source of water supply, requiring usual treatment of filtration and disinfection	Poor source of water supply, requiring special or auxiliary treatment
BOO (5-day) mg/l			
Monthly average:	0.75-1.5	1.2-2.5	Over 2.5
Maximum day, or sample	1.0-3.0	3.0-4.0	Over 4.0
Coliform MPM per 100 ml			
Monthly average:	50-100	50-5,000	Over 5,000
Maximum day, or sample:	Less than 5% over 100	Less than 20% over 5,000	Less than 5% over 20,000
Dissolved oxygen			
mg/l average:	4.0-7.5	4.0-6.5	4.0
% saturation	75% or better	60% or better	-
pH			
Average	6.0-8.5	5.0-8.0	3.8-10.5
Chlorides, max. mg/l	50 or less	50-250	Over 250
Fluorides mg/l	Less than 1.5	1.5-3.0	Over 3.0
Phenolic compounds, max, mg/l	None	0.005	Over 0.005
Colour, units a/	0.20	20-150	Over 150
Turbidity, units	0.10	10-250	Over 250

Source: US Department of Health, Education and Welfare (1965)

a/ Platinum - cobalt colour units.

Table 2. Treated water chemical standards

	WHO		
	Highest Desirable level	Maximum permissible level	A R E
pH value	7.0-8.5	6.5-9.2	6.5-9.2
Colour ^O Hazan	5	50	50
Taste	Unobjectionable	Unobjectionable	Acceptable
Odour	Unobjectionable	Unobjectionable	-
Turbidity JTU	5	25	5-treated water 25 ground water
Total Dissolved Solids	500	1500	1500
Total Hardness (CaCO ₃)	100	500	500
Calcium (Ca)	75	200	200
Magnesium (M _S)	a/30 to 50	150	150
Nitrates (N)			45
Fluoride (F)			0.8
Chloride (Cl)	200	600	600
Sulphate (SO ₄)	200	400	400
Iron (FE)	0.1	1.0	1.0
Manganese (MN)	0.05	0.5	0.5
Copper (Cu)	0.5	1.5	1.5
Lead (Pb)		T 0.1	0.1
Zinc (Zn)	5	15	15
Arsenic (As)	5	T 0.05	0.05
Selenium (Se)		T 0.01	0.01
Cadmium (Cd)		T 0.01	0.01
Mercury (Hg)		T 0.001	0.001
Cyanide (C)		T 0.05	0.05
Phenols	0.001	0.002	0.002

Source: World Health Organization

Chemical levels in mg/l

T - tentative limits

a/ depending on sulphates

WHO - World Health Organization

ARE - Arab Republic of Egypt

is: how much foreign matter can be tolerated for different uses?

Human health may be affected by ingesting polluted water directly or in food, by using it in personal hygiene or for agriculture, industry or recreation, and by living near it. Health hazards can be classified into two main categories: hazards from biological agents and hazards from chemical pollutants.

Biological hazards

Hazards from biological agents that may affect man following ingestion of water or other forms of water contact, may be grouped into the following categories: pathogenic bacteria; viruses; parasites; other organisms.

Pathogenic bacteria transmitted directly by water or indirectly through food, constitute one of the principal sources of morbidity and mortality in many developing countries. They include the causative agents of the great epidemic diseases cholera and typhoid and of the less spectacular but far more numerous causes of infantile diarrhoea, dysentery and other enteric infections that occur continuously, and often with fatal results, among rural and urban populations.

Bacterial infections, especially those caused by the salmonella group, may also be transmitted by shellfish grown in contaminated waters.

Of the parasites that may be ingested, *entamoeba histolytica* is the causative agent of both intestinal amoebiasis (e.g. amoebic dysentery and its complications) and extra-intestinal forms of the disease, such as amoebic liver abscess. It is widespread throughout the tropical countries of the world and wherever sanitary conditions are poor.

Of the communicable diseases spread by the penetration of the skin and certain mucuous membranes by parasites, the most widespread is schistosomiasis. Schistosomiasis is a chronic, insidious, debilitating disease that may cause serious pathological lesions, sap energy, lower resistance and reduce output of work. In certain endemic areas, it may not only be classed as an important health problem but also as a major social and economic one as well.

The disease in man is chiefly due to three species of trematodes, namely *schistosoma mansoni*, and *haematobium*. Of these the first two give rise to intestinal manifestations, and the third is the causative agent of genito-urinary or vesical schistosomiasis. The eggs, released in faeces or urine, hatch as miracidia on reaching a free body of water, where they penetrate snails (such as *biomphalaria*, *bulinus* and *oncomelania*). They emerge from the snails in the form of cercariae ready to infect man. Penetration is through the skin.

Notes

- 1/ World Health Statistics Report, Vol. 29, No.10, (Geneva, World Health Organization, 1976).

BB. Women and the International Drinking Water
Supply and Sanitation Decade: perceptions
and attitude

Essen El-Hinnawi*

Each year 15 million children under the age of five die in the world, 97 out of 100 of these die in the developing countries, most directly or indirectly from contaminated water. In addition, half of the hospital beds in the world are filled with people suffering from water-borne diseases.

Estimates by WHO suggest that roughly 3 out of 5 people, i.e. 60 per cent of the population in developing countries, does not have easy access to safe drinking water. The 1,500 million people without these basic services consist of 1,200 to 1,300 million in rural areas, or more than 70 per cent of the total rural population, and 200 to 300 million, or more than 30 per cent of the total in urban areas. The sanitation situation is even worse, with 3 out of 4 people, i.e. 75 per cent of the population in developing countries, having no sanitary facilities whatsoever. Out of 1,800 to 1,900 million people without sanitary services over 85 per cent live in rural areas.

The lack of adequate access to clean water and sanitation remains the single greatest barrier to good health for the majority of the world's population. It was out of recognition of the extraordinary role that the availability of clean drinking water and appropriate sanitation could play in the lives of poor people throughout the world, that the United Nations Conference on the Human Environment, convened in Stockholm in 1972, emphasized the importance of the protection of water resources from pollution and of the management of wastewater. HABITAT, the United Nations Conference on Human Settlements (Vancouver, 1976) and subsequently, the United Nations Water Conference (Mar del Plata, 1977) called upon the United Nations to establish a decade-long programme with the goal of providing clean drinking water and sanitation for all.

The launching of the International Drinking Water Supply and Sanitation Decade (1981-1990) by the General Assembly of the United Nations on 10 November 1980, symbolized the beginning of a major effort to provide the bulk of humanity with these two essential services, the absence of which has long been responsible for human tragedy on a large scale. In this sense, the IDWSSD will be an important determinant of progress towards the achievement of health for all the year 2000.**

The IDWSSD programme is clearly going to be expensive. The World Bank has estimated the total cost of the programme at about 600,000 million \$US (in 1978 \$US). Most of this amount will have to come from the developing countries, the primary beneficiaries of the Decade. However, water supply and sanitation services are seldom on the priority list of major government expenditures.

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** In 1979, the 32nd World Health Assembly launched the Global Strategy for Health for All by the Year 2000. In that session the World Health Assembly endorsed the Report and Declaration of the International Conference on Primary Health Care convened in Alma-Ata, USSR, in 1978.

Globally we spend \$US 240 million a day on cigarettes - more than enough to pay for the entire Decade not to mention the \$US 1,500 million spent every day on armaments. Political decisions tend to be irrationally biased in many cases against the vital services that could improve the quality of life in the broad masses.

Education, training and public awareness

Central to the entire IDWSSD programme are the issues of education and training, public awareness and participation. Major capital investments in water and sanitation systems in developing countries are frequently wasted because of inappropriate system designs, lack of trained personnel to operate and repair such systems and insufficient public awareness and participation. The decision-makers have long been working in isolation from the public; their decisions seldom meet the basic requirements of the people. Information linkages between decision-makers and the public are weak, sporadic and clouded in doubt and suspicion. Each government agency has its own justification for what it is doing. When the ordinary citizen questions such doings, these agencies have a ready answer: "call in the public relations boys to persuade the public to take it."

There is no doubt that ignorance is the plight of the third world. The mother of a three-year-old girl watches helplessly as chronic diarrhoea takes her daughter's life. She is unaware that where everyone has access to clean water and where children are well-nourished, diarrhoea seldom takes lives. Nor does she know that her daughter is but one of 40,000 small children who die every day from malnutrition and infection.

Shortage of clean water, inadequate sanitation and the lack of health education mean that the average child in a poor community in the developing world will have anywhere between six and sixteen bouts of diarrhoeal infection each year. Often the mother's response (mostly based on advice of a member of the family or a neighbour) is to withhold food and fluid. As a result, the child is mal-nourished both the illness and the treatment. Each episode of the infection increases malnutrition. Each increase in malnutrition increases the risk of another infection. Each period of weight loss, broken only by the plateaux of partial recovery, leads the child further down the broad staircase of malnutrition. Many children recover: but many fall into sudden and severe dehydration. In only two or three days, 15 per cent of body-weight may be lost. And at that point, death is between one or two hours away. This is what kills a child every six seconds*.

* With the discovery of oral rehydration therapy (ORT) dehydration can be treated by a mother by giving her child the right mix of sugar, salt and water in her own home. Because ORT is a breakthrough which could save the lives of up to 13,000 children every day, it has been described as the most important medical advance in this century.

Illiteracy, lack of health education and public awareness are the main causes of the vicious circle of poor conditions of health and environmental degradation in developing countries. Illiteracy is much more widespread among women than among men, and the rates are generally higher in rural than in urban areas. This constitutes one of the main difficulties in achieving the goals of the IDWSSD.

Family members are often the main providers of health care. In most societies, women play an important role in promoting health, particularly in view of their central position in the family; this means that they can contribute significantly to primary health care, especially in ensuring the application of preventive measures. Educating girls is, therefore, one of the best investments a country can make in future economic growth and welfare—even if girls never enter the labour force. Most girls become mothers, and their influence much more than that of the father, on the children is crucial. Studies in Bangladesh, Kenya and Colombia show that children are less likely to become ill or die, the more educated their mothers are.

The main sources of water in rural areas of most developing countries still continue to be uncovered wells, shallow communal ponds, rivers, lakes etc., which are used for all domestic purposes - drinking, bathing or cleaning. Domestic animals not only often drink from the same water source but are also cleaned there. All these diverse human and animal activities, and a lack of measures and awareness to protect water quality, contribute to severe contamination of the sources.

In some rural areas of developing countries (including Egypt) standpipes have been constructed to provide clean water. But due to inappropriate planning, lack of information campaigns and of public awareness, these standpipes have created a variety of problems. Instead of bringing water from the standpipe to wash dishes, clothes etc. at home, many rural women do their washing at the standpipe itself. They even encourage their children to take baths at the standpipe or near the outlet of wells. In most instances there is no provision for drainage of spilled water, with the result that pools of stagnant water become breeding grounds for mosquitoes and other insects. When water has to be brought from a standpipe, it becomes a valuable commodity in the home and the amounts used for personal hygiene are rather limited. In addition, jars used for water storage are frequently found to be contaminated. In some villages, where standpipes are far from home, women or children frequently satisfy some of their water needs from nearby contaminated canals or lakes (to save the effort of walking to the standpipe).

In rural areas, transitional settlements and urban areas, where house connections have been made, clean water is not used in the most rational way. People tend to think of water as a free commodity (although they pay for it). They do not realize its importance except when shortage occurs or there is a breakdown in the system. Since women are the main consumers of water at home, they should make every effort to conserve water and instill this among the members of the family. It has been estimated that about 30 per cent of the municipal water in developing countries is wasted because of leaks and thoughtless use.

In rural areas, sanitation deserves special attention. There is a general

lack of adequate latrine facilities. People defecate in farm fields, canals, streams, vacant lots - everywhere depositing the germs and parasites that make untreated human waste the world's deadliest environmental pollutant, as the main conveyor of the diarrhoeal and other intestinal disorders that kills tens of millions each year. The sanitary disposal of human excreta should constitute a major approach to control a number of diseases in rural areas. In Egypt, the high incidence of schistosomiasis in rural areas is mainly attributed to bathing (or coming into contact) in streams contaminated by human excreta. It was mainly due to public awareness and participation that it was possible to control schistosomiasis in China.

In transitional and urban settlements the sanitation situation is not much better in spite of the fact that most urban centres are connected by sewerage networks. The problem that has become so common in many developing countries is that of obsolescence of the urban sewer systems which can no longer cope with the increasing load of sewage. Frequent pipe bursts are common in many urban areas, and in many cases contamination of fresh ground water or domestic water supplies results, leading to widespread infections.

The problem, the public and the mass media

The problems pertaining to water supply and sanitation have been highlighted on previous pages. They are every-day problems. No one realizes the magnitude of these problems unless he (or she) is directly affected; the housewife complains when there is a water shortage and the media never give attention to the problem unless some major event occurs. Even in such cases, the media tend to concentrate on the event and its emotional nature rather than on the substantive aspects of the problem. In most cases, the media reflect the "defensive attitude of the officials" rather than dealing with a problem from the point of view of the public.

Of the mass media, radio and television are the best vehicles to increase public awareness (because of the high percentage of illiteracy, especially among women). Unfortunately, this is far from being achieved, especially in the context of the present subject. Most radio and TV programmes lack the concept of "socialization" of science, and the messages transmitted through science, technology, housewife's programmes, etc. are either too "dry" or too "naive" to have a reasonable effect.

There is an urgent need in Egypt, and in other developing countries, for well-formulated mass media programmes to address the goals of the IDWSSD, and in particular with regard to the role of women. The following main issues should be focused upon:

- (a) Awareness of the relationship between unhygienic practices and ill-health;
- (b) Avoiding waste of clean water (water conservation);
- (c) Avoiding contamination of clean water;
- (d) Appropriate and safe disposal of wastes;
- (e) Primary health care.

Some of the basic points of personal hygiene must be instilled

in rural women, i.e., discontinuing use of contaminated water for drinking, cooking, washing and bathing; boiling of contaminated water if it has to be used, storage of water, and basic sanitation requirements in handling food products and disposing of waste products. Children must be taught to use clean water, to keep away from contaminated waters and to follow simple personal hygiene practices.

CC. Infrastructure for formal and informal housing sectors
in Egypt

Abou Zeid Rageh*

The policy of developing drinking water
and sanitation facilities

The usage of purified water for drinking and household purposes in Egypt started late in the last century, when it was first used in Cairo in a limited group of wells established in 1865 by a French company in two locations.

Cairo continued to depend on these wells until the first water filtration plant was established in Rod El Farag in 1906. In Alexandria the first limited capacity plant was established in the Bab Sharky area in 1865 and was enlarged in 1879 by the Alexandria English Water Co. After the establishment of the Municipality in 1890, usage of water filtration plants began on an experimental basis to be followed by high pressure stations in El-kabary and Mina El-Bassal areas in 1912.

The Suez Canal Co. provided Canal cities with drinking water facilities in this same period. In addition, it provided passing vessels with drinking water according with international standards. This service gradually expanded to the main cities in the governorates.

Late in the thirties, the concept of bringing potable water to rural areas was introduced. The first large regional station was established in the El-Ezzab area in Fayoum in 1940 together with other ground water stations in villages. These projects were temporarily arrested by the outbreak of World War II, to be continued afterwards.

The 23rd of July Revolution has focused its attention on the provision of potable water to all rural areas. The fifties witnessed a big leap with the contract for a drinking water complex in the governorates in 1954. Execution of the project began the following year. In the early sixties, the number of water plants serving more than one governorate reached six: El-Ezzab, Bossat Karim Edin, Sherbin, Abou Hommos, Fowa and El-Abbassa. In addition, 1200 smaller water plants using wells were established to supply villages in the delta and Upper Egypt. The number of people benefitting from these plants reached 12 million in rural areas, out of a total rural population of 15.4 million and 3.2 million urban residents in 141 cities.

Drinking water facilities were designed on the basis of a low consumption ratio for the individual ranging from 20-30 litres in rural areas and 60-100 litres in the cities, including Cairo and Alexandria. Public water taps were and still are used in the villages and in some districts in cities. Due to the considerable rise in living standards and the continuous increase in population, the available water supply no longer satisfies the needs of the population. It is common to see some areas served by pipes suffer from shortages due to low water pressure.

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In 1966, an accord was signed with the Republic of Czechoslovakia to install mechanical and electrical equipment for 40 stations spread throughout Egypt with the aim of supporting the existing water supply plants.

It is quite natural that sanitation projects should parallel drinking water projects. Alexandria's sewerage projects started late in the last century to be followed by the Cairo sewer system started in 1906 and completed in 1914. In the twenties and thirties, some cities in the governorates were supplied with sanitation plants on a narrow scale. In the fifties, the remaining major cities (18) were provided with such plants: Tanta, Portsaid, Damanhour, Zagazig, Fayoum, Suez, Mansour, Mehalla, Kafr El Zayat, Banha, Shebin El Kom, Damietta, Beni Suef, Assiut, Ras El Bar, Kafr El Sheikh, Ismailia and Menia. With the completion of the nine sanitation projects provided for in the current Five-year plan, 1982/1983 - 1986/1987, in Aswan, Quena, Sohag, Luxor, Shoubra Khit, Menouf, Kafr El Dawar, Samanoud and Mahmoudia - the number of cities with such plants will reach 29, including Cairo and Alexandria.

All past projects (drinking water or sanitation) were limited to expanding the service, either by laying main or branch pipe networks, or by establishing new stations on a narrow scale to cope with urban expansion and population increase. It is essential that a thorough periodical survey be made to define the efficiency of these plants and their networks and the changes made in the number of beneficiaries, types of consumption and areas benefitted, taking into account urban expansion, as a basis for deciding on necessary renovation, replacement, or building of new plants to meet the actual needs of the citizens.

This was not done previously because of insufficient funds available for this sector - a problem which prevented embarking on the aggressive programme needed for overall development. The funds were even insufficient for the completion of plants already under way, and for maintenance, especially in the sixties. A project had been prepared for Cairo sewerage, estimated at LE 17 million, but was not executed because of the 1956 war.

A direct consequence was that sewerage capacity had reached its upper limit in some district by forcing the government to allocate limited funds in 1965 to solve the problem speedily. The result was the so-called "100 day project". Following this, funds decreased again, continuing the insufficiencies in drinking water and sanitation facilities.

Effects in the delay in facing the problem

Drinking water

With the remarkable rise in the standard of living and the increase in urban growth and population, the water supply facilities became inadequate to meet the demands of the citizens. The drinking water plants exceeded their design capacity in order to respond to pressing needs. This caused damage to the plants, along with that already suffered from water mosses in the Nile, necessitating the multiplication of water filters and affecting production. Consumers at the ends of networks received very little water, and low pressure prevented the water from reaching high floors in many areas. Still others received no water at all. These manifestations were accompanied

by shortages in spare parts and trained labour.

Sanitation

Sanitation is only available in 20 cities, including Cairo and Alexandria which together represent more than one third of the population of Egypt. Where it is available, there is capacity overrun, threatening public health and aiding the spread of epidemics.

Cities without sanitary drainage suffer from overflow of trenches, especially after a rise in ground water level. They are faced with continuous expenditure for sweeping of sewers, and at the same time lack of necessary trucks.

Facing the problem

The problem has been studied by different consulting firms, both foreign and domestic, with the assistance of the authorities concerned. The studies agreed on the following requirements:

- (a) Proceed with repairs, innovation and rehabilitation in existing plants to restore them to their design capacity;
- (b) Provide treatment, purification and measurement of equipment in order to control quantity and quality of production;
- (c) Support of existing plants, either by enlarging them or by establishing new ones in order to meet increases in population consumption, and urban expansion.

Based on these studies, plans were drawn up for drinking water plants in Greater Cairo, Alexandria and the governorates. Other plans were made for sanitation services in Cairo, Alexandria and the Suez Canal cities.

Cairo

A comprehensive project plan was prepared for Greater Cairo to the year 2000, with the objective:

- (a) To reach a production capacity, at the end of the Five-year plan, of 4 million cubic metres per day, equal to the expected needed quantity to 1990, and increasing storage capacity to 370,000 cubic metres to meet peak demand periods and improve pressure.
- (b) Meeting the increase in consumption and urban expansion to achieve balance between production and actual needs.

Regarding sanitation, the present capacity of existing stations and networks is about 1.8 million cubic metres per day, while water consumption is 2.5 million cubic metres per day. Assuming that 80 per cent of this waste water is discharged into sewer networks, the difference of 200,000 cubic metres per day appears as overflow in low-lying areas and at network end points. To alleviate this problem a general plan was prepared, accounting for present and future sewerage requirements.

Alexandria

The objective of the general plan is to satisfy the needs of both Alexandria and Mersi Matrouh governorates to 1990. This is to be achieved through increasing productivity of drinking water stations by about 780

million cubic metres per year to overcome present shortfall in drinking water.

Other governorates

Plans are aimed at extending drinking water services to the population in all governorates by the year 2000. Other objectives are:

(a) To raise the individual consumption ratio to 50 litres per day in rural areas, 100 litres per day in small towns and 200 litres per day in big cities;

(b) To supply water according with international health standards;

(c) To guarantee continuous supply with adequate pressure in areas already served;

(d) To reach a percentage of 90 in cities and 10 in rural areas for private connections;

(e) To expand sanitation services to 40 cities whose population is more than 40,000 or who have some special character, and to start work on this project in 1986-1987, with completion set for the following Five-year Plan period;

(f) To study the best ways of intrucing sanitation services to small towns and villages, according their locations and environmental conditions special attention, five in the first-year plan period, and to select a prototype for each group of villages for the execution of pilot projects.

New communities

Expanding of desert settlements and developing of remote regions away from the narrow crowded valley, is viewed as the solution to the population problem.

Plan objectives include:

(a) Establishing new communities with an independent economic structure;

(b) Establishing supplementary cities in the vicinity of the big cities that are totally independent;

(c) Developing of remote regions, such as: Red Sea, north west coast, High Dam Lake, oases and Sinai regions. The first step towards meeting this goal is the execution of infrastructure projects. In the 10th of Ramadan City and in the 15th of May City, the first phase of such infrastructure projects is nearing completion. Other projects are being carried out in Sadat, New Ameria, 6th of October cities and in other remote regions. Relevant plans have also been drawn up for El-Obour, Badr and El-Amal cities,

Funds

Total funds to be invested in water and sanitation projects by 1990 are estimated at LE 9560 million at 1981 prices. Expenditures of LE 685 million had already been incurred by June 1982. Investments needed for the first Five-year Plan 82/83 - 86/87 were estimated at LE 3582.5 million. The State has allocated LE 2952 million, a shortfall of about LE 630 million.

Informal Sector (Greater Cairo)

For housing in Egypt to be designated "formal" or legal, it must be in an officially approved subdivision (enabling an owner to legally register his land), and must have been built with a building permit (enabling an owner to legally register a building). Buildings not meeting these requirements are considered "informal". There may, nevertheless, be degrees of informality.

In general, informal dwellings are those constructed without a building permit on illegally occupied land.

In the last few years, the informal sector has grown at a rapid rate. The bulk of housing currently being supplied in Egypt is informal. Thirty-four per cent of units built in Cairo between 1970 and 1981 were estimated to fall into this category. In many areas, housing and environmental conditions are far below the accepted standard, but in some other building designs, building materials, and interior amenities, such as kitchens, toilets and number of rooms, are similar for many informal and formal households. The quantitative contribution of the informal sector has been essential in maintaining parity between increases in population and increases in the housing stock.

Provision of basic utilities in Greater Cairo has increased rapidly in recent years. The following table indicates the proportion of buildings connected to public water, public sewer and electricity systems in the year 1970, 1976 and 1981:

Table 1. Provision of basic utilities, Greater Cairo

<u>Utility</u>	<u>1970</u>	<u>1976</u>	<u>1981</u>
Public water	50%	56%	65%
Public sewer	44%	52%	71%
Electricity	54%	76%	90%

Informal housing is significantly less well supplied with infrastructure than formal housing. Most informal households first obtain their land or building without utility connections. Over time, these differences tend to narrow but they do not disappear. Table 2 shows the percentage of dwellings with access to utilities in formal and informal neighborhoods:

Table 2. Sector comparison of access to utilities

<u>Type of infrastructure</u>	<u>Formal Dwelling</u> Percentage	<u>Informal Dwelling</u> Percentage
<u>Water</u>		
Private connection to pure water	91	65
No private connection	1	21
<u>Sewer</u>		
Public sewer	95	84
Cesspool	4	11
Neither cesspool nor pit latrine	0	3
<u>Electricity</u>		
	98	97

Informal settlements are generally established in unoccupied areas within communities where infrastructure is already in existence, or adjacent to formal areas with potential access to the municipal infrastructure network. The on-site availability of water seems to be the single most important precondition for settlement because it is a necessity both for sustenance and for construction of homes. Availability of water in agricultural areas

and immediate access by pumps has therefore made settlement on these lands highly desirable. Electricity and sanitation are of lesser concern to residents because power can be obtained by other means (small generators, gas lamps, kerosene lamps, etc.) and the problem of sanitation resolved by installation of septic tanks, cesspits or holding tanks.

Electricity

In legal subdivisions, the government is only responsible for providing utilities up to their borders, and the developer is required to continue from there. When informal housing areas are spatially consolidated, represent permanent residential communities and residents collectively request government recognition, formal provision of infrastructure may be forthcoming. Residents accept the reality that they may have to wait two years or more after government recognition and sanction of the existence of their communities to receive basic services. People in these areas demonstrate a willingness and determination to provide their own basic services, and they understand that provision of services by the government is an expensive long-term process.

Water

Case studies on the informal sector in Cairo report that approximately 90 per cent of all households are not connected to water supply and 68 per cent of households are located in buildings without a water tap. These figures are indicative of much lower levels of service than prevail in the Greater Cairo area as a whole. They illustrate the variability of service levels among communities. The majority of residents in the study area depend upon the following source of potable water:

- (a) Pump installed by an individual or the community;
- (b) Containers delivered by vendors;
- (c) Taps constructed by the government;
- (d) Tap of a mosque, or extension of a tap from a mosque for public use;
- (e) Tap of an industrial, commercial or community establishment;
- (f) Tap financed and constructed by community members;
- (g) Tap of a neighbour.

Ground water obtained from pumps is an acceptable source of drinking water for many informal areas. A typical ground water system costs about LE 250, including a well, electric pump and holding tank. However, there are problems in some informal settlements with contamination from dust and sewage intrusion. To avoid this it is necessary to drill to a depth of 15 to 20 metres.

Informal settlements are often located near existing water mains. Extension from main lines, or the primary network, to formal residential subdivisions and municipal facilities from a secondary network. It is this secondary network for which residents of informal areas lobby collectively to have it officially extended into their neighborhoods.

Public standpipes are installed where needed, usually at 500 to 1000 metre intervals throughout the community. Most public taps are controlled, i.e. water allocation is supervised by a guard, and if residents pay for pump maintenance, they do so on a monthly basis at an average cost of from

10 to 25 pt. per family. Individuals and owners of establishments charge a similar amount.

The pipes installed by the government to connect standpipes and public taps provide a tertiary network into which many residents tap to extend piped water to side streets and individual houses. Officials are well aware of illegal tapping into water mains but find it difficult to control because the work is done in the middle of the night or on holidays when the chance of being caught is minimal.

In areas without public or private taps, house owners will pay a water vendor approximately 20 pt. per container, or contract an individual to carry out this task for approximately LE 3 per month. Landlords often arrange this service for their tenants, but the cost is not included in the tenants' rent.

Waste disposal

The problems of sewage and other waste disposal do not appear to be major factors in site selection for informal housing, as is water. Septic or holding tanks can be constructed in most areas and/or waste dumped into canals. Furthermore, waste water is kept to a minimum in many settlements because of the limited availability of piped water. However, health risks and high infant mortality rates are partly attributable to such sanitation inadequacies as intrusions from cesspools into ground water used for drinking and these problems are greater in informal than in formal areas.

Informal housing areas lack sewage systems. The majority of households use holding tanks for disposal of toilet waste. The tanks used may not be very effective because of soil conditions. Tight soil prevents proper drainage, and in some areas ground water is only one or two metres below the surface. Officials are particularly concerned about the drainage problem in these areas because it results in deterioration of building foundations.

Drainage of holding tanks is usually undertaken by individuals using animal-drawn carts. Tanks are rarely drained frequently enough, and excess sewage spills into streets. Drainage carts are often emptied into canals or ditches exacerbating the public health problems in these areas. To avoid overflow of tanks, residents will sometimes dump waste water into streets or into a nearby canal or ditch. In houses very close to canals, sewage is dumped directly through pipes connected to houses.

Residents are very concerned about the poor public health conditions resulting from the lack of sewer systems and the inadequacies of the methods they have to employ. Most of them are quite willing to pay for sewer connections but are not very optimistic that the city system will ever be extended to their vicinity. Self-help attitudes towards the provision of sanitation are very strong, and residents intimate that they would be willing to install their own neighborhood networks if a main connector were extended to their communities.

Garbage is dumped into vacant areas of wider streets, trenches and canals. Some residents try now and then to arrange pick-ups from individual streets or from the immediate areas around their homes, but the volume of

waste is so large that their efforts seem futile. When effort is made the garbage is usually dumped in the nearest open public space where it is scattered by the wind, or ground into the street by cars or people walking over it. In some areas, residents will pay to have garbage hauled to the periphery of the neighborhood and dumped into canals or trenches, or burned. When these efforts at removal are not mobilized by community members the degradation of the residential environment is extreme.

Many canals in these areas are completely blocked and dried up by the massive quantity of garbage. These canals are the source of wash water for many of the poorest residents of the area. Some of the wider streets are virtually impassable because of the combination of standing water and non-biodegradable garbage. Narrow side street are relatively less obstructed because they commonly serve as play areas for small children, and residents make an effort to remove garbage to the ends of the streets. Residents in one and two-story dwellings located on three-metre-wide streets spend a good portion of the day sitting in their entryways or congregating in the street with neighbours. The street in these areas is, in a sense, an extension of the dwellings and its semi-private usage often results in the assumption of greater responsibility by residents to keep it unobstructed by garbage. An underlying problem is that Cairo's private sector garbage collectors, the Zabalin, prefer to go to high income areas to obtain higher value for their services.

DD. Women, water supply and sanitation: socio-cultural and economic aspects

Zeinab M. Shahin*

Introduction

The main objective of the study is to clarify the basic socio-cultural and behavioural parameters to be taken into consideration when developing appropriate alternative technological packages for water supply and sanitation in small Egyptian rural communities. Consequently, the focus will be on the beneficiaries and not on the water and sanitation technology itself.

The degree of success of any technical solution is dependent on the acceptance and support of the community making use of it. In fact, technological packages are more readily accepted by rural populations if they evolve from systems with which people are already familiar. Technological solutions, therefore, would be much more successful if they adapted or improved systems already in use.

In this context, questions of power relations in the village, modes of production, traditional patterns of social structure and behaviour, and class and sex biases emerge and can no longer be ignored. The appropriateness of a technology involves an understanding of the system of possible change in social relationships within and outside the family, and full awareness of the technological impact on the lives of the people. In highly stratified rural areas a technology adopted by one class may have a different effect on another.

The present research study attempts to investigate perceptions and attitudes of rural populations towards the prevailing situation and their susceptibility to change. This includes people's perception of using unclear water and standpipes, acceptability of chlorine odour, attitudes towards communal or shared facilities and current plans to improve water supply and sanitary drainage, and preference for certain schemes.

Social profile

Obtaining water and making it more readily available for domestic use is recognized as one of the major elements of physical labour imposed upon women and children in Egypt. Women's role as household managers mean that in food preparation, washing and bathing they are the primary users and mediators between the water source and the household. A number of field studies conducted on Egyptian villages revealed that water fetching, a task almost invariably carried out by women, consumes over the course of a day approximately one to two hours of a woman's labour. In a number of rural areas (Abu el Matamir, Rosetta, and Kafr el Dawar in Beheira; and Biyala, Sidi Salem, Baltin and Disuq in Kafr El-Sheikh) women have to walk a very long distance to obtain their water supplies from standpipes. Nearly 30 per cent of women have to walk more than 60 minutes to meet their water needs.^{1/}

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The main sources of domestic water in Egyptian villages are standpipes, canals, or private connections. In a few areas where adequate ground water is available, handpumps are the primary source.^{2/} Water for drinking and cooking obtained from standpipes is carried to the dwellings in cans ranging in volume from 1.5 litres to 20 litres. Water is generally carried on the head in a plastic container. Young girls carry smaller containers. In some villages such as Beni Adi in Assiut, women generally make two trips to the public water system, in the morning and in the afternoon.^{3/}

The above suggests that water fetching, involving walking to the standpipes, filling buckets and returning to the house, consumes a large part of a woman's day and imposes a severe burden on her life. It is not surprising, therefore, that the United Nations International Drinking Water Supply and Sanitation Decade devoted a large part of its programme to the particular issue of women and water. The following observation was made in relation to rural areas in developing countries:

"Carrying water is a task that only women perform. It becomes even more arduous and time consuming when women are encouraged to practice better hygiene in the home, and their need for water correspondingly increases. The improvements necessitate that they travel to and from the river several times a day, or carry two or more containers at a time. This is very strenuous, especially for the old and for expectant mothers".^{4/}

Whereas pump water is used for drinking, canal water is usually used for washing, bathing and cooking. It is customary in rural Egypt for women to go in groups down to a nearby canal for washing clothes. Sometimes women transport canal water to their houses to do their washing in a large pan or "tisht". Among the main factors encouraging women to wash their clothes at the canal are the opportunity to engage in conversation and the unlimited quantity of water. Responses of women in Basaisa village, that may be typical of other villages in rural Egypt, express factors influencing the choice of washing clothes at the canal:

- "Greater opportunity for socializing";
- "Water is constantly running which makes rinsing easier";
- "There is no limit to the quantity of water available".

Women in the Delta village of Kalama, 15 kilometres north of Cairo, are caught between traditional patterns of behaviour and application of modern technology. The majority of women own electric washing machines but still use canal water to fill machines. One can easily observe an electric washing machine - with a long electric cord plugged into the house nearest the canal - standing next to the canal. Women believe that canal water gets clothes cleaner, and makes better soap suds.^{5/}

Observation indicates that the perception of a limited quantity of water or of the unavailability of water is strongly reflected in people's practices with respect to water consumption. A general attitude, that nothing should be wasted, was observed in many Egyptian rural communities. A study of two Egyptian villages revealed that villagers use the same water for washing clothes, vegetables and their dishes, in that order. Multiple water uses were directly related to scarcity of water and to the hard task of transporting it.^{6/} This attitude is very similar to that of villagers

in other rural communities in developing countries. Water for laundry is saved for later use to clean floors. Water used to wash dishes, or clean vegetables, or soak corn is used to feed poultry and other domestic animals.^{7/} It is not surprising, therefore, that abundance and proximity are the two factors most appreciated in a water supply source.

Most villagers desire greater accesibility through the installation of more taps. In Sidi Ghazi village in the Nile delta, it was noticed that taps located a long distance from the houses encouraged peasants to resort to the nearest canal, especially in unsuitable climatic conditions. Peasants also used the canal when the tap, though near their houses, was crowded or the water flow poor.

Defecation practices of villagers differ according to age and sex. Men have access to facilities in the mosques (almost all mosques in Egypt have water taps and latrines). During work, men squat in the field or by a canal for access to water. They usually urinate anywhere: in the field, or next to a wall, etc. Women, on the other hand, have limited places they can use. Women in households without latrines use the roof. A study carried out in Assiut showed that women defecate directly on the dirt floor of the roof, or place a clay pot between two stones. The pot is manufactured locally and is used for this purpose or for feeding domestic animals. The dried feces are collected or the pot is emptied about once a week, depending on use. Since water is not available, women usually bring a can of water or use dry materials (pebbles) for cleaning. Children defecate or urinate anywhere inside or outside the house. School-age children usually have access to school latrines. ^{8/}

In many villages, defecation, bathing or washing are not limited to one facility. Water available in pit latrines is usually used for anal cleaning and for flushing. A sink is usually located outside the latrine and used for washing hands before eating, and is sometimes used for washing utensils and for kitchen needs.^{9/}

Awareness of health consequences

Many field studies undertaken in rural Egypt indicate that the majority of villagers in different rural communities associate disease with water quality. Villagers in the governorates of Beheira and Kafr El Sheikh are generally aware of the importance of potable water and its impact on health. The majority of people attribute ill health directly to the use of non-standpipe water. Most of them recognize bilharzia as their main source of ill health, and that stomach complaints are caused by the use of non-potable water. This awareness is reflected in people's widespread willingness to pay for improved and reliable water supply. ^{10/}

Villages in Menufiya in Delta Region, and in Assiut in Upper Egypt, are also aware of the importance of potable water to their health. They know that bathing in canal water may cause bilharzia. In a study on formal and informal health practices in Babel Wa Kafr Hammam, most of the interviewed women were aware that bilharzia results from contact with contaminated water, either by drinking canal water, bathing in it, or walking bare-footed near it. Some women recognized that drinking water may cause intestinal diseases.^{11/}

World-wide cross-cultural studies on water supply and sanitation in rural sectors reveal that women do understand the need for improved water for domestic consumption. Women may not be aware of the direct relationship between improved water supply and health, or of the germ theory of disease but once water is more readily available they tend to evaluate the benefits in terms of improved health. Women in a Mexican village, for example, observed an increase in diarrhoeal disease when their piped water system broke down, and they requested its repair.^{12/}

Villagers in Egypt, however, fail to grasp the relationship between specific sanitation problems and disease. They do not understand, for example, that the poor sanitary condition of zir-stored drinking water is a medium for transmitting various parasitic and bacterial infections, and that dipping the fingers or utensils in the zir for taking water or filling allows transmission of infection.^{13/}

In some rural communities, people are unable to conceive of health problems resulting from contact with feces, flies, or water contaminated with human waste. Villagers could see neither a direct relationship between feces and health, nor that feces were a major source of contamination. This lack of awareness may be attributed to the traditional use of human excreta as a fertilizer in rural Egypt. In some villages, human feces are composted like animal dung and added to the piles of animal manure. There is also a general perception, as in many cultures, that children's feces are harmless and are not germ carriers.

People's attitudes and perceptions of prevailing conditions
and susceptibility to change

In many rural communities, decisions concerning drinking water are often related to sensory perceptions: colour, taste, or smell. Water from standpipes may be considered of good quality because it is introduced by a governmental health agency. Decisions not to use improved drinking water facilities are often related to unpleasant taste or smell, as given off by iron sulfide or chloride. Chlorination of rural water supplies is not always possible because of the unavailability of chlorine compounds or suitable means to supply them. When chlorinated water is made available, villagers tend to reject it in favour of a polluted more potable source. For them, chlorination spoils the taste of water, especially when the water contains contaminants that accentuate the chlorine taste. Home filtration, using a simple filter to remove suspended matter and colour, and also reduce contamination, offers greater possibility of acceptance. Another determinant of the choice of using pump water is people's perception of taste of water in cooking and in making tea. In Basaisa village, women show preference for pump water because it has a better taste for making tea. Villagers believe as well that under ground water is better for drinking and personal hygiene, whereas canal water is good for washing clothes. ^{15/}

Another factor that predisposes choice of use of standpipes is the social structure of the community. Power relations prevailing in the village determine women's unequal access to available piped water. The decision to install water pumps and the choice of their locations are usually defined by the class structure of the society. Consequently, many poor women who belong

to landless households live in areas quite far from these pumps.

Women seem in general to be aware of the time and energy spent in obtaining water, and thus the majority identify water pumps as one of their top priorities.^{16/} The provision of piped water, however, is not a priority in many developing countries when it comes to the actual allocation of resources. The reason is that priorities are defined in terms of the prevailing power structure in which the needs of women are often disregarded because men usually make the decisions.

Thus, introducing water and sanitation technologies requires full awareness of the social background of the people and their attitudes towards water. In many villages in Egypt women may endure the hardship of walking to a distant communal water source to escape the confined home environment, to talk and gossip with other women along the way, and to meet other women from more distant areas.

Studies undertaken on peoples attitudes towards communal facilities reveal that attitudes vary according to sex and location. Responding to a survey question about attitudes towards communal washing facilities, conducted in a number of villages in Upper and Lower Egypt, men in lower Egypt disagreed, whereas women who did not have potable water at home expressed a positive attitude. In Upper Egypt, however, both sexes were generally against the idea. A woman in Menufiya wanted the facility located in a discrete spot, so women may come and go without being seen by men. It should not be located near communal facilities for the use of men. Typical traditional facilities used by men only in rural Egypt are water taps and latrines found in mosques.

The above confirms that any planned change in water or sanitation practices should be based on sufficient information about villager's beliefs and practices. Careful observations are needed to analyze attitudes and perceptions about water and defecation practices. The choice of a water system, or type of latrine is a result of people's realization of the costs and benefits of any change.

Approaches towards current plans and preference towards certain schemes should involve the gathering of information on villager's perceptions of what constitutes acceptable standards with regard to quantity and quality of water. Such information would lend itself for siting water sources, selection of sources and adoption of appropriate technology.

Community involvement in water and sanitation projects includes contact and information exchange with technical people. Lack of communication and absence of trust between development agencies and community members, due to past experience with abortive attempts to introduce new technological packages or compulsory programmes, make people less willing to accept new technologies. When communities are authorized to keep water and sanitation maintenance funds in the village, people are more willing to accept new schemes, and to identify and solve their own problems. Hence, popular participation becomes more pervasive.^{17/}

Promotion of community participation

The effectiveness of any new technology depends on acceptance and support of the members of a community. Community participation involves people's actual planning, construction and maintenance of a new system. A dialogue approach is effective in enhancing community participation and encouraging people to define their present situation, choose among technological alternatives, determine methods of implementation, and suggest forms of community contribution. Cross-cultural studies also show that the success of a technology is related to people's financial support. People usually do not value systems which have been introduced free of cost, but are concerned about and do maintain those systems to which they have contributed. The community, therefore, should be as self-supporting as possible.

It is important to point out that community members are usually willing to pay for those technologies which they identify as one of their priority needs. Rural people in Beheira and Kafr El-Sheikh villages indicated their willingness to pay for good potable water supplies. The average household with an annual income level of LE 240 would be willing to pay as much as 10 per cent of income to potable water. On average, people expressed a widespread willingness to pay about LE 0.03 per day for improved water supply.^{18/} These figures indicate people's general recognition of the importance of potable water and its impact on health.

Another effective approach to encourage community participation is through mobilization of community resources, labour, and skills, and the promotion of voluntary work on new community facilities and services. planners should develop incentives for village pump caretakers, health workers, etc. The major principles to enhance community involvement are:

(a) Community participation should not be limited to one class or group in the society. Members should participate on the basis of project needs and objectives;

(b) Members should participate throughout the different project stages: initiation, plan of action, decision making, implementation, follow-up and evaluation;

(c) Special attention should be directed towards the underprivileged class, i.e. women and landless families;

(d) Attention should be directed towards identifying, involving and training local community leaders since they represent an effective channel for communicating with community members. This leadership aspect is very important in community development since the community selects the person believed most suitable. Through local leaders, change can be achieved and support and subsidies are usually guaranteed;

(e) A planned information campaign is needed to ensure that the benefits of a new water supply or sanitation system become known.

Health education and training programmes

Installation of a water or sanitation system alone would not have an immediate impact on reducing health problems in rural Egypt. Training programmes and health education must parallel construction of water and sanitation systems.

An effective approach for promoting awareness of health benefits gained from a new water and sanitation system is to give short practical training courses to a few local leaders, local health workers and members of the agricultural co-operative society. Awareness of health hazards and methods to improve sanitary conditions must be communicated in concepts and methods understandable to the villagers. Sanitarians, the health workers responsible for sanitation and hygiene, must be taught to relate hygiene to the context in which the villagers live. In rural Egypt, the sanitarian is responsible for health education outreach, but this is often not effective. Though he is supposed to deal with a wide variety of hygiene and sanitation problems, the results so far have been negative for a number of reasons. Among these are that the sanitarian gets little training on how to communicate with people, and that he is responsible for a wide range of duties leaving him little time for community outreach.

In some instances, the required changes in behaviour and hygiene patterns associated with newly introduced technological packages are quite different from the traditional customs and beliefs of the people. This adds to the responsibility of the sanitarians and necessitates adequate training to develop effective communication with the community.

Rural schools can also play a role by teaching students the basics of personal hygiene and sanitation. Teachers can effectively assist in health education activities, community organization, and technical tasks. They should receive training programmes on the technical aspects and social benefits of the new technological systems. Training can be extended to include community leaders, nurses, and women of the community, especially with regard to improved hygiene practices.

Operation and maintenance procedures are usually among the most neglected aspects of new technological packages. Poor technical support and lack of funds for proper operation are seen as the most frequent causes of failure of rural water supply systems. Thus, local personnel must be fully trained in the skills required to operate and maintain the system. The technology should be kept simple so that local people can manage the system in the absence of a qualified engineer.

Conclusions

What clearly emerges from the above review is that water and sanitation technology in Egyptian rural communities cannot be considered in isolation from the social, organizational, and cultural modes within which the village technology is introduced.

In looking at the impact of introducing water and sanitation equipment, prime consideration must be given to women since they play an important role in water fetching and in using it. Planners, therefore, should incorporate and consider women's priorities, needs and wishes.

To maximize health benefits in rural communities, water supply and sanitation technologies must be appropriate to the needs, conditions and beliefs of the people, and should be based on community participation. Health education programmes are necessary as well to guarantee the success

of the newly introduced technological package.

Surveying local conditions is essential to assess social and cultural variations in water-related beliefs and practices in different rural communities. Such surveys would help to identify available water sources, patterns of water use and defecation practices, hygiene practices and health problems, skills of local personnel, available local materials and resources, and socio-cultural structure of the community.

Notes

1/ Coopers and Lybrand Associates, Limited, "Report on a Survey of Consumers' Attitudes to Potable Water Supply," December, 1979.

2/ Ibid.

3/ Meta Metrics Inc., "Rural Sanitation in the Arab Republic of Egypt," Work Order #5, AID/SOD/PDC-C-0178, April, 1981.

4/ "International Drinking Water Supply and Sanitation Decade (1981-1990)," Case History No.2, Co-operating with Non-Governmental Groups: Women and Water in Kenya, United Nations.

5/ Shahin, Z., "Personal Observations During a Study Conducted in Kalama Village," February, 1983.

6/ Simpson, H., "In the Role of Women as Participants and Beneficiaries in Water Supply and Sanitation Programs," WASH, Technical Report No.1, December, 1981.

7/ Elmendorf and Buchles, "Socio-Cultural Aspects of Water Supply and Excreta Disposal," World Bank, Vol.5, September, 1978.

8/ Meta Metrics Inc., "Rural Sanitation in the Arab Republic of Egypt," Work Order #5, AID/SOD/PDC-C-0178, April, 1981.

9/ Ibid.

10/ Coopers and Lybrand Associates, Limited, "Report on a Survey of Consumer Attitudes to Potable Water Supply," December, 1979.

11/ Meta Metrics Inc., "Rural Sanitation in the Arab Republic of Egypt," Work Order #5, AID/SOD/PCD-C-0178, April 1981.

12/ Simpson, H., "In the Role of Women as Participants and Beneficiaries in Water Supply and Sanitation Programs," WASH, Technical Report No.1, December, 1981.

13/ Khairy, A.E.M., "Domestic Water Supplies and Community Self-Help in Sidi Ghazzi Area, Nile Delta - A Strategy for Schistosomiasis Control Rural Health," High Institute of Public Health, University of Alexandria.

14/ Simpson, H., "In the Role of Women as Participants and Beneficiaries in Water Supply and Sanitation Programs," WASH, Technical Report No.1, December, 1981.

15/ Nelson, Cynthia, "The Human Dimensions of Technological Solutions - An Illustration from a Small Community," Seminar on Water Re-use in Urban and Rural Areas, Cairo University, February 27 - March 2, 1982.

16/ "International Drinking Water Supply and Sanitation Decade (1981-1990)," Case History No.2, Co-operating with Non-Governmental Groups: Women and Water in Kenya, United Nations.

17/ Elmendorf and Buchles, "Socio-Cultural Aspects of Water Supply and Excreta Disposal," World Bank, Vol.5, September 1978.

18/ Coopers and Lybrand Associates, Limited, "Report on a Survey of Consumers' Attitudes to Potable Water Supply," December 1979.

EE. Water in ancient Egypt

Ahmed Abdel Hamid Youssef*

Twenty five centuries ago, Herodotus wrote, "Egypt is the gift of the Nile", expressing a self evident fact to which should be added, "Egypt is the gift of her people". Through their toils since prehistoric times, the Egyptians reclaimed arable land from floods, marshes, swamps and encroaching desert by building dykes and digging canals. Egypt emerged into history as a cradle of civilization and the seat of the earliest organized government in the history of mankind.

For Egypt, the Nile was its source of life and its chief means of communication and transport. Egypt was but a great oasis in the Sahara desert, a desert that extends from the Atlantic in the west to the Arabian Gulf in the east. The Nile was its only dependable source of water. There is hardly a people on earth that was so dependent on a river and so deeply impressed by it as were the Egyptians by the Nile. The amount of rainfall in Egypt was too small to measure. People in Upper Egypt would not see any rainfall for years. Its occurrence was considered an exceptional phenomenon. Nor did any river in the world occupy a similar position in a people's mind and spirit as did the Nile for the Egyptians. They were so deeply awed by it that they raised it to worship and composed beautiful hymns in its praise.

Many a foreign historian, writer and tourist has been impressed by the Nile, or rather the Egyptian Nile. In his book "The River War", Winston Churchill, the eminent British statesman, wrote:

"If the reader looks at a map of the Nile system he cannot fail to be struck by its resemblance to a palm tree. At the top the green and fertile area of the Delta spreads like the graceful leaves and foliage. The stem is perhaps a little twisted, for the Nile makes a vast bend in flowing through the Sudan... The water - the life of the Delta - is drawn from the Sudan, and passes along the channel of the Nile; as the sap passes up the stem of the tree, to produce a fine crop of fruit above".

Sir Allan Gardiner, the eminent British Egyptologist, wrote:

"Egypt resembles a lotus plant with the Nile valley as a stalk, the Delta as a flower, and the depression of the Fayyum as a bud".

The ancient Egyptians themselves thought in terms corroborating the dictum of Herodotus. They called it *Keme*, i.e. the Black Land in reference to the rich mud which countless of inundations had spread over the country and to which it owed its unparalleled fertility. The desert they sometimes described as *Dashre*, the Red Land.

The waters of the Nile have been and still are of deep concern to the Egyptians. The annual inundation that takes place between June and September was a matter of life and death to them. The dissolution of the central government and political order was always connected with the failure of the Nile waters to flood. The ancient Egyptian took his orientation from the Nile; he faced the south, the source of the water and

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annual refertilization; hence the east was on his left hand and the west on his right and the north at his back, words expressing east, west and north were derived from left, right and back. The Nile flood also determined the farmer's season. The year began with the river's rise and was divided into three seasons - the inundation, the cultivation and the harvest season. The Egyptian calendar has therefore been based directly on Nile flooding. Egyptian astronomers of the Old Kingdom observed that when the star Sothis after disappearing for seventy days rose again for the first time in the early morning before the sun had risen, it denoted the beginning of the season of inundation; hence they associated the coming forth of Sothis with the New Year's day, and, assuming that their calculations were correct, they possessed the possibility of acquiring a sidereal year of 365-1/4 days. The valley submerged under flood waters suggested to the Egyptians the conception of the myth of Nun the creator god who made his first appearance in primordial ocean beneath the earth. According to this concept, all water is flowing from Nun and the flood water rises out of caverns that existed, they believed, near the Isle of Bigeh in the first cataract near Assuan and perhaps also near the whirlpools in the river at Gebel Silsileh, south of Luxor. These were popular religious beliefs, but a scientific explanation was not lacking. A text from the time of the Nubian King Taharqa (689 to 664 B.C.) states that the Nile flood was due to heavy rains in Nubia.

The measurement of the height of the inundation each year became of vital importance to the central government in Memphis so as to be able to arrive at a just basis for estimating the expected harvest in the coming season and the rate of taxation to be fixed accordingly. Nilometres were used for this purpose; the best of these was located at the house of the inundation near Old Cairo, and another was on Elephantine Island at the end of the first cataract. After Egypt had extended its supremacy over Nubia in the Middle Kingdom, the observation posts were advanced under Amenemhet III, who decreed to have the height of the Nile recorded on rocks at the narrows of the second cataract at Kummeh and Semmeh. Soon a nilometre was fixed, recording the maximum level of the high water from year to year. These records, still preserved upon these rocks, show the river from 7.5 to 9 metres higher than Nile levels today. Such records were dispatched as soon as possible to the Egyptian authorities in the Capital to enable a closer watch to be kept on the approach of the flood. Very conservative and holding to old traditions, the Egyptians of the New Kingdom never abandoned the old cult of the origin of the Nile. Their observation posts advanced to Napata at the beginning of the Fourth cataract. They continued in the Ramesside period to offer sacrifices to the Nile - as in primitive times at Gebel Silsileh, south Luxor, in the third month of summer (15 Epiphi, i.e. 22 July) before the beginning of the inundation and again two months later (15 Thot, i.e. 26 September) hoping to secure an abundance of water.

The annual inundation also suggested the foundation of a national labour service to the central government and the local authorities. During the three month flood season, when agriculture was at a standstill and the peasants idle, the organization of many activities was instituted in the early periods of Egyptian history. Herodotus told of a three month shift for the workmen employed on the building of the Great Pyramid of Cheops. The government in Ancient Egypt paid attention to the various matters connected with irrigation and land; water rights changes brought about by the action of the current, especially on islands and riparian land, boundary stones and

other such issues were observed and regulated. The inundation was still the pivot of such matters. On the 15th day of the second month of the inundation season, the cultivated land had to be measured before the harvest by the overseer of the field and his assistant, the surveyor, who were responsible for such activities.

The high esteem of agriculture in the national economy of ancient Egypt is well illustrated in New Kingdom religious literature. The dead had to defend themselves in the hereafter against sins among which were reducing the arable area, falsifying its boundaries, damming up of basins and selfish infringement on water rights and land rights to the injury of a neighbour.

The pharaohs were well aware of the fact that the prosperity and welfare of Egypt depended so much on water and a sound irrigation system. One of the oldest administrations titles in the nomes of Lower Egypt, and one which was later to be held in high esteem as a historical survival, was that of canal digger (Cdjmer) who was empowered to conscript temporary labour for such work. He was the predecessor of the historical nomarch. The word for estate, district or nome was written in hieroglyphs as a rectangular piece of land marked out with irrigation runnels or canals. The King Scorpion of the predynastic had himself depicted on his mace head inaugurating the festival of digging a canal. Pharaohs took great care of projects that would control the flood waters of the Nile to secure arable land, protect the villages against destructive floods, and extend the time during which waters of the inundation could be made available for productive agriculture by building dykes and damming up basins to hold the flood waters until needed. The waters were then released by the piercing of the dams, into a network of canals of runnels for distribution and conducting water from the basins. The shaduf, a water raising appliance for the irrigation of gardens was and is still used.

In the Fayyum depression some hundred kilometres to the southeast apex of the delta, King Ammenemhet III of the Twelfth Dynasty carried out a great scheme, possibly conceived by his predecessors, for the benefit of the irrigation system then in force and the reclamation of more arable land. The plan aimed at controlling the inflow and outflow of flood waters that had in prehistory, entirely filled this 43 metres below sea level depression turning it into a sizeable lake. Retention walls inside this oasis depression at the point where the waters entered were built to reclaim part of the Fayyum for cultivation. It was Ammenemhet III who extended this vast wall that was at least 43 kilometres long, thus reclaiming a final total of twenty seven thousand aerea.

Strabo, the famous classical writer, reports that tourists in ancient times who visited this lake at this section of this relatively enormous project had the impression that the whole body of water was an artificial lake dug by King Lames. In this name we recognize with certainty the prenomen Nima Ct Re of King Ammenemhet III. This was then the famous lake Moeris of the classic geographers and travellers. During the time of inundation, Strabo continues, the waters replenished the lake through the canal dug through the gap and when the river fell again the waters were allowed to flow back through the same canal for irrigation. He had witnessed the regulators for controlling inflow and outflow. Modern calculations have shown that enough water could have accumulated to double the volume of the river below Fayyum during the hundred days of low Nile from the first of April

on. The masonry mouth of the canal, called Ro - hwn under the Pharaohs (nowadays Lahum) lasted to the year 1245 A.D., according to Abu Othman Naboulsi Assafadi. Earlier Abu Ishaq ibn Gaafer in 1030 A.D. gave a more elaborate description with dimensions in cubits.

Drinking water was no problem in the Nile Valley in ancient Egypt. Water for daily use since prehistory was first kept in water skins, then in jars. A general water service for the village or city was known. A certain Sa-montu, User, who lived under the kings of the Eleventh Dynasty, boasted of possessing good basins and being so devoted to his town that he organized a drinking water service, on his own, consisting most probably of a considerable number of jars somewhere in a public area. Evidence from the Ramesside period renders that picture complete by the fact that water carriers were employed to supply the community of workmen at Thebes with water.

The ancient Egyptian was very keen traveler and trader in pursuit of raw materials. The endless deserts on both sides of this black land never impeded his activities and movements after his goals. Copper, feldspar, turquoise and gold mines were off in the valley of the Sinai and in the eastern desert. Punting the marine highway through the Red Sea started from ports only reached across the eastern desert, usually through Wadi Hammamat from copots, the Quft of today. Caravans sent on the long journey, sometimes with heavy loads of water, had to ration water among its members. Wells and springs had to be sought and kept fit and clean. Sporadic rains were valued and runoff stored in basins. Henu, an official under King Montuhotep SCnkh-ka Re of the Eleventh Dynasty, speaking of his Wdai Hammamat caravan boasted:

I made the road a river and the Red Land (i.e. the desert) a stretch of field for I gave a leathern bottle, a carrying pole, two jars of water and twenty loaves to each one among them every day. Now I made twelve wells in the bush and two wells in Idehet twenty square cubits in one and 31 square cubits in the other. I made another in Iheteb 20 by 20 cubits of each side. Then I reached the (Red) Sea; then I made this ship and I dispatched it with everything.

Armenemhet, when commander of the Eleventh Dynasty King Montuhotep Nebtawi-Re, reported on his expedition to Wdai Hammamat:

rain was made... the highland was made a lake, the water went to the margin of the statue, a well was found in the midst of the valley 10 cubits by 10 cubits on its every side filled with fresh water to its edge undefiled kept pure cleansed from gazelles concealed from troglodyte barbarians.

Seti I, investigating the causes of the limited quantities of gold that were mined from the eastern desert, some 60 kilometres next to Edfu, paid a personal visit to the place. He had a well dug there yielding a plentiful supply of water and established a settlement with a small temple for workman. This is the temple of Redi slyah in Wadi Miah. He extended his attention further south to the Wadi Allagi but failed to find water through digging a well about 60 metres deep. His son and successor Ramses II did not give up the search for water. His viceroy of Nubia whom he consulted explained the difficulty; the road was tery much lacking in water. If a few caravaners went there only half of them arrived for they died of thirst on the road together with the asses they drove before them. Hence, no gold was brought from this country for lack of water.

After consultation with his court Ramses ordered his viceroy to resume the attempts as soon as possible, or as Ramses put it, "let a month become a day". Some time later, the viceroy of kush sent a message announcing success; the water has come forth of twelve cubits being four cubits in depth in the well.

The ancients were well aware of the vital importance of water reservoirs to supplement the few natural springs on well traveled routes so that the detachments of troops could be sent over vast waterless stretches of desert. In 1917 a modern desert expedition discovered an ancient storage depot of hundreds of pottery jars at Abu Ballas far to the south-west of Dekhla Oasis. It was situated on the old caravan route that bypassed the Sahara to the south and went north by way of Gilf el Kebir to Kufra.

The possibility of thirst was a terror to the Egyptian in the Kingdom of the Dead. In the Pyramid Texts, the earliest religious literature in history, the king is often assured that he would never suffer thirst or be forced to drink unclean water in his after life. So many pools, canals and lakes would be available for providing drinking water there.

Cleanliness and purification were indispensable in everyday life in ancient Egypt. The hard working Egyptian in the hot climate of Egypt had greatly appreciated washing himself after a hard day's work. It rendered him fresh and revived his senses. In the story of the shipwrecked sailor, the nobleman was advised to wash himself before he appeared before the king so as to report his journey with self-confidence. Ceremonial washing was a daily requisite and necessity for a king or a priest before he entered the sanctuary. Everybody had to purify himself before admittance to a temple or tomb chapel. The deceased were washed in a purification tent, especially erected for that purpose before the body could be admitted to the necropolis. Washing hands before meals was a habit taken for granted among the Egyptians. In the story of the two brothers, it was the duty of the farmer's wife, when her husband returned home, to pour water on his hands before he had his meal. Natron was used with water for purification.

Houses of the nobility were installed and equiped. A high official's house excavated at Tell el Amarna, the Capital of the famous Akhenaton, shows greatly refined sanitary arrangements, even equiped with seats. The houses received its water supply from a well behind it. The Egyptians were not acquainted with bath tubs before Graeco-Roman times, but did, it seems, have shower rooms. Primitive showers were known early by pouring water in baskets over a man's head. The Egyptians took special care of their skin after washing, and all private apartments had unction rooms for oiling and massage. Mouth care was practiced by chewing pellets of natron.

Drains and conduits were made of pottery. We have evidence that the Egyptians refrained from discharging waste water into the Nile.

ANNEX

List of experts in the field of
Water Supply and Sanitation

Regional, national, international institutions in charge of and involved in the area of Women and the International Drinking Water Supply and Sanitation Decade (IDWSSD) which carry out activities in the areas of socio-economic development, health and sanitation, and science and technology.

1. Centre International de L'Enfance
Chateau de Longchamp
Bois de Boulogne, 75016 Paris, France
Tel: (1) 506 79 52
Type: Non-Governmental - Centre de formation, information, recherche.
2. Groupe de Recherche et d'Echange Technique
30 rue Charonne
75011 Paris, France
Tel: (1) 261 50 50
Type: Non-Governmental - Recherche et diffusion de technologies
3. Chinese National Patriotic Health Campaign Committee
Huo Hi Beijing, People's Republic of China
Tel: 44-0531
Type: Governmental/Centre attached to National Organization
4. Mary Elmendorf, Appropriate Designs for Basic Needs
535 S. Blvd. of Presidents
Sarasota, Florida 33577 U.S.A.
Tel: (813) 388-1184
5. Dirección General de Promoción de la Mujer
Dra. Martha Olga García Santamaría
Ave. México 15
Santo Domingo, Dominican Republic
Tel: (809) 688-6509
6. Associacao Brasileira de Engenharia Sanitaria e Ambiental - ABES
Avenida Presidente Wilson 164- 7 andar
Rio de Janeiro, Brazil CEP.20.030
Tel: (021) 220-3422
7. Japan Rural Water Association
Zenkoku CHOson Kaikan
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