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The WHO International Reference Centre for Community Water Supply (WHO-IRC) is based on a contract between the World Health Organization (WHO) and the Netherlands Government and was established in 1968 at the National Institute for Water Supply in Voorburg, The Hague, Netherlands. The IRC operates as the nexus of a world-wide network of regional reference centres and national collaborating institutions in both developing and industrialized countries.

The general objective of the IRC is to promote international cooperation in the water supply field. It endeavours to match the existing problems and their possible solution with potentially available resources. Operating as a catalyst, the IRC works closely with a number of collaborating institutions, within the framework of a network and with other national and international agencies.

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

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1. INTRODUCTION

1.1 Global Situation

The world's nations, and their governments, are increasingly concerned about the provision of safe drinking water. The situation is different for the developing and the industrialized countries. In the third world, the immediate necessity is to provide easy access to sufficient and clean community water supplies. In the other countries, the pollution of water resources is of greatest concern. In both cases it is a difficult task to deliver good quality water. Extremely bad are the conditions in the rural areas and on the fringes of cities in developing regions. The Ad Hoc Working Group on Rural Water Supply and Sanitation (1975)* reported: "Stripped of the statistical evidence, the stark global facts are that people need and want water; the pace of providing it is miserably slow; the existing prospects of speeding up the pace over the next five or ten years is not promising; and where installations have been provided, they have been left with distressing frequency to fall into disrepair and disuse through faulty operation and maintenance."

Another document of this Working Group** states:

"In the view of many health experts the provision of a safe and convenient water supply is the most important single activity that could be undertaken to improve the health of people living in the rural areas. The absence of such a water supply and of sanitation services also contributes to the general failure of rural areas to share fully in the social and economic advances being achieved in developing countries. ...Important though the provision of water supply and sanitation in rural areas is, past experience has shown that many efforts at providing these basic facilities have ended in failure. Very often this has been because of unimaginative use of all

* An International programme for the improvement of water supply and sanitation in rural areas of developing countries - Objectives and Progress of an Ad Hoc Working Group, Ad Hoc Working Group on Rural Potable Water Supply and Sanitation (WHO, UNDP, IBRD, UNICEF, IDRC, UNEP and OECD), (1975). (Unpublished)

** An integrated international programme to accelerate the provision of water supply and sanitation in rural areas of developing countries Ad Hoc Working Group on Rural Potable Water Supply and Sanitation, (1975) (unpublished)

the assets available in rural areas. But what has mostly been missing is a global and integrated approach to rural development of which water supply and sanitation, although important, are but a part. From the start, action should be linked with a global concept of rural development and not be sectoral in its orientation, however, the sectoral aims should be defined to serve as a realistic basis for the proposed action."

The World Health Organization states in the introduction of its 1975 Annual Report:

"In the past, WHO, in its programmes of collaboration with Member States, has implicitly endorsed the purely sectoral approach taken by many countries on the assumption that better rural water supplies and sanitation, in addition to improving health and the quality of life, would also necessarily contribute to the development of the rural economy. No one questions the health and environmental effects of these measures, but the notion that by themselves they can have a measurable effect on the rural economy has been rejected in favour of the idea, consonant with the concept of the New Economic Order, that a concerted effort consisting of various sectoral programmes is required. Today, planners are generally convinced that only a multisectoral effort can achieve the desired goals of improving both the economic and social status of poor communities."

For all programmes in the developing countries, the ultimate aim must be to achieve self-reliance. If programmes are to be effective they should include motivation of the policy-makers, education and involvement of the local population, the application of appropriate technologies based on the efficient use of local resources and the transfer of appropriate knowledge and skills through training and demonstration programmes.

1.2 IRC; Status and Scope of Work

It is the above situation which led to the establishment in 1968 of the International Reference Centre for Community Water Supply (IRC). Operating as a catalyst, it cooperates with a worldwide network of regional reference centres and national collaborating institutions in over 30 countries. The IRC aims at developing programmes which have an impact on the socio-economic development of developing countries, taking water supply as the key. Next to programmes of a technical nature,

described later in this report, much attention is given to activities directed at motivating policy-makers, health engineers, manpower training and community participation. At the same time, the Centre coordinates research and development activities and related information exchange work in the water supply field, of equal importance to both the developing and the industrialized countries.

The IRC, taking full note of the views of developing country representatives, initiates, coordinates and conducts programmes as appropriate and ensures there is a follow-up. The essence of the programmes is that the work is carried out in the countries themselves; the IRC steps back the activities can be performed without its assistance. The Centre has built up two different kinds of communication networks with existing institutions, agencies and individuals:

- a. a formal network of contacts on a continuous basis, with existing entities, designated (by WHO) as the official national/regional focal point for the country/region concerned, and which interact with national and local programmes in the collaborative development of water supply and sanitation services. The tasks of this "backbone" network are:
 - i. to stimulate and prepare the development of the programmes;
 - ii. to implement them, assisted by other institutions, as required
 - iii. to ensure that information needs are served and to promote the application of the results of international programmes in interaction with the respective national and local development programmes;
 - iv. to promote the feedback of experiences and information.

To these, the following general functions can be added:

- i. general information collection and exchange (clearing-house function);
- ii. taking care of matters between regional centres or the IRC on the one hand and local level on the other;
- iii. preparing information for regional centres as far as current programmes are concerned;
- iv. ensuring participation by governments or application of results of the programmes in national programmes or ongoing projects.



Water is a precious necessity

b. an informal network of contacts with existing institutions or persons, cooperating on an ad hoc basis in their area of specialization. Its tasks include:

- i. collection of specific information;
- ii. execution of specific research and investigations;
- iii. cooperation in incidental training programmes;
- iv. development of specific manuals;
- v. execution of specific sociological and public health studies;
- vi. development of specific projects.

This flexible network avoids duplication and uses the available resources in an efficient way.

This implies that on a national level the network of contacts will consist of institutions which form the focal point of their country. They act as the channel through which the regional and international centres are kept informed about the needs and requirements of each country, and stimulate the development of initiatives arising from the basis. These centres will not have to be directly involved in the programmes which are being carried out by institutions in the "informal" network in the country in question. They will be active however, in the improvement of contacts within their country as one of their focal point functions. As already

mentioned, existing institutions will as far as possible carry out these functions.

In its daily work the IRC has gained a valuable experience in the application of the network concept and it can be stated with confidence that systems of contact do contribute to the early attainment of a condition of self-reliance in the developing regions of the world.

1.3 IRC Programmes

On training a long term programme has been undertaken directed to the development of national cooperation for training of manpower, including professional, technical and village workers, based on assessments of needs and facilities. Another training activity, to support the first mentioned training programme, consists of a series of regional and national workshop/training seminars, started in September 1976, form part of this training programme. The purpose is to transfer expert knowledge, both technical and non-technical, concerning design, operation and maintenance of water supply facilities; also, to assist in the initiation of permanent instruction courses. A twinning programme endeavours to establish bilateral cooperation between a water supply entity in a developing country and one in an industrialized country.

Supported and assisted by the International Development Research Centre of Canada, the Centre has recently widened the scope of its activities with an "operational programme for global information exchange in support of water and sanitation".

The public health and socio-economic aspects of community water supply are assuming growing significance. The IRC is well-placed, through its many contacts, to perform coordinating activities in this field. A programme of this type concerns the health effects of re-use of waste water for human consumption. Programmes on social and managerial aspects are in development.

The objective of the appropriate technology programme is to stimulate the use of appropriate techniques and methods in developing countries, to ensure the availability of relevant information and to assist in their application. The activities also include the development of manuals and

training aids. In a number of programmes of the IRC - carried out in close cooperation with developing countries the multidisciplinary elements mentioned earlier (training, information, socio-economic studies, etc.) are made to match with activities of a technical nature, by means of the so-called "integral approach". The appropriateness of the various techniques used in this approach and their adaptability are evaluated before application. The objective of this work is to stimulate the use of technologies adapted to the particular situations in developing countries, in localities which have been well prepared as regards the acceptance and maintenance of these technologies, so as to ensure subsequent widespread application.

At present, programme of the IRC concern the following subjects: water lifting devices, including hand pumps; slow sand filtration; and public standposts. Similar programmes are under consideration.

Approach

In a first phase of these integral programmes, the work starts with a worldwide survey of the existing knowledge, both written and unwritten. In working meetings of experts, many of whom from developing countries, the information is then developed into guidelines and the subsequent phases of the programme are planned.

In order to make sure that the concepts and designs which are finally promoted, are sound and reliable, the methods and implements selected in the first phase, are then tested and evaluated in laboratories in developing countries, with an eye on adaptation to local circumstances, locally available skills and materials, and possible inclusion of results in national plans. In some cases the development of new devices is needed. Generally, programme management committees are formed in the countries in order to ensure that the interests of all parties are considered.

In the second phase, the designs selected after testing are introduced and demonstrated in schemes in the field. The application of the designs is carried out in cooperation with the national/local governments concerned. In the selection of the areas for the demonstration, the optimum variety of conditions is sought, such as different levels of development, cultural background, geographical zones, etc., in order to arrive at as wide an

application of the results as possible. This field testing phase is the most important one because they serve to demonstrate the designs to the people who are to use or depend upon the water supply facility. It is here that the chain reaction should start. In addition, while constructing installations it is also considered essential to utilize local labour and to apply self-help schemes.

Towards the end of the programme seminars are being organized where the authorities (at national and village level) are shown the benefits, the appropriateness and the effectiveness of the new set-up. For this purpose concise instruction pamphlets are prepared. The project is terminated by

Enjoying clean water



handing over the facility built for the purpose of the programme to the community in which territory it has been installed, for which official approval is sought in advance.

The most important follow-up is generating the interest of financial agencies - national/governmental or international - for large scale implementation of the various technologies resulting from the programmes. Follow-up also includes practical guidance of whatever nature where required in subsequent construction schemes. The programme results are introduced in other regions or countries by or through the IRC.

2. TECHNOLOGICAL PROGRAMMES

2.1 Appropriate Technologies

The philosophy behind the project on appropriate technologies is the encouragement of the use of techniques which suit the human, technical, social and financial resources of the developing countries. The objective is to establish good, workable systems which provide a regular supply of drinking water; and in doing so, to allow increased participation of local populations in the setting up and maintenance of these systems.

Suitable techniques were identified during the Global Workshop on Appropriate Water and Waste Water Treatment Technology for Developing Countries, organized by IRC in collaboration with the University of Oklahoma, and held in Voorburg in November 1975. The recommendations of the Workshop on the adaptation, development and dissemination of these techniques formed the framework for IRC's activity in this field in 1976.

During 1976, a loose-leaf collection was made of the information obtained via the IRC mail survey conducted the previous year. The survey aimed to assemble hitherto unpublished information on practical solutions in drinking water supply and waste treatment for developing countries, and which would contribute to state-of-the-arts reviews. Distribution of this information is expected to stimulate interest and improve communications on field experience and user acceptance. In a similar vein, the IRC has commissioned a number of documents which will make a valuable contribution to the educational resources in the field of water supply; a reference book on principles and technological requirements for rural water supply in developing countries is being drawn up by Professor L. Huisman of the University of Delft and Professor de Azevedo Netto of the University of Sao Paulo. The latter is also drafting a case study of a successful community water supply programme in Latin America. A third document entitled "Prediction Methodology for Suitable Water and Waste Water Processes" is being prepared for publication in the IRC Technical Paper Series. This results from work led by Professor G. W. Reid of the University of Oklahoma to develop a mathematical model for forecasting the most suitable water and waste water treatment processes using socio-economic data, in-country resources, demographic data, water quality and costs as parameters. This

model was recommended for further validation, comment and field evaluation by the Global Workshop mentioned earlier.

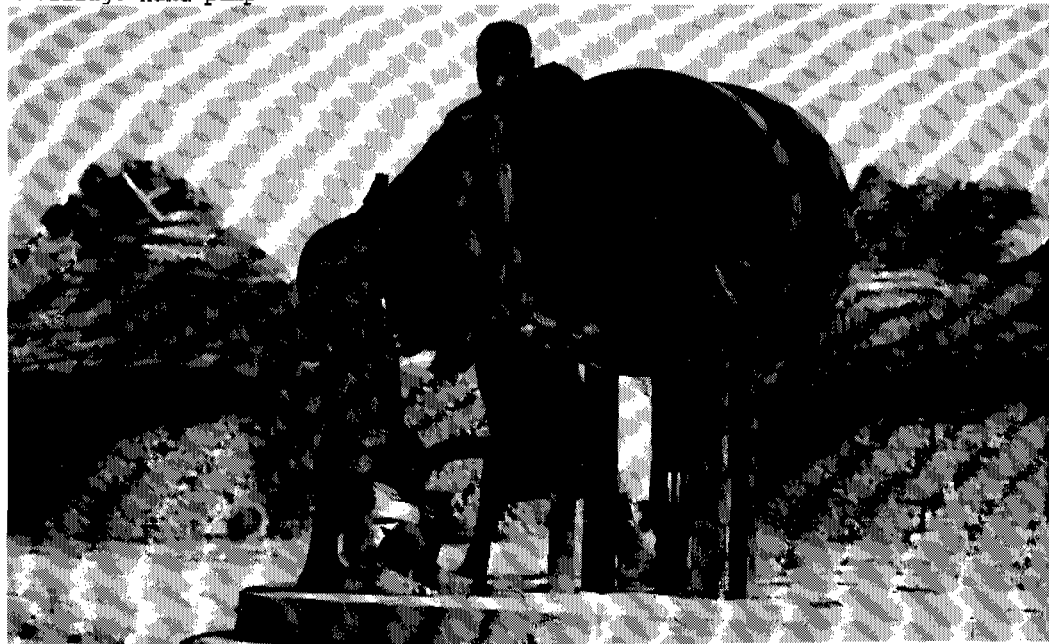
During 1976 IRC contributed to meetings and continued to cooperate with groups involved in work on Appropriate Technologies and related subjects, including:

- Congress on Applied Technology, Netherlands.
- Steering Committee on Wind Energy for Developing Countries, Netherlands.
- Appropriate Technology Group on Delft Technological University, Netherlands.
- Conference on Planning on Water and Waste in Hot Countries, Loughborough, U. K.

2.2 Hand Pumps for Water Supply Use

Hand pumps are a demonstrated weak link in rural water supply systems. Each time a pump fails, the community is exposed to the hazard of using unsafe water from the locality until the pump is put back into operation. The hand pump is likely to play an important role in providing an acceptable water supply for millions of people for many years to come. Within the last decade, several studies of various types of hand pumps have been sponsored by international organizations, national agencies and pump manufacturers. Design criteria particularly suited for developing countries are needed,

A village hand pump



taking into account operating conditions and health requirements. The aim is to promote the development and use of pumps which are easily operated, durable, trouble-free, sanitary and inexpensive; which require maintenance in line with local technical skills; which preferably can be manufactured locally; and which are acceptable to all users.

In response to these demands, the IRC initiated its programme on hand pumps for water supply use, especially in rural areas of developing countries. The programme received financial support from the United Nations Environmental Programme and is carried out under the auspices of the WHO. It aims at collecting and disseminating selected information on hand pumps to support work on hand pump research and development, rural water supply projects, water supply programme planning, education and training. Throughout 1976, the IRC continued to collect reports, correspondence, memoranda from field staff, drawings, specifications and other information from national water supply authorities, international organizations, universities, research institutions and hand pump manufacturers.

Three interrelated activities on this project were carried out in 1976. Dr. F. E. McJunkin of Environmental Services Corporation, Chapel Hill, U. S. A. served as a consultant to review and evaluate the documentation available and to obtain as much as possible of the information that was found lacking. His comprehensive draft report on hand pumps for water supply includes the following subjects: types of hand pumps, state of the technology, installation, operation and maintenance; research and development; and (local) manufacture of hand pumps.

An International Workshop on Hand Pumps sponsored by the United Nations Environmental Programme, was organized by the IRC from 12 - 16 July 1976 in Voorburg (The Hague), Netherlands. Twenty eight participants from 20 countries, with expertise in areas relating to hand pumps and rural water supply programmes, attended the Workshop. Its purpose was (1) to review, discuss and supplement the draft report on hand pumps as well as additional background information; (2) to advise on the preparation of integrated guidelines on hand pumps (3) to recommend further studies and activities in planning, technological and managerial aspects of hand pumps; also, to recommend coordination programmes, and to promote initiation of needed work. The meeting was successful in making a thorough review of Dr. McJunkin's

draft report, and in providing supplementary information which is being used to refine the document.

Towards the end of the year, an improved interim version of the document, the "Handbook on Hand Pumps" was made ready for publication. It is intended for use by project staff of water supply authorities, educators and field engineers. The IRC's work of compiling information on hand pumps has already met with intense interest from many countries and the handbook is expected to help fill the gap in information on this subject.

On the basis of recommendations made by the previously mentioned Workshop, follow-up activities were initiated such as studies of hand pump maintenance, organizations, comparative pump-evaluation and investigation of the potential for local manufacture of hand pumps.

IRC will continue to act as a clearing-house on current activities relating to hand pumps and their use in village water supply programmes, to initiate specific recommended activities in research and development, field testing and demonstration and to coordinate this work with other programmes and activities.

2.3 Slow Sand Filtration

In 1976 IRC's research and demonstration project on slow sand filtration has seen encouraging developments. There has been a considerable extension of the external contacts with research institutes, governmental authorities and international organizations. The resultant increase in exchange of information has supported the further development of the first phase of the programme and the preparations for the second phase. The programme is being financed by the Technical Assistance Department of the Dutch Ministry of Foreign Affairs.

In the beginning of the year under review, the applied research programme was further developed in close collaboration with the participating institutions, viz., the University of Science and Technology in Kumasi, Ghana; The National Environmental Engineering Research Institute in Nagpur, India; the University of Nairobi, Kenya; the Institute for Public Health Engineering Research in Lahore, Pakistan; the University of Khartoum,



Slow Sand Filtration (Umrer, India)

Sudan; and the Asian Institute of Technology in Bangkok, Thailand. In these countries pilot installations have been built, which consist of three slow sand filtration units and, in some cases, also include a simple pre-treatment installation.

As the project focusses on practical solutions rather than on theoretical problems, the applied research carried out by the participating institutions has been directed to the functioning of slow sand filtration under local conditions in developing countries. Special attention was given to subjects such as the performance of a slow sand filter in relation to the quality of the raw water, especially concerning the removal of turbidity, organic matter and specific bacterial contaminants. Studies on the optimum filtration rates and on the type and specifications of the filter material to be used also form important aspects of the programme. Next to this various pre-treatment systems were investigated in order to develop a suitable method for turbidity removal and to cope with the problem of high turbidity levels of the raw water.

In addition to applied research, field investigations of existing slow sand filtration plants were carried out in developing countries. In this connection

an extensive survey of the existing literature concentrating on practical information from the field has been carried out. As a result approximately 300 references were obtained. After studying this material, the IRC will publish a selected bibliography on slow sand filtration and related simple pre-treatment methods.

Since in many countries the gap between research and implementation in water supply is large, emphasis has been given to the promotion of local, national and international collaboration and to the improvement of the organizational infrastructure in the context of the project. In each participating country, a Project Managing Committee has been established which includes representatives of both the research institutions and the governmental agencies involved in the project. The Committee is responsible for the progress of the respective projects and promotes the direct exchange of information amongst the participants.

In order to coordinate the various programmes and activities, visits were paid to the participating institutions and governmental agencies involved in Ghana, India, Kenya, Sudan and Thailand. Visits of a more exploratory nature were paid to Brazil, Indonesia, Tanzania and the U. K. In 1976 an additional project engineer was recruited to match the extension of project duties.

A first meeting of institutions participating in the slow sand filtration project was held at the IRC in Voorburg, Netherlands, from 22 - 30 November 1976; representatives of governmental authorities involved in this project were also present. During this meeting, the results of the first phase of the project were thoroughly reviewed. Gaps in current knowledge were identified, recommendations for further applied research were formulated and agreements were made on some short-term research programmes for finalizing Phase I of the slow sand filtration project. The meeting also reviewed the draft proposal for the programme of activities for Phase II, and various recommendations for studies and activities in the context of this programme were defined.

The Advisory Group of the Slow Sand Filtration Project met twice in 1976. In the first meeting, the programme of investigations for Phase I was reviewed and recommendations were made for experiments to be undertaken.

The second one was held in coordination with the first meeting of institutions participating in the project, in order to allow the participants of the latter meeting to consult with the Advisory Group on the preliminary results of Phase I. This meeting once more underlined the opinion that slow sand filtration is a very appropriate and suitable drinking water treatment system for the developing countries; and it recommended the IRC continue its promotion of the application of slow sand filtration.

2.4 Public Standposts

Most developing countries lack the adequate resources needed to provide their population with a safe water supply at each dwelling. Public standposts are therefore considered to be an important method of providing

A public standpost



a safe and relatively convenient water supply for poor populations for decades to come. This has led the IRC to organize a study (in collaboration with the World Bank) on systems which are in existence, and to establish guidelines on techniques suitable for differing social and economic circumstances. During 1976 additional information was added to the existing preliminary report. The results have been compiled in a final report which presents an inventory of designs currently in use in developing countries, and the managerial and administrative aspects of this method of water supply. The final version of the report which will be published in the IRC Technical Paper Series, gives recommendations for the planning, design, management and administration of public standposts.

Preparations have also begun for a meeting to be held in 1977, preferably in a developing country, at which field experts who have operational experience of public standpost systems can comment on the above report and recommend possible follow-up activities on evaluation in the field and on research.

3. STRUCTURAL PROGRAMMES

3.1 Training and Institutional Development

3.1.1 Training

Among the recommendations made in 1973 at the meeting of Directors of Institutions collaborating with the IRC was, that high priority be given to developing and implementing systematic training programmes in community water supply, on the basis of an assessment of manpower and training needs in the water supply field in developing countries. It was further recommended that the coordination of these programmes be undertaken by the IRC, and that assistance be provided by WHO (technical advice and financial support), the collaborating institutions (regional coordination and promotion) and external organizations, such as the International Water Supply Association (IWSA) and other professional and training institutions.

This year increased efforts were directed to implementing these recommendations. The IRC engaged Mr. N. F. Carefoot, engineer, as a short-term consultant, because of his expertise in developing and implementing national training delivery systems for water and sewage personnel in developing countries. Mr. Carefoot has had several years experience in Latin America as a staff member of the Pan American Health Organization. During his consultancy he assisted in the drafting of a programme to accelerate the training of water and waste water personnel.

The preliminary proposal which resulted from his work emphasizes the creation of national training delivery systems, with full utilization of experience gained and training materials prepared in developing countries as well as in industrialized countries. It recommends to focus on the strengthening and acceleration of training activities, initially in a few countries in the developing regions which have previously demonstrated their own interest in training. By pooling experience, training materials and expertise these countries can accelerate the development of their own training systems. The IRC plans to organize the preparation of a detailed manual, for use as a



Students learning how to make water sample analysis (WHO Photo)

guide as a basis for adaptation, for other countries entering the same process. A number of countries have been approached for participation in this programme and stronger contacts have been made with organizations active in the field of international training.

During the drafting of the training proposal in September, a training advisory meeting was organized in the Netherlands, taking advantage of the presence in Amsterdam of a number of internationally known training officials and officers from developing countries who were attending the 11th IWSA Congress. This gave an excellent opportunity for an exchange of views in this field.

During the public session of IWSA's Standing Committee on Education and Training at the IWSA Congress in Amsterdam, an outline was presented of the intended IRC programme on training of water and waste water personnel in developing countries; and an example was shown of an audio-visual course on installation of hand pumps which is presently in preparation.

3.1.2 Seminar on Community Water Supply

An International Seminar on Community Water Supply in Developing Countries was organized by the IRC in Amsterdam from 6 - 10 September 1976. It was intended for chief public health engineers and managers of water supply programmes and agencies, and had the following objectives:

- to introduce participants to approaches, methods and techniques which are important in obtaining an increased coverage of community water supply in developing countries;
- to identify regional and national constraints and needs and the relevance of approaches, methods and techniques discussed; and
- to formulate follow-up regional and national training seminars and other relevant activities such as demonstration programmes, specific training courses, studies, etc.

Several international organizations such as WHO, the World Bank and UNICEF provided speakers with extensive experience in this sector; some experts from developing countries also willingly shared their expertise and experience with professionals and representatives from other countries.

Of the 38 participants from 26 developing countries, several were sponsored by their own agency; the participation of others who made possible by fellowships extended by the Canadian International Development Agency, the U. K. Ministry of Overseas Development, the U. S. Agency for International Development, the Pan American Health Organization, the WHO Regional Office for the Eastern Mediterranean, the United Nations Children's Fund (UNICEF) and the Netherlands Government.

By organizing the seminar in the week prior to the IWSA Congress, seminar participants had the opportunity to participate in the Congress, thanks to full cooperation from IWSA. Furthermore, the representation of the developing countries in the session had direct influence on IWSA's policies and programmes, especially those related to these countries.

The programme offered was well received and an excellent opportunity was given to underline aspects of greatest benefit to the participants in their work, such as training, the need for community involvement, and the possibilities of adapting techniques to local conditions.

Participants were requested to identify constraints in relation to progress of community water supply development in their country and to suggest programmes of action in which the international society could assist. Recommendations, screened with respect to the needs of the regions, have been submitted in the field of training and on motivation programmes, organization, exchange of information and appropriate technology.

During the meeting, certain country representatives expressed their readiness to organize follow-up seminars in their region. A regional seminar is being considered for the spring of 1977, to be held in Mexico. This would be attended by representatives of other countries who would convene a similar seminar in their region.

Along the same lines a similar international seminar for developing countries is being planned on the occasion of the International Water Supply Association Congress in Kyoto in 1978.

During the September Seminar a resolution, which is in accordance with a similar resolution of the HABITAT Conference in 1976, was approved for submission through the IWSA to the Secretariat of the United Nations Water Conference: "Governments of developing countries and aid-granting agencies are urged to give high priority to and provide all the people with safe and easily accessible water supplies by 1990."

3.1.3 Twinning

Within the framework of the IRC twinning programme, through which bilateral contacts between a water undertaking in a developing country and one in an industrialized country are promoted and actually established, further progress was made and a first link was made between the Water and Sewage Department of the Nairobi City Council

and the Provincial Water Supply Company North Holland. Efforts will be undertaken to monitor this twinning contact, which may lead to an exchange of views and experiences and possibly to a temporary exchange of personnel aimed at giving an opportunity for on-the-job training.

3.2 Health Effects Relating to Direct and Indirect Re-use of Waste Water for Human Consumption

The fact that water sources contaminated with sewage effluent are being used to supply over 100 million people in the world with their daily water needs has caused concern as to the possible effects of residual pollutants, especially organic, on health.

Re-use of waste water is likely to increase in the future, so that research into possible health effects will assume greater importance. The need to ensure the continuing safety of community water supply requires improved knowledge of the health implications of re-use.

Programmes of epidemiological, analytical and toxicological studies are developed, or underway, in a number of countries including the U. S. A., U. K., Netherlands, France, South Africa and Israel. Their common objective is to identify and characterize polluting substances in water and to evaluate their significance for health.

The IRC recognizes the need, on an international level, to facilitate the exchange of information and to coordinate research carried out in the various countries. In offering assistance to international collaborative efforts, the IRC is guided by the general recommendation of an international expert meeting which was held in Amsterdam in 1975. The meeting requested IRC to "assume the role of international coordinating agency for study of health effects of direct and indirect re-use of waste water for human consumption". The IRC has published a report on this meeting*.

* Health Effects Relating to Direct and Indirect Re-use of Waste Water for Human Consumption, Technical Paper Series No. 7 (The Hague; International Reference Centre for Community Water Supply, 1975).

Any programme of the magnitude required to alleviate concern for health arising from the re-use of waste water is not a local or even a national undertaking. International cooperation is not only useful but essential since other nations are facing similar situations of deteriorating quality of surface water and suspect water supplies.

The aim of the IRC's work in this field is to promote, support and administer internationally coordinated programmes of health effects research and epidemiological studies, in order to prevent unnecessary duplication; to ensure priority allocation of research projects; and to facilitate exchange of information. Where feasible and desirable, certain studies develop into cooperative programmes.

A study of the methodology required for the analysis of organic compounds in water to support studies into effects on health was done for the IRC by Dr. A. W. Garrison of the U. S. Environmental Protection Agency's Environmental Research Laboratory, Athens, Georgia. During a five-week consultancy in 1976, he reported on the listing of organic compounds in data banks and the needed improvement of analytical techniques to identify better the organic pollutants in water. Liaison was sought with the Environmental Research Programme of the European Economic Community (EEC), under which a number of European research institutions are jointly compiling data on the incidence and abundance of organic pollutants in water. If health risks are to be evaluated, a measure of the level of abundance, or even better, indications of concentrations are required. Such data are absolutely essential if the studies are to produce reliable findings. Dr. Garrison prepared an extensive report which will shortly be published.

The U. S. Environmental Protection Agency is also developing a comprehensive computerized collation and data retrieval system for organics in water, called *Water DROP*. A visit was paid to the office of the EEC to tentatively explore the possibilities of liaison between them and the U. S. EPA Data Systems, with a view to providing interested users throughout the world with some means of access to the information. Further contacts were established during a Colloquium on the Analysis of Organic Micropollutants which was organized by staff of the Netherlands National Institute for Water Supply, held at the IRC offices, on February 18, which was attended by some 50 experts.

Epidemiological studies are planned and developed in several countries; some international coordination of assessment strategies will be needed to ensure that the nature and amounts of aquatic pollutants, as well as the potential health reactions, are measured uniformly. The IRC will continue to collect and disseminate information on research programmes and epidemiological studies, thereby assisting the national groups in their research work on health implications.

3.3 Methodological Evaluation of Rural Water Supply Projects

At the end of the year the first steps were taken in starting a collaborative project between the Ross Institute (part of the London School of Hygiene and Tropical Medicine) and the IRC on the development of a handbook for the methodological evaluation of rural water supply projects in developing countries.

Innovative design in Nigeria



The major purpose of this handbook is to conduct more and better evaluations of rural water supply programmes and to permit these evaluations to be conducted in a semi-standardized manner in order that general lessons and conclusions may be drawn. This project will be undertaken and completed in 1977.

4. INFORMATION ACTIVITIES

As its name implies, the International Reference Centre for Community Water Supply aims to be a source of information on community water supply. During 1976, the IRC has continued to develop the information activities including the enquiry service, documentation system and newsletter, as outlined in the following subsections.

In addition to these continuous activities, a clearing-house function was developed in 1976 on specific subjects such as hand pumps, slow sand filtration, public standposts and other appropriate water supply technologies for developing countries. The possibility of publishing a digest journal giving information on results of applied research, evaluation of programmes and new developments in the field of community water supply and sanitation in developing countries is at present under investigation.

The activities of the IRC were covered in various newspapers and journals and on the radio and television. Such coverage contributed to the increased use of the Centre as an information source by institutions and individuals in both the developed and developing countries. The IRC received many visitors in 1976, a list of other visitors is found in Annex 9.

4.1 Information Exchange Programme

In the past few years several organizations, institutions and individuals and, in particular, the Ad Hoc Working Group on Rural Potable Water Supply and Sanitation, have stressed the need for an internationally coordinated programme on the transfer and exchange of information in support of the accelerated provision of water supply and sanitation in rural areas of developing countries.

In 1976, in collaborating with the International Development Research Centre (IDRC), Ottawa, Canada, the IRC had several consultations with national, regional and international organizations on the establishment of an international information programme and various approaches towards a global information system were evaluated.

A Workshop on Global Exchange of Information in Water Supply and Sanitation, sponsored by the IDRC and organized by the IRC, was held in The Hague, Netherlands, from 19 - 20 July 1976. The meeting was attended by representatives of CEPIS, CETESB, CIEH, CPHEEO, IDRC, IRC, NEERI, UNDP, WHO and WRC* and by some individual experts. The objectives of the Workshop were to review the preliminary proposal, to exchange information on present and future information activities (within the various regions) and to consult on alternative strategies, the institutional infrastructure and the implementation of the programme.

In the proposal that resulted from the Workshop the following main objectives for the programme were stated: to create and improve facilities for the international exchange of information; to promote the cooperation among various national, regional and international organizations and to establish an international information system dealing with all matters relevant to water supply and sanitation. The institutions present at the Workshop expressed their willingness to participate in the development of a coordinated information programme, to maintain contact with each other through the IRC so as to assure compatibility of developments in the various regions, and to avoid unnecessary duplication of work.

Following the Workshop, IRC staff visited the IDRC in Ottawa to review the results of the Workshop, to discuss options for the implementation of the programme and to plan a series of preliminary activities as part of the development of the overall programme that are to be carried out by various regional centres and other interested institutions.

In its October meeting, the Ad Hoc Working Group, to whom the progress was reported by the IRC, finalized their views on the further development of the programme and put emphasis on: (1) the establishment of a Planning Team, to make a detailed proposal for a global information system and work closely with the IRC; (2) the set-up of specific information activities that are directly related to the work of the Planning Team; and (3) the presentation of the present information activities at the U. N. Water Conference in 1977.

* See Annex 7 - List of Abbreviations

4.6 IRC Film

In 1976 the IRC augmented its information materials by commissioning a 16 mm colour film which depicts the water supply problems in developing countries and the scope of IRC activities. The film was shown at the U. N. Conference on Human Settlement (HABITAT) held in Vancouver in May and June 1976 and was ranked among the first twenty six out of the three hundred films submitted. Despite this, the IRC decided to improve its content by including extra shots from developing countries. With this addition, the finalized version was made available in September under the title "Water Supply, a Global Care". This 21-minute film, with optical sound track, will be used for orientation of visitors to IRC, conference and exhibition activities, and training purposes.

4.4 Enquiry Service

During the year, the IRC continued to complement the function of national and regional communication channels in the field of community water supply, endeavouring to serve those whose information requirements are not met from local sources. To answer enquiries correctly it is often insufficient to supply a simple reference based on a supporting documentation system; it is necessary to build up a system of contacts with organizations and experts who can advise on the various problems posed.

Queries received in 1976 related, inter alia, to subjects such as: suitability of certain pumps for deep well application, determinants of potable water use, criteria for the evaluation for the (bacteriological) safety of ground water supplies, techniques for surface water clarification, use of natural polymers as flocculation aids, effect of water storage in service reservoirs on water quality in distribution systems, various disinfection methods, chlorine removal techniques, specifications for diatomaceous filter media, filter operation, and courses on water supply engineering.

4.5 Participation at Exhibitions

A new development in the information activities of the IRC is the participation at exhibitions on water supply and the construction of visual aids for use at such exhibitions.

In March 1976, the IRC participated in the conference, "Information for Water Industry", held in Reading, U. K., and sponsored by the Water Research Centre.

In Amsterdam in September 1976, at AQUATECH '76 - an exhibition on water treatment, storage and transportation, organized in connection with the 11th IWSA Congress - two stands were organized. The first, which was set up within the stand of the host institute, the Netherlands National Institute for Water Supply, dealt with the aims and activities of the IRC. The second, set up in close cooperation with the Royal Tropical Institute, Amsterdam, illustrated the use of appropriate technologies, integrated and multi-sectoral approaches and the importance of creating self-generating projects.

By the end of 1976 the IRC began drawing up plans for the various activities. The programme is intended to be an active service for the transfer and exchange of information on an international collaborative basis.

4.2 Library and Documentation

As in all institutions of its type, the library of the IRC plays an important supportive role. Staff members and consultants refer to the library for information needed for programme development and in answering the increasing number of enquiries made to the IRC. The collection consists at present mainly of documents on water resources, water supply and sanitation, waste treatment and disposal, and on developing countries, development aid and appropriate technologies.

The reorganization of the library continued in 1976 and is proceeding satisfactorily. A new subject catalogue was developed and a large proportion of the documents have been recatalogued, along various entrances.

Around 500 books and reports were added to the collection in 1976, many of which were on an exchange basis with collaborating institutions and other organizations and individuals around the world. Emphasis was laid on obtaining field reports and other unpublished material, the so-called "fugitive" documents. The library's collection now contains some 2500 documents.

A manual system using feature cards was chosen to be used for documentation activities. For the construction of a thesaurus an inventory is being made of existing thesauri on water supply and sanitation and other relevant fields. The documentation system will become operational in the course of 1977.

4.3 IRC Newsletter

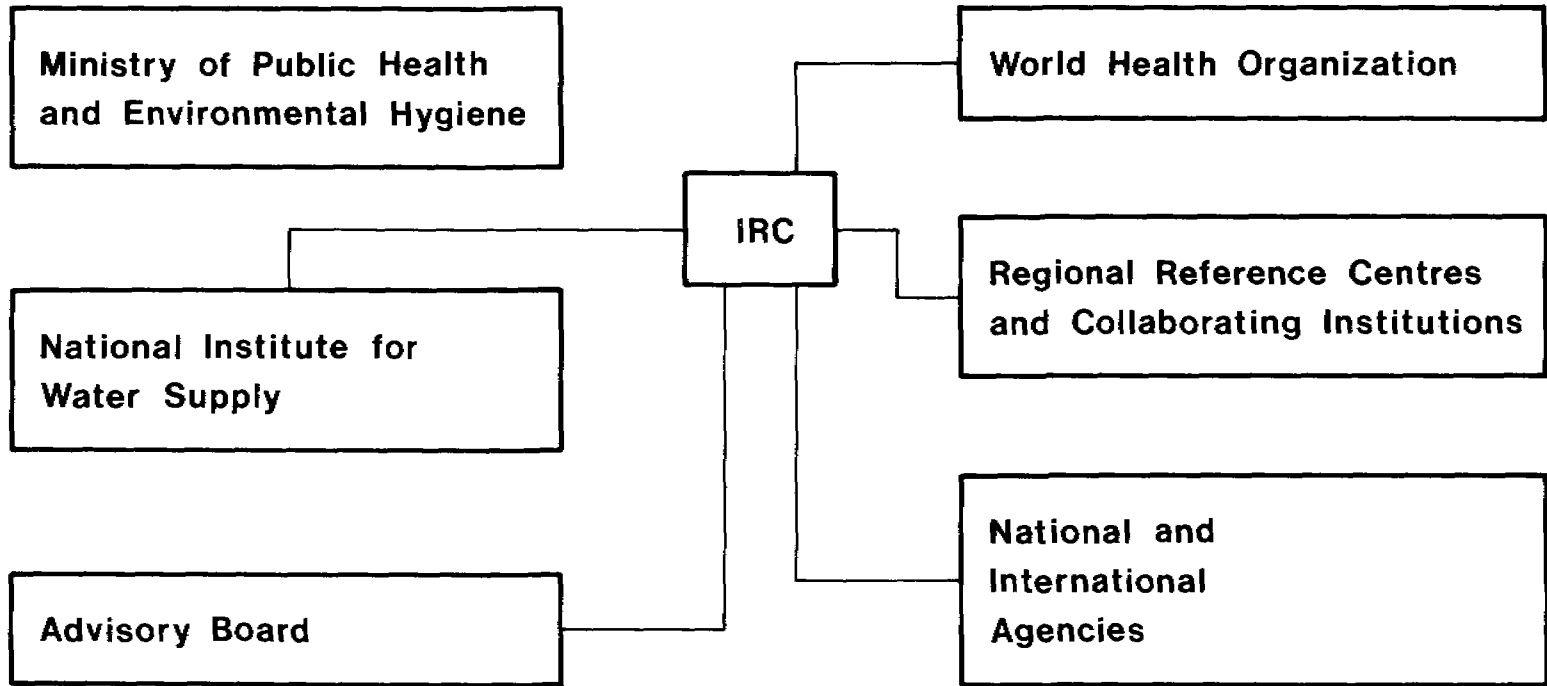
The IRC Newsletter continues to be an important source of information for engineers and researchers in the water supply field, worldwide. It is distributed to over 100 countries, having a circulation of 2800 for



ANNEX 1

ORGANIZATIONS REPRESENTED AT ADVISORY BOARD

<u>ORGANIZATIONS</u>	<u>PARTICIPANTS IN 1976 MEETING</u>
World Health Organization, Division of Environmental Health, Switzerland	Dr. B. H. Dieterich
Ministry of Public Health and Environmental Hygiene, Division of International Affairs, Netherlands	-
Ministry of Foreign Affairs, Directorate of International Technical Assistance, Netherlands	-
Delft University of Technology, Netherlands	-
Testing and Research Institute for the Netherlands Waterundertakings KIWA Ltd., Netherlands	Mr. G. Wijnstra
National Institute for Public Health, Netherlands	-
International Courses for Hydraulic and Sanitary Engineering, Netherlands	Professor L. J. Mostertman
Research Institute for Public Health Engineering TNO, Netherlands	Mr. J. A. Somers
Water Research Centre, U. K.	Dr. D. G. Miller
National Environmental Engineering Research Institute, India	Mr. J. M. Dave
Pan American Centre for Sanitary Engineering and Environmental Sciences (CEPIS), Peru	-



ORGANIZATION

International Water Supply Association -
Standing Committee for Developing
Countries

PARTICIPANTS IN 1976 MEETING

Mr. C. van der Veen

Ir. P. Santema, Chairman

Drs. J. M. G. van Damme

Mrs. M. L. Brocrsma

MEMBERS OF NETWORK OF COLLABORATING INSTITUTIONS

Regional Reference Centres

National Environmental Engineering Research Institute (NEERI)
Nehru Marg
Nagpur - 440020
India

Pan American Centre for Sanitary Engineering and Environmental Sciences (CEPIS)
Calle los Pinos 259, Urbanizacion Camacho
Casilla Postal 4337
Lima - 100
Peru

Collaborating Institutions

Institut d'Hygiène et d'Epidémiologie
14, rue Juliette Wytsman
1050 Brussels
Belgium

Fundação Estadual de Engenharia do Meio Ambiente (FEEMA)
Rua Fonseca Teles 121-15º and
Caixa Postal 23011 - ZC 09
Rio de Janeiro, GB
Brazil

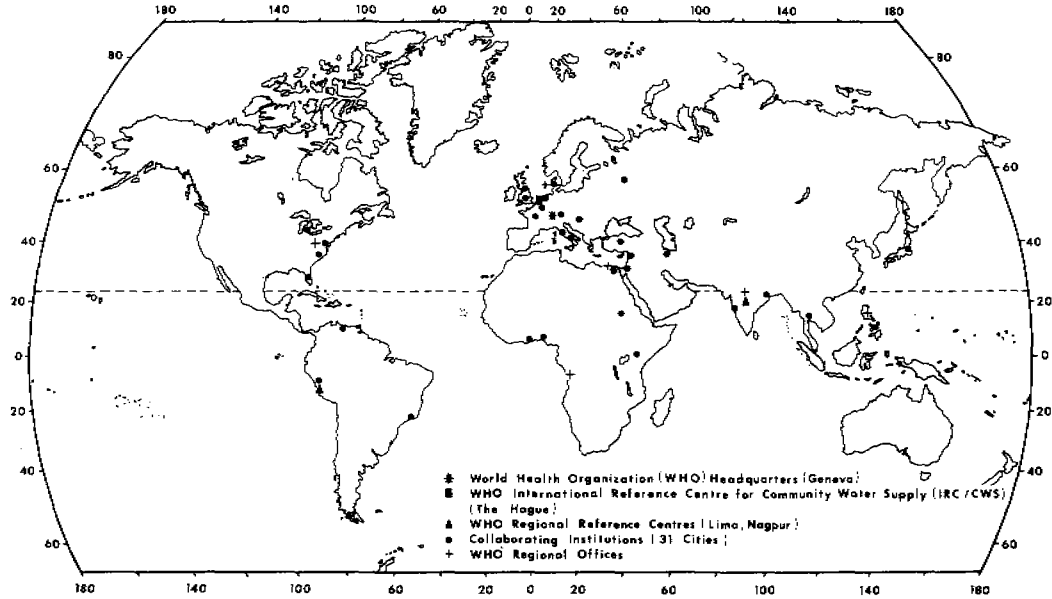
Centre of General and Environmental Hygiene
Institute of Hygiene and Epidemiology
Srobarova 48
10042 Prague-10
Czechoslovakia

Institute of Hygiene
University of Aarhus
Universitetsparken
8000 Aarhus-C
Denmark

Sanitary Engineering Department
Faculty of Engineering
University of Alexandria
Alexandria
Egypt

Office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM)
Section d'Hydrology
24, rue Bayard
Paris 8e
France

THE INTERNATIONAL NETWORK FOR COMMUNITY WATER SUPPLY AND W.H.O.-OFFICES



Department of Civil Engineering
Faculty of Engineering
University of Science and Technology
Kumasi
Ghana

Victoria Jubilee Technical Institute
Matunga
Bombay-19
India

All-India Institute of Hygiene and Public Health
110 Chittaranjan Avenue
Calcutta-12
India

Institute of Hydro-Sciences and Water Resources Technology
University of Tehran
64 Ghadessi Street
North Boulevard Elizabeth
Tehran
Iran

Environmental Health Laboratory
Hebrew University - Hadassah Medical School
P. O. Box 1172
Jerusalem
Israel

Centro Studi e Ricerche di Ingegneria Sanitaria
University of Naples
Piazzale Tecchio
80125 Naples
Italy

Instituto di Ricerca sulle Acque
Consiglio Nazionale delle Ricerche
Via Reno 1, Irsa
Rome
Italy

Department of Sanitary Engineering
Faculty of Engineering
University of Tokyo
Tokyo
Japan

Department of Civil Engineering and Architecture and School of Public Health
American University of Beirut
Beirut
Lebanon

Testing and Research Institute of the Netherlands Waterundertakings, KIWA, Ltd.
Sir Winston Churchilllaan 273
Rijswijk 2109
The Netherlands

Faculty of Engineering
University of Lagos
Lagos
Nigeria

Departamento Academico de Saneamiento
Universidad Nacional de Ingenieria
Avenida Tupac Amaru s/n
Apartado 1301
Lima
Peru

Battelle Geneva Research Centre
7 Route de Drize
1227 Carouge
Geneva
Switzerland

Faculty of Engineering and Architecture
University of Khartoum
P. O. Box 487
Khartoum
Sudan

Division of Environmental Hygiene
Asian Institute of Technology
Henri Dunant Street
P. O. Box 2754
Bangkok
Thailand

Middle East Technical University
Sanitary Engineering Laboratory
Ankara
Turkey

Water Research Centre
45 Station Road
Henlye-on-Thames
Oxon RG9 1BW
United Kingdom

Department of Civil Engineering
University of Newcastle-upon-Tyne
Claremont Road
Newcastle-upon-Tyne NE1 7RU
United Kingdom

College of Engineering
University of Florida
Gainesville, Florida 32601
United States of America

Division of Water Hygiene
Water Quality Office
Environmental Protection Agency
5600 Fishers Lane
Rockville, Maryland 20852
United States of America

National Sanitation Foundation
P. O. Box 1468
2355 West Stadium Boulevard
Ann Arbor, Michigan 48106
United States of America

School of Public Health
The University of North Carolina
P. O. Box 630
Chapel Hill, North Carolina 27514
United States of America

Academy of Community Services
(K. D. Pamfilov Academy of Community Services)
Volokamskoe Sosse 16
Moscow D-373
Union of Soviet Socialist Republics

Department of Sanitary Engineering
Faculty of Engineering
Central University of Venezuela
Caracas
Venezuela

Other Institutions with which is Collaborated Extensively

Comité Inter-africain d'Etudes Hydrauliques (CIEH)
Boîte Postal 368
Ouagadougou
Upper Volta

Companhia Estadual de Tecnologia de Saneamento Básico e de Defesa do
Meio Ambiente (CETESB)
Avenue Prof. Referico Hermann Jr. 345
C. E. P. 05459
Sao Paulo
Brazil

MEETINGS ORGANIZED BY IRC

<u>TITLE OF MEETING</u>	<u>OBJECTIVES/INFORMATION</u>
Second Meeting of the Advisory Group of the Slow Sand Filtration Project, March.	Reporting on progress of project. Advice on technical aspects.
International Workshop on Hand Pumps, July.	Formal review and supplementing of consultant's report on hand pumps for water supply use in developing countries; evaluation of recommended studies and activities relating to rural water supply schemes with hand pumps.
Workshop on Global Information Exchange on Water and Sanitation, July.	Review of preliminary programme for international transfer and exchange of information on water supply and sanitation.
International Training Seminar on Community Water Supply in Developing Countries, July.	Introducing senior public health engineers to methods and techniques to better plan and implement programme to meet an increased demand for water.
First meeting of Institutions Participating in the Slow Sand Filtration Project, November.	Reporting on results of first phase of project and discussion on technical aspects. Exchange of views amongst participants from six developing countries and Advisory Group. Review of proposal for second phase. Recommendations for further studies.
Third meeting of the Advisory Group of the Slow Sand Filtration Project, November.	Reporting on progress of project. Advice on technical aspects. Exchange of views with participants of first meeting of Institutions Participating in Slow Sand Filtration project.

VISITS MADE BY IRC STAFF

<u>DATE</u>	<u>ORGANIZATION</u>	<u>COUNTRY</u>	<u>STAFF MEMBER</u>
29 January - 18 February	Pan American Centre for Sanitary Engineering and Environmental Sciences (CEPIS)	Peru	J. M. G. van Damme
	Companhia Estadual de Tecnologia de Saneamento Básico e de Defesa do Meio Ambiente (CETESB)	Brazil	
	Fundação Estadual de Engenharia do Meio Ambiente (FEEMA)	Brazil	
	Brazilian Association of Sanitary Engineers (ABES)	Brazil	
	Ad Hoc Working Group on Rural Potable Water Supply and Sanitation	U. S. A.	
	University of Caracas	Venezuela	
6 February	Environmental Research Programme, Commission of European Communities	Belgium	E. H. A. Hofkes
19 - 23 February	University of Technology, Loughborough	U. K.	J. Haijken
15 - 23 February	University of Nairobi	Kenya	E. L. P. Hessing
	Nairobi Water Works	Kenya	
	United Nations Environment Programme	Kenya	
27 February	Reading University	U. K.	J. Haijken
23 - 29 February	University of Khartoum	Sudan	E. L. P. Hessing

<u>46</u>	<u>DATE</u>	<u>ORGANIZATION</u>	<u>COUNTRY</u>	<u>STAFF MEMBER</u>
		National Council for Research	Sudan	
	17 - 19 March	Organization of Economic Cooperation and Development (OECD)	France	J. M. G. van Damme
	21 - 25 March	National Water Council, Training Division	U. K.	J. Haijkens J. M. G. van Damme
		Exhibition on Information for the Water Industry	U. K.	
		Conference on Information for the Water Industry	U. K.	J. M. G. van Damme
	24 May - 17 June	WHO Country Representative	Tanzania	J. Haijkens
		United Nations Children's Fund (UNICEF)	Tanzania	
		University of Dar es Salaam	Tanzania	
		Water Resources Institute	Tanzania	
		Ministry of Water, Energy and Minerals	Tanzania	
		Small Industries Development Corporation	Tanzania	
		Swedish International Development Agency	Tanzania	
		Shallow Wells Project Shinyanga	Tanzania	
		WHO Country Representative	Kenya	
		Ministry of Water Development	Kenya	
		United Nations Environment Programme	Kenya	
		Water Development Training School	Kenya	
		University of Nairobi	Kenya	

<u>DATE</u>	<u>ORGANIZATION</u>	<u>COUNTRY</u>	<u>STAFF MEMBER</u>
	United Nations Children's Fund (UNICEF)	Kenya	J. Haijkens
	Ethiopian Water Research Authority	Ethiopia	
	Addis Ababa Water and Sewerage Authority	Ethiopia	
	WHO Country Representative	Ethiopia	
	United Nations Development Programme	Ethiopia	
	WHO Headquarters	Switzerland	
23 June	WHO, Community Water Supply and Sanitation Unit	Switzerland	E. H. A. Hofkes
29 August - 2 September	International Development Research Centre	Canada	J. M. G. van Damme E. L. P. Hessing
	Canadian International Development Agency	Canada	
	Coordinator Ad Hoc Working Group on Rural Potable Water Supply and Sanitation	U. S. A.	J. M. G. van Damme
26 - 30 September	University of Technology, Loughborough	U. K.	J. M. G. van Damme
	Intermediate Technology Development Group	U. K.	
	Ross Institute of Tropical Hygiene	U. K.	J. M. G. van Damme E. L. P. Hessing
2 - 16 October	National Environmental Engineering and Research Institute	India	P. Kerkhoven
	Central Public Health and Environmental Engineering Organization	India	
	Asian Institute of Technology	Thailand	

<u>DATE</u>	<u>ORGANIZATION</u>	<u>COUNTRY</u>	<u>STAFF MEMBER</u>
	Ministry of Public Health	Thailand	P. Kerkhoven
4 - 6 October	Ministry of Health	Thailand	J. Haijkens
	WHO Country Representative	Thailand	
	DSCS (UNESCO/JNDF)	Thailand	
	Bangkok Water Supply	Thailand	
	IAWPR Congress	Australia	
	Ministry of Health	Indonesia	
	Provincial Ministry of Health, Bandung	Indonesia	
	Rural Water Supply Project in West Java	Indonesia	
	University of Bandung	Indonesia	
	Department Technology Centre	Indonesia	
	Palembang Water Supply	Indonesia	
	Netherlands University	Indonesia	
	U. S. Agency for International Development	Indonesia	
	National Water Supply and Drainage Board	Sri Lanka	
5 - 22 December	Comité Inter-africain d'Etudes Hydrauliques (CIEH)	Upper Volta	J. M. G. van Damme
	International Institute for Environment and Development	U. S. A.	
	WHO Headquarters		
	Food and Agriculture Organization	Italy	
	International Water Resources Management Centre	France	

ORGANIZATIONS WHICH HAVE GIVEN FINANCIAL
SUPPORT TO IRC ACTIVITIES IN 1976

Ministry of Public Health and Environmental Hygiene,
Netherlands

Ministry of Foreign Affairs,
Directorate of International Technical Assistance,
Netherlands

Canadian International Development Agency

International Development Research Centre,
Canada

Ministry of Overseas Development,
United Kingdom

United Nations Development Programme

United Nations Environment Programme

United States Agency for International Development

World Bank

World Health Organization

World Health Organization/
Pan American Health Organization

IRC STAFF
per 31-12-1976.

Director (National Institute for Water Supply)

Ir. P. Santema

Manager

Drs. J. M. G. van Damme

Project Coordinators

Ir. J. Haijkens

Ir. E. L. P. Hossing

Ir. E. H. A. Hofkes

Ir. P. Kerkhoven

Ir. T. K. Tjiook

Information

W. -K. Hoogendoorn

Library and Documentation

Ing. H. Franssen

Administration

Mrs. M. L. Broersma

Secretariate

Mrs. L. E. den Drijver

Miss W. J. E. Heijgen

Miss Y. E. Putman

Miss C. A. W. Reinders

ABBREVIATIONS

CEPIS	Centro Panamericano de Ingenieria Sanitaria y Ciencias del Ambiente
CETESB	Companhia Estadual de Tecnologia de Saneamento Básico e de Defesa do Meio Ambiente
CIEH	Comité Inter-africain d'Etudes Hydrauliques
CPHEEO	Central Public Health and Environmental Engineering Organization
EPA	U. S. Environmental Protection Agency
IBRD	International Bank for Reconstruction and Development
IDRC	International Development Research Centre
IWSA	International Water Supply Association
NEERI	National Environmental Engineering Research Institute
OECD	Organization for Economic Cooperation and Development
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WHO	World Health Organization
WRC	Water Research Centre

IRC PUBLICATIONS

- Technical Paper No. 1 - Plastic Pipe in Drinking Water Distribution Practice, 1971
- Technical Paper No. 2 - The Suitability of Iodine and Iodine Compounds as Disinfectants for Small Water Supplies, 1972, B. C. J. Zoeteman
- Technical Paper No. 3 - The Purification of Water on A Small Scale, 1973
- Technical Paper No. 4 - Health Aspects Relating to the Use of uPVC Pipes for Community Water Supply - Report of a Consultant Group, 1973
- Technical Paper No. 5 - Health Aspects Relating to the Use of Polyelectrolytes in Water Treatment for Community Water Supply - Report of a Consultant Group, 1973
- Technical Paper No. 6 - The Potential Pollution Index as a Tool for River Water Quality Management, 1973, B. C. J. Zoeteman
- Technical Paper No. 7 - Health Effects Relating to Direct and Indirect Re-use of Waste Water for Human Consumption - Report of an International Working Meeting - 1975
- Technical Paper No. 8 - Prediction Methodology for Suitable Waste and Wastewater Processes, Report - University of Oklahoma and U. S. Agency for International Development, 1976
- Technical Paper No. 9 - Analysis of Organic Compounds in Water to Support Health Effects Studies, A Consultants Report, 1976
- Bulletin No. 1 Community Water Supply Research, 1972
- Bulletin No. 2 Training Courses in Community Water Supply, 1971
- Bulletin No. 3 Community Water Supply Research, 1972
- Bulletin No. 4 The Story of CIPHERI, 1972

Bulletin No. 5 Meeting of Directors of Institutions Collaborating with the WHO International Reference Centre for Community Water Supply, Bilthoven, Netherlands, Report of the Proceedings, 1973

Bulletin No. 6 Community Water Supply Research, 1973

IRC PAPERS

Water Supply Support Programmes, Drs. J. M. G. van Damme

Programmes de soutien pour l'approvisionnement en eau, Drs. J. M. G. van Damme

Programmes for the International Reference Centre for Community Water Supply - IRC, Drs. J. M. G. van Damme

Water Supply: Component of Development, Drs. J. M. G. van Damme

Preliminary List of References on Slow Sand Filtration and Related Simple Pre-treatment Methods, H. Hartong

Outline of Programmes for the Second Phase of the Slow Sand Filtration Project, Ir. E. I. P. Hessing

Literature Survey on Slow Sand Filtration, Ir. P. Kerkhoven

Views and Activities on Information Services for Water Supply and Sanitation, Drs. J. M. G. van Damme

Developing Countries Techniques in Water and Waste Treatment, Ir. T. K. Tjiok

Practical Solutions in Drinking Water Supply and Wastes Disposal for Developing Countries - Contributions to a Mailing Survey (in process), Ir. T. K. Tjiok

VISITORS TO IRC

<u>NAME</u>	<u>ORGANIZATION</u>	<u>COUNTRY</u>
AUCAMP, Dr. P. J.	South African Water Information Centre	South Africa
DE AZEVEDO NETTO, Prof. J.M.	University of Sao Paulo	Brazil
BANDLER, H.	Melbourne Sewerage and Drainage Board	Australia
BARABAS, Dr. S.	Canada Centre for Inland Waters	Canada
BARKER, H. W.	National Water Council	U. K.
CALLES, Dr. K.	Comité Inter-africain d'Etudes Hydrauliques	Upper Volta
CALLEJANS, P.	World Bank	U. S. A.
CAREFOOT, N. F.	Pan American Health Organization	Peru
CHOU, T. C.	Public Utilities Board	Singapore
COLLINGE, Dr. V. K.	Water Research Centre	U. K.
DASIDA, B. R.		India
DEKEL, U.	Northern Water Supply Project, Tahal Consulting Engineers Ltd.	Ghana
DELLA TOGNA, R.	Companhia Estadual de Tecnologia de Saneamiento Básico e de Defensa do Meio Ambiente (CETESB)	Brazil
DVIR, S.	Tahal Consulting Engineers Ltd.	Israel
FEACHEM, Dr. R.	Royal Society of Tropical Medicine and Hygiene	U. K.
GAGARA, G.	Comité Inter-africain d'Etudes Hydrauliques	Upper Volta
GARRISON, Dr. A. W.	Environmental Protection Agency	U. S. A.
HOYOS, Dr. E.	INSROPAL	Columbia
INAMDAR, M. I. S.	Central Ground Water Board	India
KALBERMATTEN, J. M.	World Bank	U. S. A.
KAUL, N. V.	Central Ground Water Board	India
KHARKAR, N. V.	Municipal Corporation of Greater Bombay	India
LEFEUVRE, Dr. A. R.	Canada Centre for Inland Waters	Canada
MAJUMDER, Prof. N.	National Environmental Engineering Research Institute	India
MARTIN, R. C.	University of Oklahoma	U. S. A.
MATTOS DE LEMOS, H.	Fundacao Estadual de Engenharia do Meio Ambiente (FEEMA)	Brazil
MC EL ROY, J. P.	Aqua Europe	Switzerland
MC JUNKIN, Dr. F. E.	Environmental Services Corporation	U. S. A.
MERCIER, M.	International Development Research Centre	Canada
MERRIMAN, P. O.	Canadian International Development Centre	Canada
MORRIS, Prof. J. C.	Harvard University	U. S. A.
NARVARRO, A.	Universidad del Valle	Columbia
OKUN, Prof. D. A.	University of North Carolina	U. S. A.
PACKHAM, Dr. R. F.	Water Research Centre	U. K.
PEDNERKAR, J. W.	Municipal Corporation of Greater Bombay	India

<u>NAME</u>	<u>ORGANIZATION</u>	<u>COUNTRY</u>
PETER, Mrs. P.	World Bank	U. S. A.
PINEO, C. D.	World Bank	U. S. A.
PITTERS, R. J.	WHO/United Nations Development Programme	Indonesia
PLAS, Ir. J. F.	Aqua Europe	Switzerland
RAMRAKHAYANI, S. S.		India
REID, Prof. G. W.	University of Oklahoma	U. S. A.
ROGERS, O.	Member of Parliament	Surinam
SANGHANI, K. K.	Municipal Corporation	India
SANTING, Ir. G.	Rural Water Supply Project West Java	Indonesia
SHORROCH, Mr. J. C.	Battelle Research Centre	Switzerland
SNAMDER, M. I. S.	Central Ground Water Board	India
SUKARADJA, D.	Provincial Health Officer	Indonesia
SWANICK, M.	Water Research Centre	U. K.
Second Meeting of the Advisory Group, Slow Sand Filtration Project		
BALLANCE, Dr. R. C.	WHO Community Water Supply and Sanitation Unit	Switzerland
HUISMAN, Prof. Ir. L.	Delft University of Technology	Netherlands
VAN HAAREN, Drs. F. W. J.		Netherlands
RIDLEY, Dr. J.	Thames Water Authority	U. K.
SCHMIDT, Dr. K.	Institute for Water Research	Germany
WOOD, W. E.		U. K.
International Workshop on Hand Pumps		
ABROBAH-CUDJOE, A.	University of Science and Technology	Ghana
DE AZEVEDO NETTO, Prof. J.M.	University of Sao Paulo	Brazil
BALLANCE, Dr. R. C.	WHO Community Water Supply and Sanitation Unit	Switzerland
BENNEL, B. M. U.	Ministry of Overseas Development	U. K.
BONNIER, C. J.	Shallow Wells Programme, Shinyanga Region	Tanzania
CHAKRAVARTY, A.	Mechanical Engineering Research and Development Organization	India
COWAN, A.	Intermediate Technology Development Group	U. K.
EMMANUEL, V. J.	WHO Representative to Indonesia	Indonesia
FANNON, R. D.	Battelle Memorial Institute	U. S. A.
FREEDMAN, J.	World Bank	U. S. A.
GAGARA, G.	Comité Inter-Africain d'Etudes Hydrauliques	Upper Volta
HENRY, D.	International Development Research Centre	Canada
HUSSAIN, M. A.	Department of Public Health Engineering	Bangladesh
JAGTIANI, K.	UNICEF Regional Office	India
JOURNEY, W. K.	World Bank	U. S. A.
CHAINARONG, L.	Ministry of Public Health	Thailand
LEON DE LA BARRA, F.	Comisión Constructora e Ingeniería Santaria	Mexico
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ABDULLA, A.	Sudan Gezira Board	Sudan
BALLANCE, Dr. R. C.	WHO Community Water Supply and Sanitation Unit	Switzerland
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INGAWALE, R. T.	Government of Maharastra	India
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Third Meeting of the Advisory Group of the Slow Sand Filtration Project		
BALLANCE, Dr. R. C.	WHO Community Water Supply and Sanitation Unit	Switzerland
VAN HAAREN, Dr. F. W. J.	Delft University of Technology	Netherlands
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SCHMIDT, Dr. K.	Thames Water Authority	Germany
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WOOD, W. E.		U. K.