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International Reference Centre  
for  
Community Water Supply

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# Community Water Supply in Developing Countries

Report of an International Training Seminar  
held in Amsterdam, The Netherlands

12

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The WHO International Reference Centre for Community Water Supply (IRC) is based on an agreement between the World Health Organization and the Netherlands Government. In close contact with WHO, the IRC operates as the nexus of a worldwide network of regional and national collaborating institutions, both in developing and industrialized countries.

The general objective of the IRC is to promote international cooperation in the field of community water supply. Operating as a catalyst, the IRC works closely together with its collaborating institutions as well as international agencies, national entities and individuals.

Requests for information on the IRC, or enquiries on specific problems may be directed to the International Reference Centre for Community Water Supply, Information Section, P.O. Box 140, 2260 AC Leidschendam, the Netherlands.

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IN DEVELOPING COUNTRIES

Report of an International Training  
Seminar held in Amsterdam, The Netherlands

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OCTOBER 1979

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The Netherlands

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## 1. PREFACE

In accordance with its objective to contribute to the advancement and transfer of knowledge and methods, the WHO International Reference Centre for Community Water Supply convened an International Training Seminar on Community Water Supply in the Developing Countries from 6th to 10th September, 1976, in Amsterdam. The need for the Seminar was apparent from the numerous requests for participation and the generous support received from bilateral and international agencies.

The seminar was organized just before the International Water Supply Congress, which was held in Amsterdam from 13th - 16th September, 1976, so that at the end of the Seminar a public session was held, attended by interested Congress-participants. This consisted of a panel discussion on: International Co-operation in Water Supply Development. Background papers for the panel discussion are included in full in this document (page 43).

In view of the acceleration of preparatory activities for the Water Decade (1981-1990), as recommended by the U.N. Water Conference, selected documentation dealing with the water sector is of growing significance. The Seminar papers, therefore have already been published in the IRC Bulletin Series as Bulletin No. 10. The present report of the Seminar contains the recommendations, resolution and full papers of the Panel Discussion, as well as abstracts of the Seminar Papers.





## 2. SUMMARY OF PROCEEDINGS

### OBJECTIVES

The seminar was intended for chief public health engineers and executive officers of water supply programmes and agencies,

1. to introduce participants to approaches, methods and techniques which are important in extending and improving community water supply services in the developing countries.
- 2a. to identify regional and national constraints and needs and the relevance of approaches, methods and techniques discussed.
- b. to formulate follow-up regional and national training seminars and other relevant activities such as demonstration programmes, specific training courses, studies, etc.

### PROGRAMME

The programme was concerned with an analysis of the current water supply situation in developing countries, a discussion of a strategy to reach the goals, and an introduction to various subjects which have important aspects related to the success of water supply programmes and from which participants can greatly benefit in their work (see Annex I).

Organizations like the World Health Organization, the World Bank and UNICEF provided lecturers, who brought with them the extensive experience of these agencies in the sector, to which some developing countries experts also contributed.

## PARTICIPANTS

Several participants were delegated and sponsored by their own agencies, participation for many others was made possible by fellowships extended by the Canadian International Development Agency, the Ministry of Overseas Development (U.K.), the U.S. Agency for International Development, the Pan American Health Organization, the WHO Regional Office for the Eastern Mediterranean, UNICEF and the Netherlands Government. International agencies and organizations showed their interest by sending observers to the seminar (see Annex 2).

### INTERNATIONAL WATER SUPPLY ASSOCIATION (IWSA)

Since the seminar was held in the week prior to the congress of the International Water Supply Association, participants had the opportunity to attend the congress as well. To this end full cooperation was obtained from IWSA.

## RESULTS

### *Transfer of Technology*

The programme offered was well received and gave a good opportunity to highlight important topics which will greatly benefit participants in their work. The importance of training was emphasized, as was the need to adapt techniques to local conditions.

### *Follow-up Seminars*

During the meeting two country representatives expressed their readiness to investigate the feasibility of follow-up seminars in their respective regions. These should be attended by rep-

representatives of other regions as well, who would then give follow-up in their turn.

### RECOMMENDATIONS

The delegates of the 26 developing countries participating in the seminar were requested to identify obstacles to progress of community water supply development in their countries, and suggest programmes of action in which the international society can assist. Recommendations to relieve the needs of the regions have been submitted in the field of training, on motivation programmes, organizational set-up, information exchange, and appropriate technology (see List of Recommendations, page 25).

### RESOLUTION

At the end of the seminar a resolution was approved for submission through the IWSA to the Secretariat of the United Nations Water Conference, which was to be held in Argentina in March 1977.

The resolution asked the Conference:

- to urge national governments of the developing countries to give a high priority to and strive for the provision of safe and accessible supplies to all the people by 1990;
- to urge bilateral and international agencies engaged in providing technical and financial assistance to give a high priority to water supply and sanitation projects and to increase their support.



### 3. PAPERS PRESENTED AT THE SEMINAR

Summaries of the papers listed below are given on the following pages; as mentioned before, the full texts of these papers are published in "International Training Seminar on Community Water Supply in Developing Countries" (IRC Bulletin No. 10).

#### GENERAL

- Paper 1 *Current Situation of Community Water Supply in Developing Countries*  
S. Unakul \*
- Paper 2 *A Strategy to Meet Short and Long Term Water Demand in Developing Countries*  
H.R. Shipman
- Paper 3 *The Experience with National Sector Studies: Identification of Constraints and Priorities*  
Dr. E. Becher
- Paper 4 *A Successful Approach to Community Water Supply Programming in Latin America*  
Prof. J.M. de Azevedo Netto

#### PLANNING, FINANCE, ORGANIZATION AND MANAGEMENT

- Paper 5 *Planning Water and Sanitation Systems for Small Communities*  
D. Donaldson
- Paper 6 *Financing a Rural Water Supply Programme*  
M.C. Mould
- Paper 7 *Organization and Management of Community Water Supplies*  
M.C. Mould

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\* The affiliation of the various authors can be found in Annex I.

- Paper 8 *Operation and Maintenance. The Case of Mexico*  
F.L. de la Barra

#### HUMAN FACTOR

- Paper 9 *Towards a Fuller Appreciation of Community Involvement*  
G.A. Vierstra
- Paper 10 *Assessment of Manpower Needs and Training Programmes*  
H.W. Barker

#### TECHNOLOGY

- Paper 11 *Research and Development Needs in Community Water Supply*  
J.M. Dave and R. Paramasivan
- Paper 12 *In-Country Production of Equipment and Chemicals for Community Water Supply*  
B.B. Rau
- Paper 13 *Drinking Water for Every Village; Choosing Appropriate Technologies*  
M.G. Beyer
- Paper 14 *Some Basic Ideas on Establishing a Water Treatment Technology*  
J. Arboleda Valencia
- Paper 15 *Low Cost Distribution Systems*  
Prof. J.M. de Azevedo Netto

1 *Current Situation of Community Water Supply in Developing Countries*, S. Unakul

Based on global surveys of WHO in 1970 and 1975, the author reviewed the situation in community water supply and excreta disposal and the progress made during the first half of the decade. Corrected targets for 1980 are to provide 91% of the urban and 36% of the rural population with water supply at an estimated investment of U.S. \$21,000 million during 5 years. It was shown that lower unit costs and appropriate design criteria, technology, and level of service are necessary, so as to serve more people. The survey also indicated typical constraints which hamper progress; insufficient internal financing and lack of trained personnel were given high rating by the countries. Although the surveys may not give a very accurate account of the situation, the magnitude of the problem and resources required could very well be assessed. National programmes are required to develop the sector, with international and bilateral collaboration as available.

2 *A Strategy to Meet Short and Long Term Demand in Developing Countries*, H.R. Shipman

Project planning and implementation can seldom be realized within 5 years, so that new activities can only change the situation after 1980. For medium term planning (1985) countries should base their plans on the present situation, needs, and resources. To set realistic goals which can reasonably be achieved, data from the WHO survey, corrected country data and per capita cost figures can be used for setting appropriate targets which are within the country's resources including: manpower for design, construction and operation. Targets have to be converted into a working plan. For the required engineering and feasibility studies, local consulting

capacity needs development. Other factors which require attention are organization and management, a well defined policy, and manpower development. For the long-range strategy (1990 or later) advance programming would be beneficial for a sound development and yearly updating of five-year plans was advocated. A review of service levels and investment needs for the sanitation sector was also given.

3 *The Experience with National Sector Studies: Identification of Constraints and Priorities*, Dr. E. Becher

Studies of the Community Water Supply and Sanitation Sector have been undertaken to provide basic information on the actual situation, to identify problems, to lay linkages with national plans, and to make recommendations for the development of the sector. A sector study may also stimulate the national planning process. A review was given of five years of experience of sector studies carried out by the WHO/IBRD cooperative programme in 32 countries. An elaboration was made on sector study and follow-up procedures in conjunction with national development plans, the role of WHO and IBRD staff in assisting the governments, and the structure of the sector report. Also dealt with were information requirements, economic and financial aspects, institutional options of the sector, manpower planning, and its relation to country health programming. To develop the sector it was suggested that programmes should be related to national policies and objectives, e.g. in the context of rural or regional development.

4 *A Successful Approach to Community Water Supply Programming in Latin America*, Prof. J.M. de Azevedo Netto

The author analyzed the main factors which contribute to the advancement of basic sanitary conditions in Latin America



including motivation of the community for appreciation of the benefits of the water supply, sanitary education necessary for getting public support, technology based on suitable criteria, and adequate financial resources. Important factors are the local contribution, manpower development, foreign aid, and exchange of information to utilize know-how available elsewhere. Based on a study of the economic situation in a low economic level region the policy proposed was to modify design criteria of the supply system (in order to lower cost) and to motivate and involve the population in construction and operation. With gradual development of the community, the supply can be up-graded and improved criteria introduced.

5 *Planning Water and Sanitation Systems for Small Communities*,  
D. Donaldson

The author analyzed the unique characteristics of rural water supply planning, such as the great number of similar units required (which should be handled as a total programme), the extra efforts needed for the community to accept the supply, and the limited funds that can be raised by the community itself. An inventory of water supplies needed and of the required human, technical, and financial resources would provide data for a master plan to which high-level commitment was recognized to be a condition for success. Basic elements for a successful water supply programme were summarized as: community participation necessary for appreciation of and responsibility to maintain the supply, technical flexibility to meet a large variety of problems with simple solutions, and the use of well trained sub-professional staff to relieve the few engineers of repetitive tasks. It was observed that a separate organization for rural water supply and sanitation was often beneficial to a sound development of the sector.

In an example the various stages in planning a village water

supply was illustrated: programme planning and budgeting based on preliminary figures and estimating of materials to be allocated for which a field inspection is required.

6 *Financing a Rural Water Supply Programme*, M.C. Mould

For financing a rural water supply programme, both government and public attitudes towards water charges are of relevance. In a number of countries a safe water supply is viewed as a social service for which charges should be kept to a minimum. The paper advocates that, as a general principle, user charges should be set as realistically as possible because the extent of the water supply programme (and to some extent its continuation) will depend on this source of funds as well as on general public revenues. Changing government and public attitudes towards water charges will take time and requires a continuous effort. Whatever pricing policies are adopted, village water supply programmes in many countries are likely to need continuing support from national revenues. In providing a water supply to an individual village, the level of service should be carefully tailored to the circumstances. Adopting the principle that the villagers should meet at least part of the costs, the determination of their ability and willingness to pay remains a serious problem. Many rural water systems break down due to lack of funds for operation and maintenance. Thus, in the author's view, the real problem will be to collect any water charges, which should cover at least all operating and maintenance costs, and preferably should also make a substantial contribution towards the scheme's construction costs.

7 *Organization and Management of Community Water Supplies,*  
M.C. Mould

In many systems of organization and management of community water supplies which exist, political factors directly affect the organization. Thus, a supply can be established as a public service or an industry; it can be developed as an individual sector or part of urban/rural or rural development, planning should aim at adequate political representation to ensure allocation of the available resources. Organization units at various levels with typical allocations of powers and functions were illustrated. Organizational areas could be based on topography, or on administrative delimitations as part of rural or urban/rural areas. Efficient development, cooperation, and maintenance could be performed by a public utility operating in a watershed and drainage area. A utility covering urban and rural areas would permit cross-subsidizing and would be capable of employing adequate technical and financial staff. To benefit from effective operations, integrated urban/rural units and multi-sectoral organizations are options worth considering. The importance of a good manager responsible for organization and management was underlined and training should serve the objective of early selection and development of good managers.

8 *Operation and Maintenance; The Case of Mexico,* F.L. de la Barra

The rapidly growing number of drinking water supplies which required rehabilitation mainly due to inadequate operation and maintenance had led to legislation which in Mexico delegates administration, operation, and maintenance to the communities served. State and rural councils were set up to assist in these tasks and a Technical Council at federal level to provide technical and administrative support. The author elaborated on the functions and operational methods of these councils.

Promotional activities for better users' appreciation of the facilities were found necessary to clearly define responsibility for the maintenance and to get better financial returns. In pilot studies close relationships were found between the various elements of the programme, such as village selection, choice of type of projects, promotion of programme, and construction and operation within the sector. It was advocated that sector policy should be part of a national plan for rural development.

9 *Towards a Fuller Appreciation of Community Involvement,*  
G.A. Vierstra

On the basis of a case study of a self-help water project in Kenya, the main features of "community involvement" were described. The author presented the case history of the project and evaluated the most important reasons why the enterprise was favoured by successful community participation. Local involvement in water development was shown not to be only restricted to the provision of labour, local materials, or funds, but, in fact by the mobilization of a "cooperative mentality" within the community which formed the very basis of the process. Thus, the community finally determined its own priorities, developed gradually a form of collective decision-making, as well as a cooperative action to reach the designated goals. A crucial role in this process was played by the local committee.

The case history also showed the variety of factors which should be taken into consideration when evaluating the opportunities of community involvement in water projects. Crucial factors are the stage of development of a village, the social-psychological forces that may arise when communicating an innovation, and the village's social and economic structure.

The paper ends with a list of suggestions for a rural water development policy incorporating the essential element of community involvement. It was recommended that a component of "social action research" be included in rural water projects so that programmes can be adjusted. The author finally stressed the importance of compiling a reference catalogue of social management systems, systematically arranging empirical evidence on the approaches to community involvement which were successful and the related social, economic, and cultural conditions.

10 *Assessment of Manpower Needs and Training Programmes*

H.W. Barker

The author reviewed the arguments why training should be undertaken, i.e. in financial terms it represents an investment in people which gives good returns, and organized and systematic training will assist the trainees to reach the status and standards of experience in the shortest possible time. Furthermore, it will enable people to utilize and not misuse facilities. Some observations were given regarding gaps and problem on the subject of training. The scattered labour force often lacks basic education, adaption and dissemination of training know-how is needed, information on availability and quality of training is lacking, and there is a shortage of trainers so that tutoring should be an integral part of the duties of managers and supervisors. A six-month fellowship training programme for trainers was proposed and for lasting impact it was advocated to allow a separate training budget. National, regional, and international activities were reviewed which aim at an organized and systematic training programme. Individual waterworks with their direct needs should, however, get their own programmes started and a sample collection of training topics and requirements was offered.

11 *Research and Development Needs in Community Water Supply,*

J.M. Dave and R. Paramasivan

In view of limited resources in developing countries research development has the important role to find simple and economic solutions for a reliable community water supply.

For urban systems research and development aim at reducing treatment costs via increased performance in water treatment and distribution. Some areas of study in India are: the development of coagulant aids to replace alum, high rate settlers, a two-layer filter with local bituminous coal or crushed coconut shell as upper layer, improvement of distribution networks, and related leak detection.

Socio-economic problems and low education level of rural areas pose different requirements. Development of groundwater needs simple and reliable exploration methods, suitable lifting devices, and new techniques for hard rock drilling.

Other interests are disinfection of open dug wells (for which the potchlorinator was developed), defluoridation, desalting of brackish water, iron removal for village use, and biological filtration. Adaption of water quality standards to suit the economic status of the community or country was suggested.

The author further discussed the role of NEERI, as a national environmental research laboratory, and how international exchange of information, coordination research and exchange of scientists would support country programmes.

12 *In-Country Production of Equipment and Chemicals for Community Water Supply,* B.B. Rau

The assurance of an adequate availability of materials and equipment is the prerequisite for success of large community water supply programmes. In meeting the current and anticipated demands, local materials available, and indigenous expertise

and labour should be exploited to the fullest possible extent. Constant and consistent quality control of the locally manufactured materials and equipment is necessary. In-country production of materials and equipment for community water supply programmes should be stimulated by promotional measures of the government as it forms an integral part of the national development plan.

The author described the various methods employed by the Government of India in stimulating the establishment of adequate manufacturing capacity and maintaining its efficiency. A number of regulatory measures was reviewed.

An explanation was given of the government policy of selective permission for foreign equity participation and technical collaboration in fields of high priority and in areas where the import of foreign technology is necessary. It was stressed that streamlining of licensing and approval procedures should receive continuous attention.

13 *Drinking Water for Every Village; Choosing Appropriate Technologies*, M.G. Beyer

Rural water supply programmes should be closely integrated with other sectors of rural development. In providing villages with water supplies appropriate technologies must be chosen and applied.

The question of selecting and applying a water supply technology in any given area of the world is one of proper integrated planning and implementation. Sources of water differ widely, and so do the demographic and socio-economic conditions.

The design of any project should be adapted to meet the real needs of the village population, be realistically conceived, be prepared within the framework of economic and manpower development planning, take careful consideration of social

attitudes, as well as the potential for development of the local population, and should permit maintenance at a level not beyond the capabilities of the villagers.

The author stated that for rural water supplies in many developing countries groundwater remains the most important source of water. For water supply projects based on groundwater to be efficient, hydrogeological surveys and geo-physical studies of individual sites should be carried out. Modern exploration techniques may be very useful, at least to shortcut the reconnaissance phase of many projects. Consideration pertinent to the use of surface water, rainwater, and spring water are also given in the paper. The UNICEF assisted government water supply programmes in Bangladesh and in India are briefly commented upon. It is recognized nowadays that it is of great importance for people to understand the benefits of facilities and keep them operating.

14 *Some Basic Ideas on Establishing a Water Treatment Technology Adapted to Developing Countries*, J. Arboleda Valencia

Referring to failures experienced, the author stated that water treatment technology as applied in highly industrialized countries may be completely in-appropriate in developing countries. Water treatment technology, adapted from conventional water treatment methods has been generated and applied in a number of developing countries. The author described several treatment plant elements used in Latin America including: hydraulic rapid mixing of coagulants, hydraulic flocculation, sedimentation with manual sludge handling, rapid filtration units capable of being backwashed without the use of pumps or elevated reservoirs, and declining rate filtration eliminating the use of rate-of-flow controllers.

The simplified design as described have the advantage of lower



initial capital investment, reduced costs of operation and maintenance, and good treated water quality.

The practical application of the adapted technology is illustrated for the treatment plants of Cochabamba (Bolivia) and Prudentopolis (Brazil). The plants are operating successfully and their construction costs compare favourably with conventionally designed plants.

When applying the innovated technology in the upgrading of existing treatment plants, the hydraulic capacity of the plants in many cases proves to be the main constraint.

15 *Low Cost Distribution Systems*, Prof. J.M. de Azevedo Netto

The distribution network is often the most expensive part of water supply systems, usually taking 50 percent or more of the total construction cost. Experience shows that considerable economy can be obtained in the design of distribution networks, particularly for rural communities.

Substantial cost reduction may result from the application of modest but realistic design parameters and the adoption of simplified lay-outs.

In small rural communities of developing countries, distribution networks can be designed for providing an adequate water supply for domestic purposes only. Residential roof water tanks may be used to limit the distribution network hydraulic requirements so that small diameter pipes can be used.

The author makes a brief comparison of different lay-out patterns for distribution networks from conventional networks (all pipes interlinked) to simpler models permitting the installation of secondary pipes of minimal diameter without interconnecting them. Examples were given showing the various possibilities for simplification and cost reduction of the distribution networks.



#### 4. LIST OF RECOMMENDATIONS

1. AFRICA AND MIDDLE EAST		
Subject Area	Problem	Action Proposed
Training	Lack of trained manpower	<p>Establishment of training centres in the more advanced of the developing countries. Limited in the first instance to middle grade technicians and trainer-trainees but expandable as appropriate to cover all regional needs in the field of water supply and water pollution control. In view of the action proposed, it is recommended:</p> <ol style="list-style-type: none"> <li>1. Developing countries to send details of training needs to a coordinating body, e.g. IRC.</li> <li>2. Coordinating body to organize meeting of both international agencies concerned and developing countries to decide most appropriate action.</li> </ol>
Research and Development	Inadequate knowledge and information on appropriate technology and equipment. There is a need to intensify research and disseminate information on technology and equipment most suitable for the developing countries of the region with particular regard to low cost use of local materials, local industries and local labour in the field of water supply.	<ol style="list-style-type: none"> <li>1. Developing countries to establish or expand existing research institutions.</li> <li>2. Topics and results of research to be forwarded to coordinating centre, e.g. IRC.</li> <li>3. IRC to continue its present work of coordination of research activities and disseminating information.</li> </ol>
Funding	Inadequate finance for water supply programmes. There is a need for increased priority and improved budget by national governments and improved financing by developing agencies.	A recommendation to this respect should be embodied in a resolution by this seminar and forwarded to the appropriate government and developing agencies.

2. ASIA

Subject Area	Problem	Action Proposed
Training	<ol style="list-style-type: none"> <li>1. There is a definite need for training programmes for better community water supply systems planning and management.</li> <li>2. There is a lack of training for personnel at various levels.</li> </ol>	<ol style="list-style-type: none"> <li>1. Training programmes to be established or strengthened for personnel at various levels. These may be in the form of international, regional or national seminars, depending on the type of personnel to be trained.</li> <li>2. Available training materials for water supply personnel should be obtained by the IRC and should be distributed to participating countries in published form.</li> </ol>
Information and Coordination	<ol style="list-style-type: none"> <li>1. There is a need for information on experience and technology as well as to adapt this technology to the conditions of the country.</li> <li>2. The training programmes by various agencies are widely dispersed. They need to be systematically coordinated for more effectiveness.</li> </ol>	<ol style="list-style-type: none"> <li>1. Develop an information system to gather, evaluate and disseminate available data and information on technology.</li> <li>2. IRC should collect and disseminate information on training programmes and assist in coordinating them between various agencies like WHO, UNEP, FAO, ILO, etc.</li> </ol>
Motivation and Education	<ol style="list-style-type: none"> <li>1. Lack of information on successful motivation in community water supply.</li> <li>2. Inadequate assistance available particularly in motivation and education programmes and materials preparation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Information on successful projects with motivation be prepared to assist other countries in promoting the same for their community water supply. These can be in the form of brochures, pamphlets, films, etc.</li> <li>2. Assist the countries on preparation of suitable material for motivation programmes to the participating countries.</li> </ol>
Research and Development	<ol style="list-style-type: none"> <li>1. There is no proper dissemination of research and development results.</li> <li>2. The application of these are not done in different countries due to various reasons.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inventory of available research and development information to be proposed and its dissemination to be taken up by the IRC.</li> <li>2. Full scale application of research data available in other countries to be taken up as sponsored projects by IRC.</li> </ol>
National Agencies	<p>There is a need for improving the community water supply organization in many countries.</p>	<p>IRC should collect information on organizational set-ups and legislations and publish them as monographs. This will help countries select the organization most suitable to them or improve upon it.</p>
Funding	<p>There is a general inadequacy of funds available for community water supply.</p>	<p>More and more funds should be made available by international financing agencies like World Bank, IBRD, Asian Bank, etc. IRC should assist in such programmes.</p>

3. LATIN AMERICA

Subject Area	Problem	Action Proposed
Training	There is currently a lack of an effective plan for training the technical and managerial personnel required to provide quality water on a long-term basis.	Each country should develop and/or improve their national training policy directed to decision-level officials, necessary for developing a national training plan. International agencies should help implement the plans and coordinate resources on a regional basis. <u>Initial action:</u> Have a series of workshops, develop recommendations and presentations to decision-level officials; assignment of teams to work in the development of policies and strategies. The first workshop should be convened within one year.
Information Exchange	There is often a need for direct information at the managerial, technical and operational level.	<ol style="list-style-type: none"> <li>1. Create a global system to gather, evaluate and disseminate currently available information using the mechanisms of national, regional and international agencies.</li> <li>2. Promote information exchange mechanisms to develop and maintain regional centres to disseminate, collect and/or develop information.</li> </ol> <u>Initial action:</u> Convene regional workshop to identify current sources of information and outline required actions (such as development of a thesaurus).
Motivation	The problems currently being encountered in operating and maintaining water and sewerage systems reflect the lack of motivation of officials and technicians at all levels of government and within the agency.	To include in proposal and/or current training programmes elements for promoting motivation. <u>Initial action:</u> Convene national meetings for planners and agency directors and their staff to improve their understanding of the cost-effectiveness etc. of water systems.
National Authorities	The multitude of agencies with responsibilities in this sector is delaying the development of strong and effective national water and sanitation agencies.	Develop a dual level sectoral agency that will have a centralized responsibility for planning, financing, developing of standards, control and co-ordination as well as regional responsibility for system operation, maintenance and administration. <u>Initial action:</u> International agencies should promote initiation and/or improvement of programmes for the institutional development of these agencies in each country.
Funding	Current policies of international agencies are not sufficiently responsive to the needs of the developing countries.	Modification of existing procedures, policies of these agencies to reflect that while a water system should be as self-sufficient as possible there will be the need for loan conditions which allow subsidies in the small communities. <u>Initial action:</u> Taking note of IDB's leadership in this activity request the other international agencies to include similar conditions in loans within the next two years.



## 5. RESOLUTION

At the IRC-Meeting in Amsterdam attended by senior administrators, chief engineers and public health officers responsible for national community water supply programmes from 27 developing countries during the week preceeding the bi-annual conference of the IWSA, it was unanimously agreed to present a draft resolution to the Executive Board of the IWSA. The draft resolution after suitable review and possible reframing is to be submitted by IWSA to the Secretariat of the World Water Conference scheduled to be held in Argentina in March 1977 with a request that the resolution be presented to the Conference; information on the Secretariat's reaction should be asked and IWSA should be prepared to take such action as appears desirable and necessary to assure presentation of the resolution. The draft resolution is as follows:

The members of the International Water Supply Association meeting in bi-annual session at Amsterdam from 13 - 16 September, 1976;

- a. Having reviewed the world situation and considering that in 1976 some 1.500 million people, urban and rural, living in the developing countries, do not have access to a safe and convenient source of water;
- b. noting that water is not only fundamental to an improved standard of living, but is essential for personal and household hygiene;
- c. observing that in most developing countries where reliable vital statistics are available, water borne and water related diseases rank either first or among the top three causes of morbidity and mortality in people of all ages;
- d. accepting the view held by leading health authorities that few activities can yield greater benefits through the prevention of disease and the preservation of health than those which assure safe water supplies in adequate quantity;

- e. believing that actions can be taken by the governments of the developing countries and by the international community which will permit the immediate launching of a global programme which objective it will be to provide for most of those needing water to be reasonably served by the year 1990.

Therefore, be it resolved:

- a. that national governments of the developing countries be urged to commit themselves to give a high priority in their national development and investment plans to urban and rural water supply and to strive for the provision of safe and accessible supplies to all people by 1990;
- b. that bilateral, multilateral and private agencies engaged in providing technical assistance and financial support to the developing countries, elevate water supply and sanitation projects and programmes to a high level of priority and commit the substantially greater resources required for the support of sound governmental programmes directed at reaching realistic targets, the preparation of manpower, the strengthening of organizations, and to the financing of well conceived projects.



## ANNEXES



## AGENDA

I MONDAY, 6TH SEPTEMBER, 1976

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|---|---|---|
| 1 | Opening   | Ir. P. Santema<br>National Institute for Water<br>Supply, the Netherlands           |
| 2 | Current situation of community<br>water supply in developing<br>countries                       | Presented by S. Unakul, WHO<br>Regional Office for South-<br>East Asia, India       |
| 3 | A strategy to meet short and<br>long term water demand in<br>developing countries               | Presented by H.R. Shipman,<br>World Bank, U.S.A.                                    |
| 4 | The experience with national<br>sector studies: identification<br>of constraints and priorities | Presented by Dr. E. Becher,<br>WHO-World Bank Cooperative<br>Programme, Switzerland |
| 5 | A successful approach in<br>community water supply<br>programming in Latin America              | Presented by Prof. J.M. de<br>Azevedo Netto, University of<br>Sao Paulo, Brazil     |

II TUESDAY, 7TH SEPTEMBER, 1976

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|---|--|--|
| 1 | Organization and management of<br>community water supplies     | Presented by M. Mould,<br>World Bank, U.S.A.                                     |
| 2 | Operation and maintenance. The<br>case of Mexico               | Presented by F.L. de la<br>Barra, Dirección de Agua<br>Potable y Drenaje, Mexico |
| 3 | Planning water and sanitation<br>systems for small communities | Presented by D. Donaldson,<br>Pan American Health Organ-<br>ization, U.S.A.      |

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|---|--|--|
| 4 | Financing a rural water supply programme | Presented by M. Mould,<br>World Bank, U.S.A. |
| 5 | Discussions                              |  |

III WEDNESDAY, 8TH SEPTEMBER, 1976

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|---|---|---|
| 1 | Towards a fuller appreciation of community involvement                      | Presented by G.A. Vierstra,<br>Royal Tropical Institute,<br>the Netherlands |
| 2 | Assessment of manpower needs and training programmes                        | Presented by H.W. Barker,<br>National Water Council,<br>United Kingdom      |
| 3 | Research and development needs in community water supply                    | Presented by J.M. Dave,<br>NEERI, India                                     |
| 4 | In-country production of equipment and chemicals for community water supply | Presented by S.T. Khare,<br>Government of Maharashtra,<br>India             |
| 5 | Discussions   |   |

IV THURSDAY, 9TH SEPTEMBER, 1976

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|---|---|--|
| 1 | Drinking water for every village; choosing appropriate technologies | Presented by M.G. Beyer,<br>UNICEF, U.S.A.                             |
| 2 | Some basic ideas on establishing a water treatment technology       | Presented by J.V. Arboleda,<br>Columbia                                |
| 3 | Low-cost distribution systems                                       | Presented by J.M. de Azevedo Netto,<br>University of Sao Paulo, Brazil |

- 4 Regional working group  
discussions

V FRIDAY, 10TH SEPTEMBER, 1976

- 1 Closing session of seminar  
Recommendations and priority  
allocations

- 2 Opening Panel Discussion:  
International Cooperation in  
Water Supply Development

The International Water Supply  
Association and the developing  
countries

Presented by V. van der Veen,  
International Water Supply  
Association

Technical assistance in water  
supply development

Presented by S. Unakul,  
WHO Regional Office for  
South-East Asia, India

Water supply finance,  
sources, channels

Presented by H.R. Shipman,  
World Bank, U.S.A.

International cooperation in  
water supply development in  
developing countries

F.K. Lweqarulila († 1978),  
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PANEL DISCUSSION



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## PANEL DISCUSSION PAPERS

- PD Paper 1 : *The International Water Supply Association and the Developing Countries*  
C. van der Veen \*
- PD Paper 2 : *Technical Assistance in Water Supply Development*  
S. Unakul
- PD Paper 3 : *Water Supply Finance, Sources, Channels*  
H.R. Shipman
- PD Paper 4 : *International Cooperation in Community Water Supply Development in the Developing Countries with special reference to Tanzanian Rural Water Supply Programme*  
F.K. Lwegarulila (+ 1978)

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\* The affiliation of the various authors can be found in Annex I.



*The International Water Supply Association (IWSA) and  
Developing countries*, by C. van der Veen, Vice President IWSA

#### HISTORY

The International Water Supply Association was founded a few years after the Second World War had come to an end. During the period of the war, there had been absence of communication between many groups of people involved in water supply. It was natural that the contacts after 1945 were re-established. They took the more official shape of an international organization. In 1947, the IWSA was formally established. In 1949, about 400 people from all over the world, though mainly from Europe, attended the first international Congress in Amsterdam.

In a sense, the world was smaller than as it is now; it was mostly people from the Western European countries that took a leading part in the building up of the organization.

No doubt the people who came together were fostered by the hope that international peaceful contacts and collaboration would help to avoid international misunderstanding and conflicts. Also, of course, there was a need to exchange information about mainly technical experience and results of research in the field of water supply.

At a meeting of the First General Assembly of the Association, held in Amsterdam on Thursday, the 22nd of September, 1949, the Constitution was approved. It says that the Association is created:

To establish an international body concerned with the public water supply through pipes for domestic, agricultural, and industrial purposes;

To secure concerted action in improving the technical, legal, and administrative knowledge of public water supply systems;

To secure a maximum exchange of information on research, methods of supply of water, statistics, and all other matters of common interest;

To encourage communication and better understanding between men engaged in the public supply of water.

#### ORGANIZATION

The main instruments of IWSA since 1949 has been its regular international congresses \*. The next Conference is again in Amsterdam, September 13-17, 1976. The subjects are mostly of a technical nature, including treatment processes, water resources, chemical and physical technology, planning procedures, corrosion, testing of materials, construction, etc. Also, attention is given to the training of personnel, management problems, and financial aspects of water supply. The subjects, proposed by the corporate members (countries) of the IWSA. This mostly results in a large variety in subjects, giving something of a choice for everyone. In this sense, it is an advantage as it attracts a large audience with a broad interest.

As the Congresses have been devoted to broad subjects in water supply in lieu of specific technical themes, publicity to date has been rather minimal.

As Congress subjects are selected by the Technical and Scientific Council, which consists of representatives of the various

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\* Amsterdam 1949, Paris 1952, London 1955, Brussels 1958, Berlin 1961, Stockholm 1964, Barcelona 1966, Vienna 1969, New York 1972, Brighton 1974.



corporate members of the Council. The corporate members are national organizations that represent water supply interests in the member countries and take part in IWSA's activities. For the United States, it is the American Water Works Association. IWSA has also a number of standing committees. A standing committee is a permanent committee appointed by IWSA to consider a special subject. There are now about eight standing committees <sup>\*\*</sup>. During the Congresses, time is allotted, mostly an afternoon, to these standing committees to discuss topics within the scope of the committee's subject. So, for instance, during the Amsterdam Congress, the following three subjects will be discussed during the afternoon session of the Committee on Desalination:

1. Energy consumption of different desalination techniques in view of increasing energy costs, by J. Franquin, France.
2. Reverse osmosis for public drinking water supply and its use for desalination of brackish water and for treating heavily polluted rural waters, by D. Kuiper, The Netherlands.
3. Orange County Water Project, by Mr. David G. Argo, U.S.A.

The Amsterdam 1976 conference will initiate specialty sessions and group discussions where specialists can discuss in an informal way a specialized topic; e.g., sanitary and operational

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**\*\*** Committee on Pollution and Protection of Water Sources  
Committee on Corrosion and Protection of Underground Pipelines  
Committee on Water Quality and Treatment  
Committee on Water Distribution  
Committee on Public Relations  
Committee on Desalination  
Committee on Water Meters and Water Metering  
Committee on Education and Training of Waterworks Personnel

control by rapid bacteriological methods. In these sessions, the emphasis is on discussion in which only a short introduction is given by the convenor of the session.

Associated with the Congresses are international exhibitions organized by IWSA. The governing organization of the IWSA is the General Assembly consisting of all corporate members and an Executive Board, consisting of nine members and the President, Vice President, Past Presidents, and Secretary-General. The President is elected at the beginning of each Congress and nominated by the corporate member in whose country the Congress is being held. In 1972, during the New York Congress, Professor Merryfield was elected as President for the Period 1972-1974; he was succeeded by Mr. Leonard Millis of Great Britain who was elected in Brighton, 1974. For the day-to-day business, there is a Secretary-General, who at this moment is Mr. Fairall from Great Britain. The Vice President is charged with the organization of the coming Congress; he will then succeed the President. The three last Past Presidents are members of the Executive Board.

Apart from its Congress and Exhibition activities, IWSA publishes a quarterly journal, Aqua, which is sent to its corporate, associate, and individual members. The individual members are persons and the associate members are individual water undertakings who have mainly the same rights as the corporate members, except the right to vote in the General Assembly.

#### DEVELOPING COUNTRIES

I consider a developing country in relation to water supply to be a country where water supply as an organized system of

public utilities is in an early or very early stage of development. There can be various reasons for that. There may be no strong need for it for instance, or there may be a need, and in many cases this is so, but at the same time a lack of financial funds or a lack of development in the technical structure of a country. In this last-mentioned situation, usually there is no adequate technical education and training, not a sufficient number of lower, medium and higher technical staff, insufficient basic data about geological conditions, climate, hydrology, etc., and an underdevelopment of technical industry.

It requires a complex set of measures to bring a higher degree of development in which assistance by the industrial countries can be essential. However, most important are the dominant factors in the developing countries themselves, such as a stable government, good development planning, and the availability of a sufficient number of people trained to bear certain responsibilities.

Virtually from the beginning, it was realized by IWSA that most of the members were European or from Westernized countries. This has naturally stemmed from the circumstance that water supply in these countries has developed most. To overcome this difficulty, special attention is paid to developing countries. During the International Congresses, special afternoon sessions are devoted to water supply in developing countries. This has been the case for a long time. The programme is prepared by a special Committee for Developing Countries, in which these countries have a fair representation. International Agencies like the World Bank, the World Health Organization, and the International Reference Centre are also represented in the committee. They take special interest in the sessions on water supply problems in developing countries. During the Barcelona Congress in 1966, Mr. Harold Shipman of the World Bank was a

speaker and so was Mr. van Damme of the International Reference Centre during the New York Congress in 1972.

Dr. Dieterich of the World Health Organization will speak during the coming Congress in Amsterdam. Members of these agencies are also represented in the IWSA Committee on Developing Countries.

Although the sessions on Water Supply in Developing Countries have been successful in that they obtained qualified speakers and a good audience, unfortunately, but quite understandably, there has been a lack of attendance by people from the developing countries for which these sessions are meant. This reason is that quite often in these countries there is not a sufficiently developed national organization of water supply that can send delegates or participants to congresses abroad. Likewise, the developing countries are not sufficiently represented in the Board, Council, and Committees of the IWSA. As a result, they have practically no direct influence on the Congress programme as a whole. This works as a vicious circle. During the New York Congress, the representatives of the United States and The Netherlands in particular have pointed out this situation. As a result, the Executive Board of IWSA appointed a Committee on Membership Promotion of which Mr. Leonard, the Vice President, Mr. Eric Johnson, the Secretary-General, and myself were members; at a later moment, the committee was strengthened by Mr. Pierre Descroix of France.

The findings of the Committee have been essentially as follows: To remedy this situation, it is necessary, to extend IWSA's activities and to change, if necessary, its organization. The following programme should be gradually brought to action:

1. Special efforts to promote IWSA.
2. Issuing a Newsletter to improve contact between members.

3. Upgrading of Aqua.
4. Introducing regional Congresses.
5. Strengthened collaboration with international agencies; e.g. by assistance in regional seminars.
6. Adoption of the programme of Congresses in general to the needs of developing countries.
7. Spreading the membership of the Board, Technical and Scientific Council, Committees, etc., over more countries so that more world-wide representation is obtained.
8. Strengthening the secretariate to be able to do the extra work.

A first step that was taken was to change the status of the standing Committee on Developing Countries. This was decided by the Executive Board in 1975 during its meeting in Helsinki. Up till that time, the task of the standing committee was to prepare a congress session and make proposals to the Technical and Scientific Council. In its present position under the chairmanship of the Vice President, it reports directly to the Executive Board. Its task is to consider also policy matters in relation to the membership of developing countries. I would like to stress a few aspects and give my personal opinion on it.

The first question is: Is it worthwhile to change the IWSA into a more worldwide organization? My answer can be simple yes. The constitution of IWSA contains as an object the encouragement of communication and better understanding between men engaged in the public supply of water. The IWSA should pursue this object actively. Of course I realize that the problems in the field of water supply vary largely in the world. In some countries, drinking water is still obtained by walking to the river and filling a jar that has to be carried back home, which may take hours. In other countries, water is piped to every home, school

and hospital and because it is so easily obtained, consumers don't realize the value of good water for life. In some countries, water can be taken from rivers that are heavily loaded with sewage and industrial waste may involve intricate chemical processes and research. Sometimes, water is nearby at hand; in other cases, it has to be transported over hundreds of kilometers.

Although conditions vary so much, there is one thing in common: the task to supply good drinking water no matter how different conditions may be. This task brings us together. I believe that a world-wide cooperation will broaden the view of all of us. We are all subject to seeing our own problems only and sometimes to narrowing our view such that we overlook the obvious. We can learn from our experiences; so others can, too. If the industrialized countries want to give help and advice to the developing countries, then the IWSA is a good instrument to be used in the field of water supply. Conversely, the industrialized countries can benefit in many ways from the experiences in the developing countries. The instruments that IWSA can use to promote international collaboration, with a special emphasis on developing countries, are limited but not unimportant.

Regional Congresses, organized by or with help of IWSA could be very helpful, for instance. First of all, travelling distance is much smaller and enables many more people to come who do not have the funds to travel to other continents. Then the subjects chosen as topics for discussion can be tailored to the need of the region, so that the outcome of the congress is more effective. Thirdly, it helps to establish good relations between the water supply people in the region. A region can be considered to be any area of some size, comprising a number of countries. It can also be a continent. An example of a regional

conference of the kind I intend is the Regional Conference held in Mbabane in Swaziland, 2-5 June 1975, which conference was sponsored by the International Association for Water and Pollution Research, IAWPR. The theme was "Practical Aspects of Water Supply and Pollution Control in Southern Africa". The conference was attended by some 240 delegates. Subjects being discussed were very practical and related to day-by-day problems. For instance, the design and maintenance of latrines with a view to local climate and soil properties was a thoroughly treated subject. I don't think this could easily be accepted as a subject for an International Congress. Still, for the people concerned, it was of greater direct use than many International Congresses. Also, simple water treatment installations were discussed.

I would like to draw attention to another point of IWSA's programme: seminars. A seminar is a short course in which invited speakers teach or instruct on certain subjects to a number of selected participants.

In the week before the Amsterdam IWSA Congress, the International Reference Centre, with help of IWSA, will organize a seminar on "Community Water Supply in Developing Countries". A number of other international agencies will collaborate in organizing the seminar. The participants will be offered a possibility to attend IWSA's Congress in the following week. In this way, a larger attendance from developing countries to the Congress is promoted. The seminar is intended as a start-off for a series of regional and national training courses, as recommended by the Directors of Institutions collaborating with the International Reference Centre.

Also, participants of the International Courses in Sanitary Engineering held at the Technological University in Delft will take part in IWSA's Amsterdam Congress, many of them coming from developing countries.

In this way, an effort is being made to attract delegates to the IWSA Congresses and break through the vicious circle mentioned earlier.

IWSA itself, as I see it, should regionalize in its structure. To be active region-wise requires regional centres of activity. The areas, roughly speaking, might be North America including Canada and Mexico, South America, Asia and Australia, Africa and Europe. In these areas, regional Conferences could be organized and assistance given to regional seminars. For the activities within the region, a Vice President could be responsible. The Secretary-General can assist in the organization of the regional activities.

In this structure, developing countries could benefit more and at the same time, be more active in the IWSA. The formal distinction between industrial and developing countries in the organization would be replaced by a cooperation on an equal basis.

Finally, IWSA could operate as a means of communications, apart from the Congresses, between developing countries, industrialized countries, and agencies of the United Nations. This could be done as general information through a Newsletter and Aqua and also as specific information, e.g. answering questions that are being sent to the Secretariat. Also, IWSA could help in making available a list of qualified experts in water supply



who are willing to act as an adviser. Of course, the Secretariat would have to be equipped to act as a centre of relations in this sense.

It will depend on the will of the corporate members of IWSA if developments will take place along these lines. Experience has taught, unfortunately, that we cannot expect great progress in a short time. In my opinion, IWSA will have to promote this development in order to keep pace with the developments in the world as a whole.



*Technical Assistance in Water Supply Development*, by Somnuek Unakul, Regional Adviser in Environmental Health WHO/SEARO

#### INTRODUCTION

It is a well recognized fact that a safe and adequate water supply is vital to the health, and economic and social well-being of mankind, but it is unfortunate that the majority of the world population, especially in the rural areas of developing countries, is still deprived of this basic necessity. However, in the last two decades an encouraging development has been the growing awareness by governments of the problems and their magnitude, resulting in increasing concern, and mounting efforts to strengthen and expand community water supply programmes.

In 1972, the 25th World Health Assembly reviewed the world situation of community water supply and recommended new global targets for the Second United Nations Development Decade (1971-1980). This had set as a goal that 25 per cent of rural populations should have reasonable access to safe water, and the entire urban population should be served with piped water supply either by house connections or from public standposts. A survey conducted in 1975, in 67 countries through a questionnaire, revealed an encouraging improvement over the situation shown by a similar survey in 1970 in 91 countries. The percentage of coverage of rural population having access to reasonable water supply, had risen from 14 to 22 per cent. In the urban sector the achievement was less spectacular having gone up from 67 to 76 per cent only.

In order to cover the present unserved population and to prepare to serve the extra population due to foreseeable growth, concerted efforts are required to expand water supply develop-

ment, by national authorities as well as by international and bilateral agencies interested in assisting in this field. It is estimated that to achieve the revised target of 36 per cent coverage of rural population by the end of the current decade, as recommended by the 29th World Health Assembly, would cost around US \$ 6,500 million at 1975 price levels. A further US \$ 14,500 million would be needed to extend urban water supply to the revised target fixed for this sector, i.e. 68 per cent of urban population served by house connections and 23 per cent by public standposts. This gigantic task necessitates various actions, including a critical review of the organization and manpower, material and financial requirements of the present programme; unification or coordination between various national agencies engaged in community water supply; and mobilization of internal and external resources in order to quicken the pace of development of community water supplies to meet the increasing demands. A concerted effort at international cooperation is desirable to make maximum use of available resources.

#### INTERNATIONAL COOPERATION

Because of their vital importance to the social infra-structure necessary to sustain and advance the national economy, community water supply programmes have received attention in most of the bilateral and multilateral programmes of assistance to developing countries during the past two decades. With a view to avoiding duplication and making maximum use of the available resources, a constant exchange of information, documentation and experience, etc. between countries, bilateral and multilateral agencies and WHO has been developed over the years. Within the United Nations System, coordination at the policy level takes place in the Administrative Committee on Coordination (ACC), in addition to the normal direct consultation between

agencies. A programme which could be interfaced with those of other agencies has been encouraged.

An interesting recent development has been the establishment of an Ad Hoc Working Group on Rural Potable Water Supply and Sanitation consisting originally of seven agencies, namely, the United Nations Development Programme (UNDP), International Development Research Centre (IDRC), World Health Organization (WHO), United Nations Children's Fund (UNICEF), United Nations Environment Programme (UNEP), International Bank for Reconstruction and Development (IBRD) and the Organization for Economic Cooperation and Development (OECD). This Group held its first meeting in Montreal in April 1974. A further meeting was held in WHO/HQ in Geneva in November 1975 with representatives from several governments and other international and inter-governmental agencies to discuss the work of the Group and a proposal for the establishment of an international programme with the main objective of promoting and assisting the expansion and improvement of domestic water supplies and sanitation in the rural and metropolitan fringe areas of developing countries. Although there was no consensus on the proposal it was agreed that the Ad Hoc Group should continue to function and that further consideration would be given to the proposal a year later. It is to be hoped that the spirit of international cooperation will lead to a definite resolve for combined action in this field.

There have been many commendable achievements in the field of community water supply in developing countries as a result of bilateral and multilateral cooperation. The impressive, expanded programme of community water supply in Latin American countries was inspired by the establishment of general objectives in health for the decade beginning in 1962. An agreement, known

as the "Charter of Punta del Este", was signed by Chiefs of States of 19 Latin American countries in 1961. A target was set whereby each country aimed at supplying potable water to at least 70 per cent of its urban and 50 per cent of its rural population. The remarkable achievement made by the programme was due mainly to national efforts and internal resources, but mutual cooperation, including financial aid from international and bilateral lending agencies, helped to attain this success. Bilateral assistance, notably from the United States Agency for International Development (USAID), contributed significantly in initiating water supply and sanitation programmes in many developing countries in the late 1940's. Since then, there have been many more bilateral agencies, among them those from Australia, Canada, Federal Republic of Germany, Japan, Netherlands, Sweden and U.K., rendering assistance in this vital area. Some agencies have, however, gradually changed the emphasis of their technical assistance to economic aid and capital assistance.

WHO and other UN agencies started their intensive assistance in the 1950's and are still active in this field. Their roles and the approach, as well as the magnitude of their assistance, differ according to the needs at various levels of development and are directed by the policy of the agencies involved.

It is recognized that the slow progress in establishing community water supplies is due to the limited financial and manpower resources, and the political considerations and lack of interest of the governments concerned. Moreover, external assistance failed to fill the gaps in financial or technical resources and such assistance is still badly needed.

## TECHNICAL ASSISTANCE

In the past, the technical assistance given by the international agencies has been scattered and often piecemeal. This is understandable because, at the early stage of development, especially in the field of rural water supply, there was no set policy; an out-dated legal framework; lack of appropriate organizational structure; inadequate financing; absence of trained personnel; no data, and often a total lack of necessary supplies and equipment. With the experience gained over the years, however, several areas suitable for technical assistance have been identified. Some of these are listed below:

- Dissemination of technical information
- Development of information systems
- Manpower development - training, organization and management
- Sector studies and programme planning
- Preparation of pre-investment projects
- Implementation and evaluation of programmes
- Water quality management
- Research and development and its application in the field
- Indigenous manufacture of materials
- Demonstration or pilot projects
- Operation and maintenance

In most instances, financial assistance is intended essentially to relieve the government of the monetary burden. It may or may not be linked with technical assistance. On the other hand, the ultimate goals of technical assistance is to develop or improve the ability of governments to execute their own programme, that is, to develop an appropriate organizational structure, and technical, managerial and manufacturing capacity.

Although the type of assistance may vary from case to case, it generally consists of experts, fellowships, group educational activities such as seminars or workshops, research, and the provision of essential supplies and equipment.

Technical assistance is obtained, through an established channel of communication that is, the government makes a specific request to the prospective donor government or agency. In recent years, aid organizations have tended not to accept ad hoc or isolated projects but to review such requests in the light of the general socio-economic development and priorities of the country. With the current emphasis on urban fringe and rural development, community water supply is often considered as an integral part of such development programmes. The criteria and requirements of lending or donor agencies have also to be considered. Great care is therefore necessary in preparing a proposal in order to make it acceptable. Information which is generally needed by aid agencies for consideration of such proposals is not limited to the technical aspects alone but also take into account the questions of manpower, material and financial resources and their development as well as managerial capabilities. Necessary data have thus to be collected on the entire sphere of water supply development. The technical proposals for a typical community water supply project should include information on topics such as the period of project, population projections, present and projected water consumption, a study of water resources including ground water, the current status of community water supplies, an assessment of the existing system and the weakness, and the effect of water and sanitation on the state of health of the people. The other aspects which have to be studied in a project of this type are (1) economic, (2) organizational, (3) managerial, (4) financial, (5) commer-



cial, and (6) legal. It is desirable to include the proposals under different phases of development, short-term and long-term. Finally the external assistance needed for the implementation of the proposals must be assessed.

#### THE ROLE OF WHO

The major function of WHO is to provide services and technical collaboration to Member States in the field of health. These are rendered through its own regular budget and are supplemented by projects financed from extra budgetary resources. Since the "provision of safe and adequate water supply" is very much related to the improvement of the health and social well-being of the people, the Executive Board, the World Health Assembly and Regional Committees have through their successive resolutions continuously endorsed the emphasis being given by WHO to this area. The resolutions have constantly recommended Member States to give priority consideration to a safe and adequate water supply in their national plans and to make all possible efforts, including the mobilization of internal and external technical and financial resources, for increasing the programmes so as to achieve the national targets for the improvement of water supplies in both urban and rural areas recommended for the Second UN Development Decade. These resolutions have also requested the Director-General to continue to provide increasing technical collaboration at country level and to increase WHO's coordinating and catalytic role in order to encourage the international community to enhance its assistance to developing countries.

WHO's Headquarters in Geneva provide the policy, guidance and coordination. The work itself is carried out through its six Regional Offices and a network of country representatives and field staff. Close collaboration has also been established

with country representatives of other United Nations, multilateral and bilateral agencies in the field of health, including community water supply. The process of programming begins at country level where the authorities identify their priority areas for assistance in the context of their national development plan. The Regional Office finalizes the proposals received from countries and consolidates them into a programme and budget document according to the set priority and criteria. This is submitted to the Regional Committee for consideration and approval being sent to HQ for final approval by the Executive Board and the World Health Assembly.

In addition, WHO has established an International Reference Centre for Community Water Supply with a number of collaborating institutions throughout the world. This network has been designed to facilitate the collection and transfer of information, pilot studies and demonstrations, preparation of training manuals and guidelines, and training programmes in the field of community water supply.

The types of assistance given by WHO at country level are related to specific needs and are given on request of governments. The projects range in complexity, magnitude and variety from a simple rural water supply and sanitation project to a sophisticated one on urban water supply and sewerage. The assistance covers practically the entire field of community water supply, that is, evaluation, formulation and implementation of the programme, including manpower planning and development; promotion of applied research and developmental studies aimed at the adaption of existing technology to maximize available resources; and the transfer of technical and scientific information.

Traditionally, the technical assistance provided by WHO to Member Governments on rural water supply and sanitation projects has been closely associated with financial and material aid given by UNICEF for the same purpose. Through financial support from UNDP, WHO acts as executing agency for a number of community water supply and waste disposal projects. Many of these are for pre-investment planning and manpower development. There are indications that WHO will similarly be designated by some bilateral organizations as executing agency for water supply projects proposed to be assisted by them. WHO has also collaborated closely with international and regional lending agencies. Collaboration with IBRD was further strengthened in 1971 when arrangements were concluded for a formal WHO/IBRD Cooperative Programme which aims at providing assistance in the following activities in the field of water supply and waste disposal: formulating sector programmes and policies; identify and preparing investment projects; identifying and preparing proposals for pre-investment studies and other projects; and supervision of on-going projects. Because of its limited resources, WHO has a special responsibility to channel its assistance to Member Countries to selective, catalytic activities so as to create the maximum impact and generate a climate for planning and development of services which will ensure the maximum benefit to the country and the people.

In recent years, WHO has placed more emphasis on sector surveys and carries out country-wide technical and organizational studies of water supply and waste disposal facilities from which constraints and priorities can be identified. These studies provide the basis for making policy decisions and plans which are suited to the available resources and also help to determine the need for external assistance. WHO also gives

emphasis to pre-investment planning on water and waste disposal projects of high priority and assists in preparing project documents capable of attracting external assistance.

In every WHO-assisted project, special attention is being given to the establishment or strengthening of the institutions necessary for the proper planning, operation and management of community water supplies; to the development of this facility in rural and urban fringe areas, and to the integration of this activity with the rural and urban development programme where it is feasible.

In the South-East Asia Region, WHO has been providing technical assistance to Member Governments in the field of community water supply since 1956. The emphasis in the beginning was on the training of personnel, and on demonstration and pilot projects. It has, however, gradually shifted to the building of institutions, manpower development and planning, according to the needs of the countries.

Currently, the emphasis is on: collaboration with national expertise to improve their planning and managerial capabilities; development of the whole sector; increasing the rate of programme delivery by the identification of problems, setting up targets and priorities, identifying and preparing proposals for investment projects and by developing appropriate plans of action. This includes, among other things, the mobilization of manpower and resources, applied research and development and its application in the field. Special emphasis is also laid on assisting the governments in developing an information system and in securing maximum efficiency in the development of available resources, both national and international.

## CONCLUSIONS

To provide a safe and adequate water supply to the population not having this facility at present, and to cope with the steadily increasing demand of the rapidly growing population both in urban and rural areas, calls for urgent action by the national authorities to mobilize their internal technical and financial resources to increase the development of water supplies. A realistic approach must be evolved to suit the prevailing socio-economic condition of the country. It is equally incumbent on the part of the international and bilateral agencies to review their programme of assistance in order to both increase their input and to ensure that this input is applied in the most productive ways. It is necessary to improve the planning, technical and managerial capabilities within the country and for this purpose some steps will have to be taken to review the programmes. Such a review should identify the problems and constraints, set up targets and priorities, and develop appropriate plans of action for the execution of the programmes. Proper planning, project review and formulation will improve the prospects of attracting more political and financial support, not only from internal sources but also from international and bilateral sources as well. Nevertheless, it remains the sole responsibility of governments to implement their national community water supply programmes, the successful implementation of which will depend entirely on a determined effort, a dynamic policy and a forward looking political consideration in each country.



*Water Supply Finance, Sources, Channels*

by Harold Shipman, The Senior Sanitary Engineer, World Bank  
(The opinions expressed in this paper are those of the author  
and are not necessarily those of the World Bank)

Water supply officials working in the developing countries frequently are unable to know what sources of funds and technical assistance may be available to them, how they can get information, and what channels may be used. Similarly, they may not know of the range of resources which may be available to them for assistance in the solution of certain problems. In the following paragraphs a partial, but incomplete, presentation of information is given on various aspects of this subject which may help to orient those who desire such information. While an effort has been made to make the information as comprehensive as possible, there will undoubtedly be omissions. The statements on sources, channels, procedures and arrangements have been prepared from the author's personal experiences and understanding and are believed to be accurate. However, in some instances these may be wrong; in others they may have been correct at one time but recent changes may make them no longer valid. The various agencies should therefore be contacted directly by those who need detailed information and wish to request assistance. The views and statements in this paper are those of the author's and do not necessarily reflect those of the various agencies mentioned including the World Bank.

TYPES AND SOURCES OF EXTERNAL ASSISTANCE FOR PLANNING, PROJECT DEVELOPMENT, CONSTRUCTION, OPERATION AND MANAGEMENT

The following list shows activities which usually require funds beyond those normally included in the operating budgets of water agencies or which frequently need inputs which would

permit more extensive and thorough preparations than possible when only existing staff is employed. Only external sources of assistance are shown; it is being assumed that water supply officials will be familiar with local resources.

TABLE I

<u>Type of Activity</u>	<u>Sources of Assistance</u>
Planning, Programming, Analysis	WHO/IBRD Cooperative Programme, Bilateral Agencies
Sector Studies	WHO/IBRD Cooperative Programme, Bilateral Agencies
Engineering & Feasibility Studies	UNDP/WHO, IBRD, IADB, AFDB, ASDB, OECD, Bilateral Agencies
Project Financing	IBRD, IADB, ASDB, AFDB, OECD, Bilateral Agencies, Private
Financing of small equipment items and assistance for rural and fringe areas	UNICEF
Organization & Management Studies	UNDP/WHO, IBRD, IADB, ASDB, AFDB, Bilateral Agencies, Private
Economic & Financial Studies	WHO/IBRD Cooperative Programme, IBRD, IADB, ASDB, AFDB, Bilateral Agencies, Private



Manpower Development & Training	WHO, ILO, IBRD, IADB, ASDB, AFDB, OECD, Bilateral Agencies, Private
Special Studies & Testing: water quality, hydraulic, hydrogeologic, soils, chemical, biological, materials, leak detection, metering, rates, meteorologic, etc.	UNDP/WHO, IBRD, IADB, ASDB, UN, WMO, Bilateral Agencies, Private
Water Resource Studies & Planning	UNDP, UNCRET, WMO, FAO, WHO, IAEA, UNESCO, IBRD, & Regional Banks, Bilateral Agencies

CHARACTERISTICS OF ASSISTANCE BY TYPES OF AGENCIES

A. World and Regional Banks - (IBRD, IADB, ASDB, AFDB)

The assistance provided by these Banks is primarily through loans. The regional Banks serve those countries which are within their region and are members. Where these Banks are shown as sources of assistance in Table I, such assistance is normally provided through funds included in project loans and which will have to be repaid with interest over the period of the loan. Some of these Banks have arrangements for making small loans for project development and engineering. In a few situations, grant funds for project development may be made available but folded into the loan later, if one is made. Loans for water projects by each of the Banks are made following an appraisal which is based on preliminary or final engineering and feasibility status. Organization, management, financial performance, technical approaches and economic aspects are included in the appraisals.

A period of three to six months is normally required following appraisal to process the loans. Enquires on suitability of projects on specific questions concerning criteria and requirement can be addressed directly to the Banks' water supply staff or can be channeled through Ministries of Finance.

Multilateral Agencies of the UN System - UNDP, WHO, UNCRET, UNICEF, ILO, FAO, WMO, IAEA, UNESCO, UNIDO

Specific information on addresses and areas of competence for each of the specialized agencies of the UN system will be available in the office of the UN Resident Representative usually located in the capital city of most countries.

Those agencies which are most active in the fields of public water supply are described in the following paragraphs:

B. UNDP - (United Nations Development Programme)

UNDP provides funds to assist countries in the development of high priority projects and to make studies considered as important to the countries' development. Each country is given national allotment of funds for a period of time for planning purposes, referred to as an IPF (Indicative Planning Figure) within which the country can prepare projects. Water project studies have to be assigned a priority sufficiently high to compete with other requests for the scarce funds. The Planning Agency or other designated office of the Government, working with the local representatives of the UN (UN Resident Representative), carries the responsibility for deciding how the UNDP fund will be assigned. Water supply officials can obtain information on project possibilities from the local UN office. WHO can help prepare requests to UNDP for project assistance if the Government and the UN Resident Representative give encouragement.

UNDP funds are almost always supplemented by contributions of funds, office space, local personnel costs, etc. provided by the host government or its water agency.

#### WHO/IBRD COOPERATIVE PROGRAMME

This programme is jointly financed by WHO and IBRD and responds to requests from countries desiring assistance in resolving problems associated with water supply. The programme to date has concentrated on helping countries to carry out sector studies in the field of water and wastes. These studies analyze the existing situation with respect to number of people currently served, analyze governmental targets or propose targets for consideration, define the principal problems and constraints, and suggest actions which the Government can consider for implementation. The report can serve as a basic document for planning and project development. Follow-up assistance both by WHO country and regional staff, and by staff of the Cooperative Programme Unit in Geneva, Switzerland can be arranged. It is possible to request assistance on special problems on which the water agency may wish consultation.

Assistance provided by the Cooperative Programme staff is at no expense to the Government except for national staff designed to work with the Cooperative Programme Staff; and for local arrangements of transport and office space. Requests for assistance can be directed to the local WHO engineer if one is present; to the WHO regional office serving the country; to the P.I.P. unit of WHO Headquarters in Geneva; or to the World Bank, Washington, D.C.

The Regional Banks take part in, or are consulted on all sector study work carried out by the Cooperative Programme in countries

which are members of the regional bank concerned.

#### WHO

WHO has its headquarters in Geneva, Switzerland and has regional offices in Washington, D.C. (Latin America), Copenhagen (Europe), Brazzaville (Africa), Alexandria (Eastern Mediterranean), New Delhi (South Asia) and Manila (Western Pacific). Each of these offices has sanitary engineers whose responsibilities include assistance to the member government in the field of water supply. In a number of countries, WHO has country engineers working on various aspects of water supply.

WHO normally acts as the executing agency on projects financed by UNDP. It assists countries to develop requests to UNDP for preliminary project financing, and if approved by UNDP, in consultation with Government employs consultants to carry out the studies. On studies which may result in projects requiring finance, if the country so indicates and if IBRD agrees, the latter Bank may express special interest in the studies and follow them to completion at which time it may consider lending for construction. The Regional Banks may, if they so elect, follow a somewhat similar pattern.

WHO may be approached for assistance on all technical aspects of water supply operation. Assistance requiring the employment and assignment of an engineer or other specialist to the country will require a request from Government to WHO, and the latter will likely have to place the request in its planning budget for consideration along with other requirements. Assuming approval, a period of up to three years may be required before the specialist is available. Short-term assistance can frequently be arranged within fairly short time either out of regional re-

sources or from the Cooperative Programme as noted previously.

UNICEF

UNICEF assistance in water supply is directed to the improvement of health and social conditions for children and families in rural areas or fringe areas of urban communities where simple technologies common to rural areas may be employed.

UNICEF assistance is given in the form of equipment and materials, consultation in the planning of the programme, provision of project staff and funds, principally for the training of national personnel. The support from UNICEF is reinforced by technical advice from WHO and other UN agencies, which may also participate in the financing and other phase of the programming. In many instances, assistance of bilateral and non-governmental organizations is also included in or supplements UNICEF assistance.

Request for information can be directed to the nearest UNICEF office for the attention of the local representative.

UNCRET (UN CENTRE FOR RESOURCES, ENERGY AND TRANSPORT - NEW YORK)

UNCRET carries out work usually financed by UNDP on broad water resources matters. It has conducted groundwater and hydrogeological studies, advised on resource organization and planning, and assisted on matters concerning water law. It currently functions as the Secretariat for the 1977 World Water Conference.

FAO - (FOOD AND AGRICULTURAL ORGANIZATION - ROME, ITALY)

FAO is concerned with aspects of water related to agricultural use. Because of the opportunities to assist rural people with water supply as part of water irrigation schemes, and because

of the inclusion of rural water in many rural development schemes, FAO is a source of assistance. It works closely with WHO in the consideration of facilities suited to human needs.

WMO - (WORLD METEOROLOGICAL ORGANIZATION, GENEVA, SWITZERLAND)

WMO provides assistance in the fields of meteorological and hydrological data collection and evaluation.

UNESCO - (UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION - PARIS, FRANCE)

UNESCO, in addition to being concerned with general education works closely with WHO in educational matters concerned with Sanitary Engineers within the framework of university and professional engineering school curricula and development. UNESCO also is involved in water supply through its research and study activities outside the operations side of public water systems.

ILO - (INTERNATIONAL LABOUR ORGANIZATION - GENEVA, SWITZERLAND)

ILO is able to assist in the development of training programmes for various categories of water works personnel at the sub-professional level.

IAEA - (INTERNATIONAL ATOMIC ENERGY AGENCY - VIENNA, AUSTRIA)

IAEA can contribute to studies of surface and groundwater where radioactive tracers may prove useful. IAEA would also be a source of assistance in instances where combined nuclear power and desalination plants are being considered.

UNIDO - (UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION -  
GENEVA, SWITZERLAND)

UNIDO is primarily concerned with industrial water supply, and particularly for industries which may not have access to public supplies.

UNEP - (UNITED NATIONS ENVIRONMENT PROGRAMME - NAIROBI,  
KENYA)

UNEP is concerned with those aspects of water supply which concern the environment. Where environmental assessment of the impact of projects may be needed, assistance can be requested.

BILATERAL AGENCIES

Many countries have established agencies through which funds are channeled to assist other countries on a wide range of activities. Over the past 20 years and longer, sums of money and many man years of technical assistance have been provided by these agencies for various activities in the field of water supply. Such assistance has ranged from a few weeks of highly specialized consultations on local technical problems to the financing of all engineering and construction of sizable water systems. Such assistance may take the form of loans or grants. It may be through the supply of one or two experts for a brief period or it may be from consultants who prepare master plans and first step engineering designs. No two agencies will likely be found to have identical requirements nor will the procedure and time required to act on requests be found similar. The place for information on resources available is the local embassies of the various countries. Ministries of State or Finance will likely be the official channel for submission of formal requests. Among the bilaterals which have been active in offering assist-

ance in water supply can be mentioned the following: US AID (USA), SIDA (Swedish), CIDA (Canada), ODM (British), KFW (German), France, Switzerland, Netherlands, Australia and Japan.

#### PRIVATE SOURCES

Several different kinds of assistance can be noted as available from private sources and each is rather specific to the source. A few of these sources are as follows:

Private Banks - A fair number of water supply loans have been made by private banks over the past years. In some cases this has been through direct loans and in others purchase of national bonds the proceeds of which were used for water supply construction. While not a major source of funding at present, this resource should not be overlooked by those water agencies which are operating on a sound utility basis and where past performance gives assurance that the entity will be able to meet the debt service on loans. Unfortunately, few organizations are currently able to demonstrate this capability to the extent that private banks require.

Suppliers' Credits - A major source of financing for particular items of equipment is suppliers' credit. Such credits are usually fairly short-term - 8 to 12 years, and frequently carry high interest charges. The credits cover only the particular contract. Water agencies commonly ask bidders on equipment to submit proposals on financing as well, and at the time of bid evaluation the terms of the credit are compared together with the other evaluations. A number of problems can be encountered in this approach among which is that of the bidder who submits the best price for the best equipment but who is unwilling or unable to arrange the financing.



## PRIVATE SOURCES OF TECHNICAL ASSISTANCE

Universities engaged in research, foundations, churches, semi-private technological groups and a number of retired executives' organizations are possible sources of assistance on certain local problems. Assistance from these sources may be at no cost, at cost or something in between. Retired Executives' Organizations in Canada and the U.S.A., for example, are able to provide the services of water supply people with years of experiences in nearly every type of activity encountered. Such assistance is provided under an arrangement whereby the individual receives no salary but the country receiving him has to pay the costs of transportation and local living. The local embassies of various countries should have information on addresses and arrangements. If not, they can advise on where to write for such information. Certain foundations and some semi-private agencies such as the International Technology Group in U.K. have contributed varying amounts of assistance in the field of water supply. The Rockefeller Foundation is known to have financed a number of projects having demonstration or stimulation aspects which contributed to country's approaches to their problems. Those such as the International Technology Group have been concerned with finding technical solutions to problems which avoid undue sophistication but rest above the more primitive methods. These and others exist in various countries and may be known to agencies such as WHO, UNESCO, IBRD and the commercial attaches of embassies.

## SUMMARY

It is apparent that many sources of assistance, technical and financial, are available to developing countries. One common problem in arranging whatever type of assistance as is desired, is the time element. The need for advance planning and schedul-

ing, and the ability to anticipate needs well in advance is the best way to avoid problems of delayed help and delayed projects. Obviously, the more countries can train their own specialists, and the better the performance of the water supply organizations, the less the reliance that needs to be placed on external assistance. At least for financing, it can be said that the better the organization and its performance, the easier it is to obtain the funds. As time goes on, better organizations can look forward to selling their own bonds to their own nationals. Sound utilities have historically been places for sound investment. Unfortunately, too few such utilities currently exist in the developing countries. The goal is to reach that point as rapidly as possible.

*International Cooperation in Community Water Supply Development in the Developing Countries with Special Reference to Tanzania Rural Water Supply Programme, by F.K. Lwegarulila*

In general, most of the population in the developing countries live in the rural areas. In Tanzania, for instance, the rural population accounts for more than 20 per cent of the total population.

The rural areas, apart from sustaining the biggest portion of the population of these countries, are the source of the largest contribution to the national economy. Thus the development of their rural areas is synonymous with the development of these countries.

Water for domestic consumption is absolutely necessary for sustaining life, without water no human life is possible for a long time. Thus in referring to community water supply we shall be confining ourselves to the water supplies for the rural communities necessary for human and for stock use. In the developing countries, rural water supply is integrally tied up with rural development. We cannot think of rural development without solving the rural water supply problem.

THE MAGNITUDE OF THE PROBLEM

In order to get the facts correct it is better to take a practical and concrete example. Throughout this paper I shall refer to Tanzania as a typical case, partly because I am familiar with the conditions there and above all because Tanzania is one of the few developing countries which is laying strong emphasis on the provision of water to the rural areas. The objective of the rural water supply programme in Tanzania is to provide water to the rural areas so that everyone will have ease of access to a

public domestic water point by 1991, the immediate objective being to provide a source of clean, potable and dependable water to every village in rural areas by 1980. What does this imply?

In 1971 the population of Tanzania was estimated at 13,000,000; in 1976 it is 15,000,000 and by 1991 the rural population is expected to be 22,000,000. The annual rate of provision of water to the rural areas in Tanzania has been as follows:

Period	People served per annum
1948 - 1964	40,000
1964 - 1971	114,000
1971 - 1973	300,000
1973 - 1975	400,000

The rate of population growth in the rural areas is roughly 2.7 per cent and is likely to continue in this way to the turn of the century. By providing water at the rate of 300,000 people per annum, 7,410,000 people will have been provided with water by 1991 leaving 14,700,000 without improved water supply. Thus the rate of provision of water has to be stepped up considerably. By providing water to 1,219,000 people every year from 1976 everyone in the rural areas will have been provided with water by easy access to a domestic water point by 1991. This means that efforts of providing water made during the period 1971 - 1973 must be increased four times in order to achieve the objectives outlined earlier. Taking an average of sh. 200/= per capita as the construction cost for the rural water supplies, the work done during 1971 - 1973 at the rate of 300,000 annually works out to be shs. 60,000,000/= per annum. In case of providing water to 1,219,000 per annum the annual amount of funds required is shs. 244,800,000/=. To this sum must be added

20 per cent required for investigation and 5 per cent for operation and maintenance and allowing for escalation in cost the average expenditure on rural water supplies works out to be shs. 400,000,000/= per annum. This is a high figure for a country like Tanzania to spend on its rural water sector which has to compete with other sectors of equal if not greater entitlement to the scarce available financial resources of the country.

Apart from the financial problems there are other bottlenecks such as lack of trained manpower required for the surveys, investigations, designs, construction, operation and maintenance of water supply projects. All these phases of water supply schemes require the services of specialized staff and only a few of these are available in Tanzania at present.

Although Tanzania has enormous water resources potential this water is not evenly distributed over the country; hence considerable efforts have to be made to find an economic water source for a given village, particularly those located far from surface water sources. However, work done to date indicates that ground water may turn out to be the most economic source of water for many villages in rural areas. The problem lies in the location and tapping of these underground reservoirs and this requires considerable expertise in the fields of geology, hydrogeology and hydrology of which Tanzania is in short.

In the field of construction: engineers, drillers, mechanics and plant operators are required to construct the water supply projects. Finally, and the most important phase of the water supply project, is the operation and maintenance of the water supply system. The type and the number of staff required will depend upon the complex nature of the water supply system. This may be in the form of a single pump attendant to operate a

water supply system for a small village, to a full complement of staff including engineers, chemists and mechanics, required to operate and maintain a water supply scheme supplying a larger number of villages such as Makonde Water Supply system covering an area inhabited by over 300,000 people. As more and more projects are constructed, the operation and maintenance problems increase. This calls for rapid increase in the funds and the number of staff required for the efficient operation and maintenance of the water supply systems.

The above synopsis has thrown light on the magnitude of the problem facing a developing country like Tanzania when setting itself on the path of providing water to the entire rural population with a specified period of time. The problems to be overcome include: finance, trained manpower, lack of proper equipment and shortage of relevant data to be used in the preparation of rural water supply projects.

It is true that Tanzania has devoted considerable amount of its own resources towards execution of the rural water supply projects. It must be admitted that the problems are such that outside assistance via bilateral and international cooperation is necessary to enable Tanzania to tackle the problem effectively. The response by the countries approached by Tanzania to assist in the execution of rural water supply programme has been encouraging. Such cooperation has been in the form of assistance with respect to manpower, finance and training.

#### TRAINED MANPOWER

Due to the pressing need of having to expedite the provision of water to the rural areas and due to the acute shortage of trained manpower in Tanzania to cope up with the tempo of work,

Tanzania had to rely on assistance from outside to strengthen its own manpower forces to enable it to carry out the programme. In all cases, staff from outside have been seconded to work with the Tanzania agency responsible for the execution of the rural water supply. While serving in Tanzania such staff carry out their duties alongside their Tanzanian counterparts and are identified as the employees of the Tanzanian Government. There are three distinct terms of secondment under which Tanzania has been cooperating with other countries sending staff to serve in Tanzania.

- The assisting country helps Tanzania to identify the suitable candidate and seconds the candidate to Tanzania which meets the whole expenditure including travel expenses.
- The country assisting Tanzania helps in the selection and the recommendation of the candidate to fill the post as required.

The salary as payable to a Tanzanian of similar status as per scheme of service is paid by Tanzania and the country seconding the officer to Tanzania tops up the salary in form of an expatriation allowance.

- The country assisting Tanzania helps to identify the candidates and for those eventually seconded to Tanzania the assisting country pays the entire remuneration of the seconded staff. Tanzania undertakes to provide free housing.

Most of the staff seconded to Tanzania under bilateral cooperation fall into the above three categories. Apart from staff recruited as experts there are other staff recruited as volunteers, normally young in age who are paid wholly by the country of origin and sent to Tanzania to carry out technical work which does not call for the services of a fully fledged expert.

There have been some problems associated with staff recruited under the above arrangement. One has been the time constraint on the period imposed on such a staff. The maximum period has been five years, other countries go as far as to limit the stay of the expert to three years or simply one contract tour of two years! It must be conceded that once an expert comes to a new country he takes time to acclimatize himself, get a house and become familiar with the working system of the new set-up he has joined. Such a gestation period may amount to six months. Similarly, before his period of stay comes to an end a good six months are required to sort out things such as selling his car, arranging for a new job, etc. It can be seen that at least one year of his residential service in Tanzania is not fully productive relative to the remaining period. Thus for a maximum period of five years, four years may be taken as fully productive. Worse still, by the time such an expert has settled down fully in his work and starts to operate at his full capacity his maximum tour comes to an end. When Tanzania is anxious to keep this post filled and has no local replacement, a new expert is recruited to take the place of the outgoing one and the process of acclimatization begins again leading to another loss of one year! In most cases, experts have carried out their work satisfactorily. However, there are few instances where some have failed to measure up to expectation and their period of stay has had to be shortened.

In spite of the above set-backs, the services rendered by this type of staff has enabled Tanzania to execute its programme of rural water supplies steadily.

The following countries have assisted Tanzania in providing both experts and volunteers under the terms stated earlier: Sweden, Federal Republic of Germany, Canada and the Netherlands.



The following countries have provided experts to Tanzania under the above terms: Finland, Norway, U.S.A., Denmark, Yugoslavia, Hungary, Czechoslovakia, Democratic Republic of Germany, India, Pakistan, Egypt, United Kingdom, Bulgaria, Japan. This is a good example of bilateral cooperation.

Borrowing of staff from outside can only be taken as a temporary measure, to enable Tanzania during this interim period to carry out its immediate work. In the long term the bulk of the work has to be carried out by the Tanzanians themselves. Hence the long term solution to ensure continuous water supplies to the rural area is to train Tanzanian nationals to carry out these duties. In this context, the staff seconded from other countries have not only helped in the project preparation, construction and maintenance of water supplies but in the process of carrying out these duties have been able to impart experience to their Tanzanian counterparts.

#### TRAINING

In order to cope with the critical shortage of trained manpower, priority has been placed on training at all levels. This has been a sector which has attracted a considerable amount of international and bilateral assistance. The conventional assistance has been for a donor country to offer scholarships to Tanzania for prospective candidates to take up studies in the donor countries' institutions of learning. Many of the scholarships offered have been for post-graduate courses in the appropriate field of studies. Other donors have offered scholarships to cover for the undergraduate courses as well. This type of combination of graduate and undergraduate scholarships offered by many friendly countries have helped Tanzania to produce some of its professional and technical staff. Tanzanian students

were awarded scholarships and went to study in the following countries offering these scholarships: Sweden, Federal Republic of Germany, India, Hungary, U.S.A. and the U.S.S.R.

Training on the job: This type of training is basically informal and most of the staff recruited to come and assist Tanzania in carrying out its work are expected to train their Tanzanian counterparts by imparting to them knowledge and experience while working together. Looked at from this angle countries and agencies who have seconded their staff to Tanzania have contributed much in this type of informal training.

Formal Training: Apart from donating scholarships to go to the donor's country to pursue the relevant courses and be trained there, some countries have assisted Tanzania in setting up training facilities in Tanzania. Sweden had helped Tanzania in setting up the Dar-es-Salaam Water Resources Institute. This Institute runs a three-year course in the field of civil engineering, hydrology and hydrogeology and produces senior water technicians, badly needed in the field of water development. The Institute's plan includes research work in connection with water resources development. The Federal Republic of Germany has assisted Tanzania in setting up the Faculty of Engineering at the University of Dar-es-Salaam.

China sent two drill rigs and instructors to train Tanzanian drillers. Forty trainees are following a four-year drilling course under this programme.

Tri-country training arrangement: This is a new type that has been found convenient and is being tried by the cooperation between Sweden, Tanzania and India. In order to overcome the language difficulties Sweden and Tanzania agreed to send

Tanzanian students to a country where the medium of instruction at the University is English. This would eliminate a delay of at least a year to be spent in learning the Swedish language if the students were to go to Sweden. India agreed to provide the required places at Roorkee University and in 1975 Tanzania sent 129 students to the University of Roorkee, India, for a four-year Water Resources degree course. Sweden is meeting all the expenses for the training of these students. This year a batch of 30 students has been sent to Roorkee under similar arrangements.

#### COOPERATION IN FINANCING OF RURAL WATER SUPPLY PROJECTS:

Normally finances are sought for specific projects. Each project is identified, designed and its economic viability ascertained prior to finance being raised. The provision of water to the rural areas poses a slightly different problem and requires special treatment. There are numerous villages scattered all over Tanzania. Every one of these villages needs water at least for domestic use. Several villages can be supplied from one water supply system and this may form a project. On the other hand one village may be served by an independent water system. Thus with rural water supplies we encounter numerous projects of different sizes and magnitude. This variation is also to be found in the sources used to provide water to these villages. Thus financing of rural water supply projects should be done preferably on a programme basis allowing flexibility of financing on project basis where and when called for. Participation of some countries in the Tanzania Water Supply Projects has been on the project basis: for example, cooperation with the Federal Republic of Germany, under which "Handeni Trunk Main", a water supply project to provide water to over 120,000 people

in Handeni District, is being implemented; and with the Netherlands to construct 700 wells in Shinyanga Region. These are typical examples.

#### PROGRAMME FINANCING

The unique feature has been the Swedish/Tanzanian cooperation in the provision of water to the rural areas. From 1965 to date the cooperation between Tanzania and Sweden in this field has been a continuous process of providing water to the rural areas on a programme basis rather than on project basis. The funds provide by Sweden were not tied to a specific project but tied to the rural water supply programme. This covered funds required for investigation, design and construction of water schemes, purchase of equipment, vehicles and improvement of water supply facilities such as offices and workshops used for the furtherance of the objectives of the rural water supply projects. With such an arrangement Tanzania was able to make rapid progress in supplying water to the rural areas.

#### COOPERATION THROUGH OFFERING SERVICES

Instead of providing funds for a particular project the donor country enters a special arrangement to provide services required in the execution of the project. This applies mainly to studies such as feasibility studies or surveys and investigation. Such studies are carried out under technical assistance or on a grant basis. The donor country, in consultation with Tanzania, appoints an executing agency, normally a consultant firm which carries out the study. Tanzania provides local supporting services. Below are examples of the countries that have adopted this procedure while participating in the Tanzania rural water supply programme.

Participation by the Federal Republic of China in the Tanzanian rural water supply programme is a typical example. At the request of Tanzania, China sent experts and technicians to participate in the construction of rural water projects. Under this arrangement China assisted Tanzania in the construction of 21 rural water supply projects in Ruvuma, Mtwara and Lindi Regions. The projects were mainly pipelines with pumping equipment and storage tanks. Under similar arrangements China assisted Tanzania in the construction of 26 water projects in the Kondia District of Dodoma Region. The sources for all these 26 projects are boreholes drilled under this type of bilateral cooperation is the preparation of the Water Master Plan of Tanzania whose execution is in progress.

#### WATER MASTER PLAN FOR TANZANIA

Realising the vast amount of work that lies in the provision of water to the entire rural community, the most important factor which led to the urgency of formulating the Water Master Plan was the collection of sufficient data on the water resources of the country and its distribution to enable its equitable apportioning to the potential consumers in accordance with the priority ranking of their respective demands. So far as the rural water supply projects were concerned, it was absolutely necessary to carry out this exercise to be able to identify and locate water sources from which different villages could economically be provided with water. This exercise entails knowing the location of water reservoirs both on the surface and underground so that in selecting a source for a particular village both ground and surface sources should be compared and the most economical source selected. The Water Master Plan requires highly trained staff in hydrology, hydrogeology, chemistry, drilling and economics. Moreover, it requires considerable

financial outlay for its execution.

The cost for carrying out the Water Master Plan in Tanzania is estimated at shs. 200,000,000. Tanzania found itself deficient both in the required number of staff and funds to enable the work to be done by Tanzania alone. Hence it was decided to appeal to friendly countries for assistance in the preparation of this Water Master Plan. To facilitate finance by different participating countries it was decided to prepare the plan in parts as Regional Water Master Plans, which could later be synthesized into one Water Master Plan for the entire country. For convenience of administration, the regions coincided with the administrative regions rather than the hydrological basins, although the latter would have been more appropriate from the physical and hydrological point of view.

The response to the appeal was very encouraging. The following table gives the name of the region and the country assisting Tanzania to carry out a Water Master Plan for the region:

<u>Region</u>	<u>Assisting country</u>
Mara	Sweden
Mwanza	Sweden
West Lake	Sweden
Shinyanga	Netherlands
Morogoro	Netherlands
Kilimanjaro	Japan
Tanga	Federal Republic of Germany
Coast	Canada
Dar-es-Salaam	Canada
Lindi	Finland
Mtwara	Finland

Dodoma Region Water Master Plan has been prepared with Tanzania's own resources. Discussions are going on to enable prospective countries and agencies to assist Tanzania in carrying out the Water Master Plans for the following remaining regions: Ruvuma, Iringa, Mbeya, Kigoma, Tabora and Arusha. A considerable part of the Water Master Plan for the Singida region will have been done when the present drilling and hydrogeological investigation with Australian assistance come to an end. Under this programme Australia has placed two modern fast drilling rigs in Singida with drilling supervisors, geologists and hydrogeologists to assist in carrying out the drilling programme there. At the same time, the Australian team will be collecting hydrogeological data and training their Tanzania counterparts to take over the operation once they leave. Originally the programme was estimated to take two years. Indications are that the programme may be extended for a further period to be agreed by the two governments.

For one year UNDP assisted in the coordination of the different groups carrying out the Regional Water Master Plans. This work is now being carried out by the Project Preparation Division of the Ministry. The data being collected and compiled will form a monumental document that will be a firm foundation on which orderly exploitation of Tanzanian water resources will be based.

As mentioned earlier, the cost estimate for the entire country Water Master Plan is shs. 200,000,000, 80 per cent of which will be covered by bilateral assistance, i.e., technical assistance.

The above summarizes the way Tanzania has been able to cope with the planning and execution of rural water supply projects

under international cooperation. Without such a cooperation, the achievement gained in this field would have been impossible. Of special significance has been the example set by Sweden, not only in the volume of funds made available to Tanzania for the rural water supply projects, but in the principle of providing the funds on a programme rather than on project basis. This has enabled Tanzania to prepare projects on a country-wide basis, executing at least a project in each and every region which is consistent with the political and social aspirations of the people of Tanzania. Funds provided by Sweden also helped in the improvement of the Ministry's water supply facilities such as regional water engineers' offices and workshops, including provision of plant and vehicles to all water supplies offices which enabled them to cope with transport and maintenance problems.

Initially the assistance from Sweden was in the form of credit on soft terms. Now the participation by Sweden takes the form of grants.

#### PARTICIPATION BY INTERNATIONAL ORGANIZATIONS

The rural water supply sector till recently has not attracted much attention from the international financing institutions. This might have been partly due to the low priority given to it by the developing countries themselves and partly because of the pre-occupation of international financing institutions themselves with other sectors which had higher claims on the available finances. With the realization of the importance of rural development to the developing countries, attention is being paid to the rural water supply sector by different financing institutions.



The World Bank: As a part of integrated rural development of the Kigoma Region, the World Bank has allocated shs. 10,000,000 towards the financing of rural water supply projects for selected villages under the above scheme. Indications are that the World Bank will give similar support to other selected regions in Tanzania.

UNDP: The United Nations Development Programme provided for one year the services of an expert to coordinate the Water Master Plans being prepared by different agencies.

UNICEF: UNICEF has always shown keen interest in the provision of water supplies to rural communities as a part of integrated community development including education, health and water supply. UNICEF provided hand pumps to be used for rural water supplies in Tanzania before the country became independent. Of late, UNICEF has shown more interest and has purchased workshop equipment which is now being finalized under which UNICEF will participate in the implementation of rural water supply projects of selected villages in Iringa Region, at the same time laying emphasis on community training.

#### TYPE OF PARTICIPATION

Funds or services rendered as part of participation in the rural water supply development in Tanzania have been either in the form of grants or technical assistance and in the case of credit, have been on soft terms such as 10 years of grace at one per cent service charge and fifty years repayment period. In order to ensure that materials required for the rural water supply projects are obtained at reasonable cost, procurement procedures so far used in this sector put emphasis on international competitive bidding. The procedure also allows some flexibility to

purchase limited or urgently required materials and services locally by quotation.

#### CONCLUSION

With strong determination and sparing no effort on her part Tanzania, with the cooperation received from bilateral assistance and from international agencies, managed to provide water to 20 per cent of its rural population by the end of 1975. If the objectives of providing water to everyone in the rural areas by 1991 is to be achieved, the above efforts have to be intensified and expanded.

The hardship and misery that are brought by sudden natural calamities such as floods or earthquakes meet with a quick response of international cooperation to assist the affected areas to recover from such disaster. On the other hand, there are millions of people in the developing countries who live in perpetual hardship, having to put up with a state of continuous thirst. Most of their time is spent in fetching water for domestic consumption. Left unaided, it will take a long time for the developing countries alone to eradicate thirst from their respective countries. The problem is enormous but not unsurmountable. It requires a concerted effort that can be obtained through bilateral, multilateral and international cooperation in the fight against thirst in the developing countries. It is my conviction that through such a fight the noble goals that Tanzania has set for providing water to its rural population will be achieved.

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