

AD HOC WORKING GROUP ON RURAL POTABLE WATER SUPPLY AND SANITATION  
(UNICEF, UNDP, UNEP, IBRD, WHO, IDRC And OECD)

7

GROUPE DE TRAVAIL AD HOC SUR L'APPROVISIONNEMENT EN EAU POTABLE  
ET L'ASSAINISSEMENT EN MILIEU RURAL  
(PISE, PNUD, PNUE, BIRD, OMS, CRDI et OCDE)

Meeting of the Technical Panel  
on Rural Potable Water Supply  
and Sanitation

Geneva, 7-16 Octobre 1974

Réunion technique sur l'approvisionnement  
en eau potable et l'assainissement en  
milieu rural

Genève, 7-16 octobre 1974

CWS/RS/74.14  
Original: English

LIBRARY  
International Reference Centre  
for Community Water Supply

REPORT

of the Meeting of the Technical Panel

on Rural Potable Water Supply and Sanitation

The issue of this document does not constitute formal publication. It should not be reviewed, abstracted or quoted without the agreement of the Ad Hoc Working Group on Rural Potable Water Supply and Sanitation. Authors alone are responsible for views expressed in signed articles.

Ce document ne constitue pas une publication. Il ne doit faire l'objet d'aucun compte rendu ou résumé ni d'aucune citation sans l'autorisation du Groupe de Travail Ad Hoc sur l'Approvisionnement en Eau potable et l'Assainissement en Milieu rural. Les opinions exprimées dans les articles signés n'engagent que leurs auteurs.

279  
71  
AHWGR 74

LIBRARY  
International Reference Centre  
for Community Water Supply

TABLE OF CONTENTS

	<u>Page No.</u>
I. The Present Situation	1
II. An Exploration of the Constraints	1 - 5
A. Constraints enumerated	1 - 2
B. Constraints reviewed	2
C. Economic, Social and Health Aspects	3
(i) Economic	3 - 4
(ii) Social	4
(iii) Health	4 - 5
III. The Programme	5 - 21
A. Technology Support Systems	6
B. Technological Investigations	6
1. Specific Areas	6 - 8
2. Technological Goals	8
3. Criteria for Assessing Technology	9
4. Required Activities	9 - 10
C. Education and Training	11 - 12
D. Information - its Collection, Evaluation and Dissemination	13 - 15
E. Health Education	15 - 16
F. Special Studies	16 - 19
(1) Critical Review of Past Undertakings	16
(2) Review Procedure	16 - 17
(3) Case Studies	17
(4) Health Effects	17 - 18
(5) Studies of Special Problems	18 - 19
IV. Main Conclusions	19 - 21
List of Participants	22 - 25

A group of international agencies meeting in Montreal in April 1974 created an Ad Hoc Working Group on Rural Potable Water Supply and Sanitation. The Group convened a meeting of a technical panel in Geneva from 7 to 16 October 1974 to advise it on the development of a programme of international action.

### I. The Present Situation

The lot of people living in rural areas or on the fringes of cities has increasingly become the concern of governments. From the sanitary or public health standpoint the conditions in which they live are usually extremely bad. Basic sanitary services are largely distinguished by their absence.

In spite of the statistical inaccuracy of much of the global information on the subject, it is clear that more than 1000 million people fall within the category with which the panel was concerned. Of these, more than 85% do not have safe water available to them in adequate quantity.

The prospects for 1980 are unfortunately worse. At the present pace of installation it would be optimistic to hope to reach 25% of the people in rural or fringe areas by that time. With the anticipated growth of the population of the world, moreover, by 1980 some 50 million more people will be without safe water than in 1970. At the same time the volume of human waste will have increased, further aggravating environmental pollution and leading to unnecessary illness, debility and death. Even now, fringe area populations have inadequate human excreta disposal facilities.

Stripped of the dull statistical evidence, the global facts are that:

- (a) people need and want water;
- (b) the pace of providing it is miserably slow;
- (c) the prospect of speeding up the pace over the next five or ten years is not promising; and
- (d) where installations have been provided, their maintenance and operation have been so defective that too many facilities have been left in disrepair and disuse.

### II. An Exploration of the Constraints

#### A. Constraints enumerated

Implicit in this preamble are the objectives and purposes of the Technical Panel. Can we discern the constraints on the extension of safe water facilities to rural or fringe area populations? Are we prevented from extending them by one or more of the following considerations?

- (a) Is low-cost technology absent?
- (b) Are there deficiencies in manpower throughout the whole structure of governments?
- (c) Do governments and people really want water and intend to obtain, use and pay for it?
- (d) Can we disseminate known and discoverable data more widely and successfully?
- (e) Do we know what the infrastructure will achieve in the execution of government policy at the grass roots, not only with the acquiescence but with the active participation of the people?
- (f) Do we know where to find the money to finance rural water supplies and to continue financing them?

If these constraints exist, what possible steps could be taken?

- (a) Would a survey of existing successful and unsuccessful projects disclose useful characteristics that could be used as models elsewhere, as well as the characteristics that led to failure?
- (b) Would detailed evaluation of health, economic and social benefits provide an incentive to the installation of safe water supplies?
- (c) Would increased technological research be of value? How could advances be tested for their relevance and adaptability to the very different local circumstances in different countries, regions and cultures? Are least cost systems the key to a more rapid expansion of facilities?
- (d) Is additional international machinery required? If so, what would its functions be?
- (e) Can existing agencies perform most of the desired stimulating functions, given sufficient additional resources?

### 3. Constraints reviewed

It is important to recall that, in developing countries, the infrastructure for planning, implementation, management, administration and evaluation of national programmes falls within the purview of more than one ministry. Hence major coordination is required to maximize the efficiency of this important area or function. The panel devoted considerable time to a discussion of the impediments to progress inherent in the existing institutional structures. Major attention was devoted to the changes that would bring about a more rapid realization of the goal of wider availability of water and sanitation facilities for people in rural and urban fringe areas.

It is evident that difficulties in execution stem, to no inconsiderable degree, from a lack of conviction on the part of key political and administrative personnel that this is a priority area for public and private action. The situation is further aggravated by the attendant problems of distance, scattered communities, underdeveloped or non-existing supporting infrastructure, low incomes, and identification of leaders. Manpower shortages at all levels of government are general. Strict technological or engineering deficiencies are rarely controlling constraints, although the search for cheaper facilities and methods must continue. Because of the dramatic failure in information collection and dissemination it is clear that to provide improved services will mean that a large number of steps will have to be taken together.

Accomplishing the objective will depend on governments agreeing that rural and fringe area water and sanitation services should receive a proper share of the resources devoted to national water programmes. Furthermore, water and sanitation services should be made an integral part of any rural development or agricultural project, and water resource development should rank high in social or income redistribution projects to meet the minimum needs of the low income group. It should be stressed that experience in many regions does not support the belief that these facilities represent a form of largesse or charity. In many instances, the capital and maintenance and operation costs are completely or partially reimbursed.

C. Economic, Social and Health Aspects

In scattered rural areas, the economic, social and health aspects of providing water and sanitation are of greater complexity than they are in congested urban areas. In cities, the support for improved water and sanitation on health grounds is overwhelming and the need for social inputs to ensure use is limited. As rurality and poverty increase, the economic situation and the possible technical solutions become more varied and difficult. The funds per head of population are smaller and the technical solutions more diverse as settlements decrease in size. The evidence for health benefits in terms of traditional waterborne epidemics is less strong, but there is a greater range of diseases related to water. Problems of a social nature related to use also increase and assessment of the impact is more difficult. The purely financial aspects of water provision is less compelling.

In these circumstances the strategies of water and sanitation development in rural areas range from heavy reliance upon financially self-supporting projects to assistance to impoverished groups. Between these extremes the needs for improvement differ from both the social and the health point of view, and the differences need to be taken into account.

(1) Economic

It is possible to identify and measure certain economic benefits directly attributable to rural water supply and sanitation improvements. Some of the enlarged country programmes have been supported on the ground that they are justified in economic terms. For example, it is said that improved water supplies will increase the quality and quantity of farm labour, that it will help slow economically harmful migration to the cities and that access to water directly facilitates desirable changes in farm practices. Such reasoning is plausible, but it must be stated that several studies show little or no change in the level of labour supply and little or no productive use of any improved labour supply. Indeed, there is some indication that migration to the cities has not slowed down following improved water supplies. Farming practices often do not change despite the evident new opportunities created by the supply of water to farms.

For these reasons the economic justification for rural water investment as presently executed is weak and tortuous. The authorities responsible for promoting rural water programmes should face up to this. Furthermore, the poor economic prospects will inevitably lead to financial problems when projects are undertaken on a reimbursement basis.

Nevertheless, in certain circumstances economic gains from improved water services may be anticipated. Economic benefits will not stem from water supplied in isolation, but as a joint response from integrated rural development. Therefore, if economic gains are required to justify an expanded rural water and sanitation programme, a range of complementary inputs should be made available simultaneously. These would include agricultural extension services, credit and the supply of fertilizers, crop protection chemicals, and animal husbandry requirements. Economically oriented programmes should be tied in some way to agricultural development projects and programmes, and possible alternative institutional arrangements to facilitate this should be explored.

Whenever new rural development schemes are put forward, they should be examined with a view to securing that, so far as practicable, adequate provision is made for water supply and sanitation. In some agencies this would require changes in priorities, in others changes in design and appraisal procedures.

(ii) Social

Despite the obvious attractions of identifying areas of maximum economic gain from water and sanitation investment, little change is likely in the scope and purpose of current investments if an exclusively economic aim is pursued. However, because the present status of many rural water supplies is extremely poor and in some cases deteriorating, a strong case for improvement can be made on social grounds. People are entitled to a healthy living environment and to household comfort and convenience in so far as these are available at suitable cost.

Making a case for living standards below which the conscience of the community cannot permit people to live is not too difficult. Specification of the exact components that make up minimum acceptable standards is far more difficult. But no one denies the central rôle of water supply and wastes disposal in human welfare, the poor status of many existing supplies as judged by health, reliability, proximity, quantity or other criteria, and the grave risk of deterioration of even the present water supply and sanitation systems as the population continues to grow. In this state of affairs some form of water improvement has high priority in any genuine rural development strategy.

If the infrastructure in countries was better developed, the international community, the governments and some of the potential beneficiaries would probably take steps to improve the present inadequate provision for this sector. Perception of needs generally precedes by a varying margin the response to needs. However, the relationship between knowledge and action is complex. Studies relating to the infrastructure are needed now in order to attract the critical attention that will translate a knowledge of needs into action at the farmstead, village, urban and national level.

(iii) Health

If social needs are the main justification for providing rural water and sanitation facilities, increased health is the most clearly defined social gain. Studies are therefore needed both to assess the health benefits from improved water and, in the allocation of resources, to obtain these benefits at the lowest cost. We interpret "health" in the broad terms in which it is defined by the WHO Constitution, and include those infections and infestations (such as many skin diseases, scabies and lice) which make for misery as well as clearcut disability.

In cities the need for safe water is manifested chiefly by the need to prevent epidemic waterborne disease. In rural areas the need for further health data should not be allowed to delay the beginning of an extended rural programme. However, the health benefits of rural water and sanitation are inadequately known; the studies that have been made are rarely quantitative in relation to improvements, relatively inconclusive because of design defects and unstandardized methodology, and incomplete in their coverage of diseases. While the reduction in strictly waterborne diseases in rural areas may be rather less than hoped for, improved water and sanitation may affect a greater range of diseases than is widely appreciated. These include a large number of skin infections (sometimes affecting a quarter of the population at once)

and purulent eye disease sometimes leading to blindness - conditions that depend in part on poor personal hygiene, which is unavoidable when water is scarce. Other disabling worm diseases multiply in organisms that can inhabit rural water sources. Insect vectors of disease may breed in water sources, in water storage containers, in latrines and in surface drainage. Work on waterborne disease so far has been stronger on epidemic than on endemic infections, and the latter can have large but easily missed effects on morbidity.

If the momentum of increased rural water and sanitation programmes is to be maintained, economists and planners will rightly demand evaluation of their health benefits. This will be needed for comparison with the benefits from other social and economic improvement projects. In addition, where the main aim of water and sanitation is better health, competition will be against alternative health projects with the same goal.

For these reasons, there is a need for a limited number of health evaluations of water and sanitation improvement projects, with measurements before and after the improvements. A quicker method of assessing likely health gains in other communities, to assist in determining priorities, would be most useful.

### III. The Programme

If rural water supply has fairly obvious desirable attributes, why is there dissatisfaction at the present status and pace of improvement? To answer this question it may be useful to distinguish between technology constraints and support systems. Technology consists of the pipes, engines, designs and the schemes they make up. The support systems are the legal, economic and institutional backing that facilitate some degree of social control. The technology of water supply is well established; the technology of wastes disposal is less so. This does not mean that technological research might not reveal ways of allocating existing resources more judiciously, new ways of performing defined functions, ways of giving early warning of problem areas, and so on. On the contrary, such research objectives are laudable. The question is whether technology is at present the key constraint with regard to water, and to a lesser degree to wastes disposal. Research on support systems is unquestionably vital, particularly in relation to such problems as different methods of management of the operation and maintenance services, different rating and financing procedures, different systems of scheme selection, and local participation. Research can be carried out partly by studying alternative support systems in various countries, but the planning of water programmes needs from the outset to integrate the social, economic and legal aspects with the technological aspects.

Three groups contribute to the process of providing basic rural services. They are the technicians (engineers, doctors, sociologists, economists, agriculturists and planners), the politicians and the beneficiaries. Each group must learn to listen and appreciate if the whole system is to be improved. It is possible to view the failure of effective action by the three groups as a significant obstacle to efficient programmes of water supply and sanitation improvement.

## A. Technology Support Systems

The main conclusion of the Technical Panel on the question of technology was that it cannot truly be considered either a weighty or a controlling constraint. Certainly there is the opportunity of important advances in technology, but the main impact on environmental health and welfare will come from the application of known technology. This application will only be achieved if the support systems are vastly improved, and in this area research is of high priority.

The word "research" is not a precise term because of its very different connotations. Much of the research recommended below is really part of good planning procedure. However, the studies recommended may be termed research because most 'planners' do not at present have the resources or even the aptitude to carry out the sustained practical investigations necessary to derive sound plans that will command the requisite attention and be translated into appropriate and efficient operating rural water supply and sanitation services.

The Technical Panel was conscious of the need for research on support services and also of its limitations in making recommendations in this area. A much wider range of disciplines than that represented here needs to be consulted. It recognized, however, that any research-promoting body should be very open to research proposals in the field of technological support.

## B. Technological Investigations

### 1. Specific Areas

Despite the previous, somewhat negative, conclusion regarding technological research, certain opportunities do exist. There are four areas in which investigations might proceed and where the search for innovative ideas can be pursued. These are:

- (i) existing technology used effectively in some developing countries but not known or appreciated elsewhere;
- (ii) known technology which has been abandoned (especially in developed countries) because of changing economic and social circumstances, but which might be revived in rural areas in developing countries;
- (iii) known technology which might be improved by redesigning in the light of modern scientific knowledge and the availability of modern materials;
- (iv) new technology which has become possible as a result of recent scientific and technical advance.

#### (a) Existing Technology

Any informal survey of water supply and sanitation technology now in use in rural areas in developing countries will reveal an enormously rich variety of methods and approaches. Methods of developing water resources for domestic potable



supplies are very different in Brazil, Indonesia and Iran. Much might be achieved by the careful selection, adaptation, testing and introduction of methods from one part of the developing world to another. However, one cannot simply take the khanats of Iran and expect them to fit into or gain immediate acceptance in other cultural realms or other climatic and geological conditions. The suitability of a technology needs careful evaluation and testing before it can be introduced on a pilot scale. Nevertheless, a systematic survey of successful technologies now in use in limited areas can be expected to reveal opportunities for fruitful transfer to other developing countries.

(b) Disused  
Technology

In the developed nations the present water supply and sanitation technology did not spring to life overnight. It emerged as a result of a slow evolution during which many earlier forms were discarded. These discarded forms are no longer generally available. Some of them may be especially suited, however, to the present-day needs of rural areas in developing countries. Before such disused technology can be recommended it is necessary to make careful inquiries about the reasons for its abandonment. In certain cases this may have been due to the high cost of labour. Under such circumstances its use in some developing countries today might be strongly indicated. If such technology was also associated with inadequate protection of health, however, it would be inappropriate for present-day use without modification. Methods considered include simple but effective water treatment including filtration and disinfection. A survey of disused technology coupled with a careful evaluation of its potential for present-day use offers another potentially fruitful direction for investigations.

(c) Blending  
the old  
with the new

In both the above cases (existing and disused technology), opportunities exist to redesign equipment in the light of modern scientific and technical knowledge, using modern materials where appropriate. For example, wind-driven pumps have long been used as sources of power for lifting water, and many traditional designs are available. Now, however, it is possible to make much more efficient pumps using newly acquired knowledge of aerodynamics, newly developed fabricating materials, and new engineering designs.

New designs for small manually operated pumps might also be created by substituting new materials (e.g. plastics) for old as in the case of the experimental foot pump (the African pump) being developed at Ouagadougou by C.I.E.H. (Comité inter-Africain d'Etudes hydrauliques).

Such innovations require the skilful blending of well-known principles with modern materials and designs. The prospects for useful new technology in this direction seem especially encouraging.

(d) New  
Technology

It is difficult to imagine an invention in water supply and sanitation technology that is fundamentally new in some unforeseen way. However, the African pump is new in that it operates on a principle of displacement rather than on the piston action of a conventional reciprocating pump. By definition, it is impossible to describe new inventions of this kind before they arrive. While there is general scepticism about the possibility of the appearance of anything radically new, it would be a mistake to close the door completely on the sort of imaginative thinking that might give rise to such an eventuality. Stimulation of imaginative ideas by an expanded and coordinated programme of research and development along the three lines suggested would help to create a climate favourable to the emergence of new ideas.

2. Technological  
Goals

The activities proposed cover a range from fundamental research to field testing and pilot projects. The need and opportunity for research of a more fundamental sort is small, but this should not be entirely excluded. The main activity required is for applied research which will take ideas from existing technology and adapt it to the needs of rural areas in developing countries. This investigative work in technology adaptation would focus on the basis of engineering design of projects, as well as of the design and redesign of equipment and the substitution of materials.

The development of a programme of research and development in technology would lead to the provision of new items of equipment which, when integrated with existing technology, would offer the possibility of more rapid expansion of improved water supply and sanitation facilities.

Several meetings at the international level have been held in recent years to prepare suggestions for a technological research programme. These include technical panels established by WHO, meetings of the directors of collaborating institutions at the international reference centres for water supply and waste disposal, and seminars organized by the International Development Research Centre, Ottawa. As a result of these and similar efforts, engineering personnel are more conscious of research opportunities and needs for rural communities. Proposals for research activities are beginning to emerge spontaneously from institutions in the developing countries. This trend would be greatly encouraged and strengthened by the establishment of a coordinated international programme. A specifically rural focus would bring ideas to light that have been overshadowed by the past focus on the problems of the major metropolitan centres.

A number of specific research suggestions have been developed by the panel. These show some similarities to lists that have been recently prepared by other groups of experts but have some important differences. Specific suggestions for technology research are less crucial at this stage, however. Once the international programme is under way, full-time professional staff will be responsible for identifying priority research activities and drawing on the best available advice.

### 3. Criteria for Assessing Technology

A programme for technology geared to rural and fringe areas should satisfy the following criteria:

- (i) it should be at as low a cost as is practicable without jeopardizing the effectiveness of the improvements sought;
- (ii) it should be easy to operate and maintain at the village and community level, not demanding a high level of technical skill or requiring a massive deployment of professional engineers;
- (iii) it should rely as much as practicable on locally produced materials rather than on externally provided equipment and spare parts;
- (iv) it should make effective use of local labour and avoid the displacement of labour;
- (v) it should facilitate and encourage the development of local capacity to manufacture needed equipment and parts under the leadership of entrepreneurs;
- (vi) it should facilitate the participation of village communities in the operation of the water supply and sanitation systems, including the choice of technology and maintenance;
- (vii) it should be compatible with local values and preferences.

### 4. Required Activities

An effective programme of research, adaptation and testing includes a number of centralized functions and a number of field project functions. The centralized functions do not necessarily need to be concentrated in one place, but they do need substantial facilities including libraries, data storage and processing facilities, chemical and biological laboratories, drafting equipment, machine shops and the like. They include technology surveys, collection and evaluation of information, technology adaptation and engineering, materials selection, equipment construction and testing, and the dissemination of information.

The purpose of the centralized functions is to create and provide an appropriate centralized pool containing a variety of skills and experiences. The professional manpower would include engineers and other specialists, some permanent staff, others drawn in on a consulting basis. It is envisaged that the centralized functions might begin as soon as possible with a slowly increasing budget over the period. Provision would be required for periodic review and assessment.

The field project functions include the provision of field personnel, technical and research contracts, demonstration works and installations, and operation and maintenance.

Dissemination of information and of research results is crucial to the success of the operation. While reports, publications, manuals and the like are of great value and should be utilized, the panel puts more faith in the spread of innovation by demonstration projects and the associated use of manpower training programmes. Alongside the centralized functions, therefore, a manpower training programme should be established. This might be for the training of teachers who will form the staff of national training institutes, especially at the sub-professional level.

A coordination mechanism is essential at a high level to provide general guidance and to help in the channelling of funds. The mechanism should be closely coordinated with international organizations, national aid agencies and nongovernmental organizations. Provision for inputs of technical advice at the coordination level would also be required.

A substantial degree of independence of operations is necessary in order to maintain flexibility and ability to carry out research free from institutional constraints. Close contact should be maintained with organizations active in the world, including the United Nations system of organizations, bilateral aid agencies and nongovernmental organizations. The programme should be flexible enough to respond to the wide variety of conditions and needs found in developing countries. It should be in a position to cultivate imaginative and innovative ideas.

As new improvement schemes get under way with innovations in organization, design, execution or linkage with other development programmes, it would be important to provide for ongoing evaluation of what happens with a view to drawing lessons and suggesting possible ways of improving the operation.

Areas would be selected to be representative of larger project areas.

Social evaluation should begin with the planning and include baseline observation, it should continue for at least three years after construction is complete, and should be considered an integral part of the project and the construction budget.

Field work would comprise demographic land use and economic data collection, interviews, and participation in project operations. It would call for skills from anthropology, economics, engineering, geography, sociology and related disciplines. The project operations should be viewed as community-structured and linked to individual behaviour and, in turn, should provide an opportunity to find out what people want, prefer, or know. Education of the public would then be helpful in achieving or modifying its aims.

Observations and analysis should be carried out by personnel not directly connected with the operation of the project, but should be shared from time to time with project administrative officers. Institutions responsible for individual evaluations should be expected to follow general guidelines worked out at regional workshops, but should be encouraged to experiment with additional parameters and techniques. They should have the capacity to organize multidisciplinary teams and to provide continuity in analysis. By drawing upon advanced students in engineering and the social sciences they could cultivate among those professional groups a deeper understanding of the processes of rural water and sanitation development.

Guidelines for evaluation and monitoring should preferably be the concern of the same institution as carries out the critical review. It should not attempt to direct individual studies, but should provide for communication among them and for assistance on questions of methodology and of generalization.

C. Education and Training

Technological research and development and health, economic and social studies will all be important parts of the education and training of those concerned with the development programme. The major input into the programme will be engineering, but the education of other related workers is also necessary. It is usual to find that the main manpower bottleneck is in professional engineering cadres, sub-engineers and at trade levels. Conditions vary from country to country, but in many countries there is a scarcity of personnel. The extent of this deficiency should be assessed in each case before launching a new programme.

If research and development reveal new techniques or if new policies dictate new approaches (e.g. labour-intensive solutions), the retraining and updating of engineers become important. Retraining may be best carried out by effective dissemination of information, as discussed below, but refresher courses have a rôle.

The form of training appropriate for different countries varies considerably. Some countries lay more stress on in-service training than others. Training for civil or environmental engineers cannot usually be adapted to meet the precise needs of all rural water programmes; conditions in rural areas differ so much that some retraining is generally required. Manpower planning in this area is generally weak. A valuable international picture of such needs is given in the various IBRD and WHO sector surveys.

Of all the constraints operating in this sector manpower needs are the most amenable to change. This cannot, of course, be achieved overnight.

One educational step often overlooked that could have great impact in the long run on the priority accorded to water is the stimulation of interest in environmental health topics in lower schools. It might also help to increase the quality and quantity of candidates for a professional career in this area.

International organizations can assist countries in many ways to meet their needs for education and training. Some of these ways are:

- (i) assistance to national manpower surveys in implementing rural and fringe area water supply and sanitation projects;
- (ii) assistance in promoting planning capacity and facilities for training and education;
- (iii) assistance to universities in the improvement of undergraduate civil engineering curricula so that they have more relevance to rural water supply and sanitation;
- (iv) the promotion of the temporary transfer of qualified manpower to countries with shortages;
- (v) making available fellowships for public health engineers and other professional personnel needed for the programmes.  
(Fellowships for study abroad should only be granted where there is no appropriate facility in the country and, furthermore, they should only be granted to personnel either with previous experience in and/or commitment to rural water supply and sanitation programmes.)

The international community could further promote education and training activities which do not pertain to a specific country, such as:

- (a) The development and distribution of teaching aids (the conception of teaching aids requires imagination and skill but they are powerful aids when applied for the purpose intended).
- (b) The preparation of textbooks, etc. in various languages and also printed material specifically designed for the education of the general public. It will not be sufficient to adapt or to translate existing texts. The contents of the material to be published should have a high relevance to the conditions in the rural regions of the countries where they will be used. The material destined for a wider public will have to be imaginative and local people should be engaged in its preparation.
- (c) Collecting and disseminating material on existing and newly designed curricula teaching material and on organizational forms for educational and training programmes as an aid to those who may develop such new curricula and programmes.
- (d) The continuous training of teachers at all levels. Many teachers obtained their education at institutes where the conditions of urban and industrialized regions were of primary interest. Many find difficulty in keeping abreast of newer developments in rural water supply and sanitation. Teaching personnel should, therefore, regularly be brought into contact with newer developments. This can be done by inviting them to special summer schools and by arranging field visits. Whenever possible, teachers should be given the means and motivation to spend a longer period of work in rural regions.
- (e) Training courses in industrial countries for postgraduate public health engineers from overseas should be strongly oriented towards the needs of rural areas and should contain adequate amounts of appropriate epidemiology.
- (f) Apart from the professional and sub-professional groups, it is essential to seek out individuals in villages who may be the key to the acceptance and use of the ideas described. Their education and training and their enthusiasm for the task may represent the difference between success and failure in the implementation of the programme.

A successful strategy requires a multidisciplinary approach and education and training should therefore be given to chemists, biologists, agronomists and other specialists appropriate to the special needs of a country. Present curricula, particularly for engineers, in many but not all instances contains too little on the social sciences and economics.

The rural sanitarian, when wisely prepared, is a source of great strength and indispensable. By whatever name, he represents a resource that should be developed where he does not exist and husbanded and further educated where he does exist. Unfortunately, rural areas have sometimes become the dumping place for less effective workers dropped from the more lucrative national and provincial levels. This practice obviously must be reversed. The complexity of rural and urban fringe areas requires the best equipped, not the least equipped, workers.

D. Information - its Collection, Evaluation and Dissemination

A great deal of information on various aspects of rural and fringe area water supply and sanitation is currently available. The collection and transmission of this information to countries, institutions and people that need it may help to remove one of the obstacles to an accelerated programme. While published research may be readily available through journals, other information is not easily available but may be of potential use to policy makers and programme managers. Such information includes:

- (i) innovative technologies;
- (ii) patterns of financing;
- (iii) institutional structures;
- (iv) successful and not-so-successful experiences in promoting rural programmes;
- (v) types of personnel and their effectiveness;
- (vi) training methodologies;
- (vii) patterns of community organization;
- (viii) guides, manuals and other audiovisual materials developed and under use, etc.

Because of the inaccessibility of much of this information and financial and organizational constraints, a programme of information collection and dissemination to be successful will have to be sponsored and financed initially through international efforts.

A system to reduce the present gap between the generation of knowledge and its use might be evolved by developing clearing-house functions. These are indirect ways of exchange of information between producers and users. The Panel were divided on the question whether this would bridge the gap. The proposals are tentative in nature and need further assessment by the Ad Hoc Working Group. *to think*

Clearing-house functions include:

- (1) the collection of materials - publications, maps, films, tapes, training materials, unpublished documents, etc. - that are of importance to research workers, decision-makers and educators;
- (2) surveys of institutions dealing with research, training and demonstration;
- (3) evaluation of information;
- (4) the provision of access to information, calling attention to new ideas, and stimulating interest and action by judiciously providing materials to decision-makers, researchers, etc.;
- (5) publishing activities;

- (6) the dissemination of information through publications, workshops, seminars, training courses, etc;
- (7) the conduct, analysis and evaluation of communication research to identify and overcome barriers in the exchange of information;
- (8) the organization of feedbacks so that researchers can adapt their work to the needs of users;
- (9) training for clearing-house staff;
- (10) the storage of information including cumulative indexing, microfilming, the computerizing of part or all of the information, its transfer into bibliographical form, etc.

On the ground that the above objectives and functions are valid, the Panel recommends the establishment of an institutional network for communication flow (rough international assistance). The institutions within the network should be named "information centres". Their functions are indicated below.

*Ref.*  
(1) International Information Centre

An international information centre should be established staffed by a multidisciplinary team consisting of engineers, administrators, social scientists, communication specialists, trainers, etc. The need for a multidisciplinary staff cannot be overemphasized in view of the expected functions of this centre. Physical facilities, easy access, communication facilities and staff recruitment possibilities may be the criteria for the location of such a centre, which should be exclusively for rural and fringe area water supply and sanitation activities so as to attract priority attention. The centre should also have sufficient autonomy and flexibility for its operations, once the policy decisions governing its work are taken.

*plus CEARIS*  
*+ CEYSE*  
(2) Regional Information Centres

The second tier in the information network is the regional information centres. While the present grouping under the WHO regions could be made a starting-point, this should not act as a constraint for regrouping if required or locating more than one centre in one of the existing regions. What is important is that the countries proposed to be served by the regional centres should have the freedom to use them. They should also contribute financially towards its operations so as to generate a sense of ownership. The staffing pattern and functions of the regional centres should be similar to that of the international centre, but their sphere of operations should be confined to the countries they serve.

Whether the information centre is in effect to become a research institute commissioning and/or carrying out demonstration project evaluations, etc. is really a key question for the Institute Panel. Would they also have a direct training function?

*7/11/74*



(3) National Information Centres

National information centres located in countries would form the third tier in the network. Initially, large countries where diversities exist and activities in the field of rural water supply and sanitation are sufficiently extensive may be helped to set up their own information centres. Savings could be effected by locating them along with information centres developed for other health activities or as part of existing research institutes for water supply and sanitation. Ideally these centres should have a nearly autonomous administrative set-up, free from bureaucratic controls.

E. Health Education

Progress in the programmes depends essentially on the behaviour of people - at government level as well as at the grass roots. Perhaps the greatest constraint is in the local perception of needs and consequent way of life. Long-term social and cultural patterns, if they are to be changed to the advantage of people, must be changed by the people themselves. The art of assisting them to change is a most subtle and difficult one - rarely successful when practiced by unskilled and unperceptive individuals.

The present-day needs of which we speak are too great to be met by government funds only. Rapid progress will be conditional upon the readiness of the community to contribute personally and financially to increased health and comfort. Experience has shown that such community participation can be elicited through sound educational efforts.

Health education, therefore, should be part and parcel of all programmes aimed at rural water supply and sanitation development. Special attention must be paid to:

- (i) integrating health education with planning for environmental health projects, a process requiring international and national help in (a) persuading environmental health planners of the need for health education; (b) providing them with competent health education personnel; and (c) furnishing them with the relevant technical literature;
- (ii) integrating health education in manpower development programmes in environmental health.

Educational efforts should be particularly aimed at political, religious, occupational, professional, industrial, women's and other special groups. Their involvement will create the necessary social climate within which changes might take place.

Special attention must be paid to school-age children and the young to inculcate in them hygienic habits, beginning from their early life. Environmental health instruction should be incorporated in the curricula of schools, necessary sanitary facilities provided in schools, teachers oriented towards environmental health, and literature and equipment supplied to schools.

It will be necessary to analyze the factors that facilitate or act as barriers to community involvement; to ascertain the attitude of political decision-makers toward environmental health; and to develop the health education approaches most suitable for the promotion of safe excreta disposal programmes within the understanding of the people. Hygienic habits require major adjustments in individual understanding, acceptance and behaviour.

#### F. Special Studies

To build soundly upon different experiences and to broaden the outlook and impact of current efforts will require immediate study and several longer-term research projects tied closely to the execution of new improvement projects. The work linked to new projects will involve evaluation of their problems and yield, including their health effects, in selected localities. It could also provide for studies of special issues emerging as the programme moves ahead.

##### (1) Critical Review of Past Undertakings

Although the available literature on rural water supply and sanitation is summarized in several places, a critical review needs to be made of the factors that account for the success or failure of improvement schemes in a wide variety of environments. There are over a quarter of a million of these. The more common explanations for the slow pace at which improvements take place include the level of national or external funding, shortage of trained personnel, inadequate administrative organization, limitations of practicable techniques, planners' attitudes and weak village organization or leadership. Not enough is known as to why some rural groups vigorously seek water and sanitation improvements while others are apparently satisfied with contaminated water supplies; why certain groups contribute heavily to new schemes while others do not; or why some projects are maintained while others fall into disrepair. Much of the information is anecdotal; perceptive observations are mixed with excuses.

The time is ripe to take stock of experience and to subject it to a searching assessment. A specific institution should be charged with the task of examining the literature and preparing a review of the relative importance and interactions of the various factors in different environments. This would make explicit at the working level much that is now obscured by generalities or by justifications for new programmes.

##### (2) Review Procedure

The review should recognize the diversity of economic development and the difficulty of generalizing from one social or physical setting to another. It should accordingly be accompanied by a rough classification of areas in developing countries according to the combination of factors thought to be significant. The resultant map and text would be a first attempt at designating a number of areas with common characteristics in relation to water supply and sanitation.

From this review and classification suggested guidelines may appear for the conduct of case studies of selected improvement activities. The case studies would require field work over a few months and should be made by research institutions or universities in developing countries. The latter should adhere to the agreed guidelines sufficiently to assure comparable findings but should be encouraged to look into any other promising leads. The national and district authorities concerned should be involved in advising on the case studies.

### (3) Case Studies

The review and proposed guidelines for case studies should be examined in a series of regional workshops in Africa, Asia and Latin America, with representatives of the institutions and government agencies concerned. After the studies are completed the same groups would meet to consider the findings before a final version of the review and the individual case studies was released. They would be associated, as far as practicable, with the people taking part in project evaluation, and would be linked with the information centres.

This review would provide the first systematic and comprehensive sifting of world experience. It also would involve and bring together within a year's time a large number of research institutions and government agencies in developing countries that could be expected to bear the responsibility for a continuing appraisal of improvement schemes.

Responsibility for the critical review should rest with an institution that is prepared to maintain its interest in research and project development related to water supply and sanitation. It should have access to engineering, medical and social disciplines and aid in the coordination of project evaluations.

### (4) Health Effects

The required programme of work in health resembles that put forward for social investigation except that most of the component parts of a critical review have been produced in the last few years. Emphasis needs initially to be on the standardization of methods and case studies in the field. As the organization and staffing of assessment surveys are more complex and expensive than for the sociological work, there should be no question of a detailed health assessment of all improvement projects, but rather a selection of only a few (say 6) covering a range of environmental conditions and levels of living.

As for social and technological studies, an institution is needed that will maintain its interest in the epidemiological assessment of water and sanitation projects over a decade. Its functions would include helping with the selection of projects for evaluation, research on the methodology of assessment and the selection of indicator conditions so that a rapid survey technique can be developed. It would assist local teams with the design of health evaluation, provide help in data analysis if needed, and integrate the separate field studies into a coherent body of knowledge.

Standardization of survey methodology would be best achieved by meetings with the field epidemiologists under WHO auspices. Such meetings would take place regularly.

Field studies to measure the health benefits of improved water and sanitation should be linked with a small number of operational or demonstration projects of both standard and innovative type. The prevalence of diarrhoeal, skin, febrile and eye diseases and of some specific infections would be determined by a standardized methodology in a population not exceeding a few thousand people before and after the improvements. A control group would be included.

Each field study, which would require an epidemiologist and supporting nursing and technical staff, would be based on a local medical school or institution. Additional laboratory investigations would be handled within it, since to set up complete new facilities would not be feasible. Intensive field work would occupy two or more periods of about a year, separated by the construction of the water improvements. Medical students might be involved in the intensive field work; this would help in their training and orient them towards rural sanitary problems.

Several of the social case study sites should be evaluated in detail from the health viewpoint. The others would need a brief qualitative health assessment. One aim of the health field studies would be to detect and validate epidemiological index conditions for use in rapid surveys. These could then be applied at low cost at other sites.

#### (5) Studies of Special Problems

In a programme that expands rapidly and in some new directions it is to be expected that problems will arise that require early and sophisticated study by highly trained workers. Provision should be made from the outset to deal with a number of those problems by making grants to qualified individuals or research institutions. The funding should be flexible so that troublesome questions are studied soon after they are recognized.

The anticipated character and scope of three such problems may be shown by examples. Much more needs to be learned about what conditions in various cultures affect individual perceptions of the health risks from poor sanitation. This is basic to an understanding of how new information in alternative forms will influence individuals, village workers or groups in considering proposed improvements. Sound answers require more than opinion polls. There is no assurance that conventional printed materials will be effective or even that demonstrations will alter a community's attitude toward causes of disease. Nor is there any direct correlation between the attitudes people express and the actions they take.

A second problem is what forms and what channels of communication will affect the behaviour of people in dealing with innovations in techniques. Government planners, village leaders, health workers and professional engineers may be expected to respond in different ways to the same scientific information, depending on the means by which it reaches them.

A third problem relates to the conditions in which self help is generated in very poor agricultural groups and in dispersed settlements. Inasmuch as these are the areas in which change may be very slow or the cost very high, it is specially important to identify ways in which local initiative gathers force.

These are only examples of possible lines of investigation. Others may well emerge as more urgent, such as administrative responsibility and disease transmission.

#### IV. Main Conclusions

The primary objective of the panel was to consider activities and suggest programmes that could assist governments in strengthening their capability to deal with water supply and sanitation for people living in rural and urban fringe areas. It also considered the institutional framework needed for attracting national resources to this field, so that investments by governments and by the people concerned would be encouraged and the resources needed mobilized. The objective was obviously not to supersede ongoing activities but rather to strengthen them.

The panel was concerned with the prospects for removal or alleviation of constraints resulting from operational frustration and difficulty. Constraints are caused primarily by a lack of appropriate national and local infrastructures - less dominant problems are internal and external financing. Improvement in this respect will be difficult and slow.

Several other constraints may be reduced more quickly through technology or engineering adaptation and increased community involvement in the selection of the level of improvement desired and in more efficient operation and maintenance. The adaptation of technology to rural conditions is certainly feasible and ways of moving more effectively in this direction have been described in the report. Community interest and involvement pose a more difficult and challenging problem. The identification of the perceived needs of the users of facilities that will lead to new approaches acceptable to users is not simple and will require both time and skill.

The alleviation of these constraints is fortunately not one that will require a great deal of money, but it will require new perspectives, improved means of communication, more information and more personal contact with the local communities.

Even with the best of low-cost technology and a convincing demonstration of the health, economic and social benefits, appropriate action will be largely contingent upon the development of managerial machinery at international, national and grass roots level. It is axiomatic that one gets nowhere without appropriate mechanisms for the implementation of agreed objectives, which in turn must be grounded upon the perception of needs and continued motivation at the various levels of government and people.

It is not an oversimplification, therefore, to suggest that actions should be directed primarily at:

- (a) identifying machinery at the international level that will be responsible for promoting the programme, and giving it the necessary financial resources to accomplish this task, existing organizations having long and extensive experience in these areas being called upon to the maximum extent possible;
- (b) convincing governments that they should do more; and
- (c) developing the programmes and approaches appropriate to each country, since it may be assumed that no two countries are likely to have either identical programmes or exactly the same approaches.

The implementation of the programme presented depends on substantial resources becoming available. The funding of this programme offers an opportunity of collaboration between a number of international and national organizations and agencies, since it is improbable that any single organization or agency will be able to finance all the activities proposed. Organizations and agencies interested in supporting the programme will wish to meet to review the various requirements of the programme, financial and other, and to decide how best to manage and assemble funds that might become available. At this stage potential donors will need guidance with respect to the priority and feasibility of the components of the programme, individual projects, and any other aspects of programme implementation. The experience of existing organizations would be utilized to make the necessary arrangements, which could include the establishment of a panel of experts from various disciplines for periodic review of specific programme proposals, guidance on their implementation, and evaluation of the progress achieved.

Some organizations have had experience in implementing projects similar to those proposed in this programme, including research and institutional projects. Such organizations may be in a position to make suitable arrangements to handle the financial resources that might become available for the programme, on the basis of financial and administrative policies acceptable both to the donors and to the organizations.

The next step would be to bring potential donors together to consider the recommendations made in this report as well as in the report of the Panel on Institutes.

The convening of a group of interested parties is recommended. Such a group would meet intermittently to review ongoing programmes, suggest new activities, assess the general progress and act as a permanent stimulus. Its composition should be variable, but always representative of donor and action agencies. Its secretariat might well be within WHO.

At national government level, each country should determine its present investment levels, present needs, and present institutions or instruments for action. Goals and costs should be determined so that the extent of the expanded rural and fringe area programme is agreed upon and modes of implementation are created, where they do not exist.

A method of advancing these purposes may be the establishment of a demonstration project in each country, which will serve (a) to define village approaches and techniques; (b) to establish criteria useful for the country as a whole; (c) to determine manpower and training needs accordingly; (d) to prepare projects requiring external financing; and (e) to develop institutional arrangements to implement the programme.

Such a project might well provide a training area for personnel to be assigned later to the larger project area.

These proposals depend heavily on the dissemination of information, external and on-site training, and technological research adaptable to countries. Stimulation and coordination of such activities are a major international responsibility in augmenting and facilitating action at the country level. They are of an ongoing nature and should not be considered as a prerequisite to immediate action within countries.

The fact must be faced that persuading governments to expand the programme requires detailed negotiation with national planners, finance ministers and political leaders, whose daily task - one of formidable proportions - is to match objectives against uncomfortably restricted resources. The coupling of rural water supply and sanitation development with broader national purposes such as food production and community development then becomes highly important.

The panel was not assigned the task of estimating the cost of its proposals. It may be said, however, that the annual expenditure on research, the dissemination of information, catalytic and stimulation activities and coordination, is likely to be of modest proportions.

A last proviso is important. A number of elements in the programme have been set forth. Support for any one element will be ineffective in advancing the programme unless it is closely linked with support for each of the other elements. No priorities or invidious selections among objectives are suggested, but the guiding emphasis should be upon unification of the processes at the level of urban fringe areas, discrete agglomerations of rural people, villages and farms, in close association with research centres and field training and education activities. The details of these processes are given in the report.

Consideration of research institutes and international reference centres in the light of their present and potential functions was likewise not included within the tasks of the panel. Another group is examining them from the point of view of their contribution to the advancement of rural and urban fringe area water supply and sanitation.

LIST OF PARTICIPANTS

Chairman:

Mr Myer Cohen  
~~International Development Research Centre~~  
680 Fifth Avenue, Room 2302  
New York, N.Y. 10019  
United States of America

Participants

Professor J. de Azevedo Netto  
Av. Angelica 1814  
01228 Sao Paulo  
Brazil

Professor D. J. Bradley  
Ross Institute of Tropical Hygiene  
London School of Hygiene and Tropical Medicine  
Keppel Street, Gower Street  
London WC1E 7HT  
England

Professor I. Burton  
~~International Development Research Centre~~  
Box 8500, Ottawa  
Ontario K1G 3H9  
Canada

Professor I. D. Carruthers  
Agrarian Development Unit  
Department of Economics  
Wye College (University of London)  
Wye, Near Ashford  
Kent, England

Professor Richardus Harjoko  
Institute of Technology  
Bandung  
Indonesia

Professor G.v.R. Marais  
Department of Civil Engineering  
University of Cape Town  
Rondebosch, Cape Town  
South Africa

Professor L. Mostertman  
Director  
International Courses in Hydraulics and Sanitary  
Engineering  
University of Delft  
Delft, Netherlands

Mr J. C. Obel  
Chief Health Inspector  
P.O. Box 30016  
Nairobi, Kenya



Dr K. A. Pisharoti  
Director  
Gandhigram Institute of Rural Health and  
Family Planning  
Gandhigram, P.O. 624302  
Madurai District  
Tamil Nadu, India

Mr C. Puvaneswaran  
Senior Water Works Engineer  
Department of Water Supply and Drainage  
Ministry of Irrigation, Power and Highways  
Ratmalana  
Sri Lanka

Dr D.J. Stanislawski  
Ul. Bonifacego 135  
02-909 Warsaw  
Poland

Professor G. F. White  
University of Colorado  
Institute of Behavioural Science  
Boulder, Colorado 80302  
United States of America

Observers

October 7 and 8

Mr J. J. Berna  
Senior Project Officer  
Division for Global and Interregional Projects  
United Nations Development Programme  
866 United Nations Plaza  
New York, N.Y. 10017  
United States of America

Mr J.M.G. van Damme  
Manager  
WHO International Reference Centre for Community  
Water Supply  
Parkweg 13  
The Hague  
Netherlands

Mr W.T. Mashler  
Director  
Division for Global and Interregional Projects  
United Nations Development Programme  
866 United Nations Plaza  
New York, N.Y. 10017  
United States of America

## AD HOC WORKING GROUP ON RURAL POTABLE WATER SUPPLY AND SANITATION

(UNICEF, UNDP, UNEP, IBRD, WHO, IDRC and OECD)

GROUPE DE TRAVAIL AD HOC SUR L'APPROVISIONNEMENT EN EAU POTABLE  
ET L'ASSAINISSEMENT EN MILIEU RURAL

(FISE, PNUD, PNUE, BIRD, OMS, CRDI et OCDE)

Meeting of the Technical Panel on  
Rural Potable Water Supply and Sanitation

CWS/RD/74.4

Geneva, 7-16 October 1974

Original: English

## TECHNICAL PAPER

by

DR DARIUSZ J. STANISLAWSKI

Research Institute of Environmental Development, Warsaw

"THE MAIN ELEMENTS OF A PROGRAMME  
OF TECHNOLOGY ADAPTATION AND TESTING"

Note: Most of the proposals and opinions presented in this paper are not pre-panel inventions. I have witnessed or participated at the time of my service in Tanzania in quite a few actions which can be called now a small scale implementation of those proposals. I shall take along with me to Geneva some illustrative documents about these facts in case they can provide a material for discussion at the Panel meeting. I have obtained an authority from the Principal Secretary of the Ministry of Water Development and Power of Tanzania for using facts from this country as an example of a high priority and great efforts made by some developing countries in the field of water supply for remote rural communities.

The issue of this document does not constitute formal publication. It should not be reviewed, abstracted or quoted without the agreement of the Ad Hoc Working Group on Rural Potable Water Supply and Sanitation. Authors alone are responsible for views expressed in signed articles.

Ce document ne constitue pas une publication. Il ne doit faire l'objet d'aucun compte rendu ou résumé ni d'aucune citation sans l'autorisation du Groupe de Travail Ad Hoc sur l'Approvisionnement en Eau Potable et l'Assainissement en Milieu Rural. Les opinions exprimées dans les articles signés n'engagent que leurs auteurs.

LIBRARY  
International Reference Centre  
for Community Health

Introduction and Technology Assessment

Looking at the problem of rural water supply and sanitation with the eyes of the middle level field executive engineer working in a developing country, I think that present involvement of the international community in many countries can hardly be noticed. In spite of many correct suggestions and important ideas generated in high level conferences and included in many papers, only very few projects finally reach a grass-root level and materialize in widely disseminated, practical actions. The network of the WHO Reference Centres with the number of collaborating institutions exist and carry out a good work, but I have learned these facts after returning home to Europe. Even assuming that all this information would actually have reached me at the Tanzanian up-country executive post I do not think I would be much aided by it. It was almost entirely strategy level material with rather limited chance of ending soon in a form of practical executive aids.

As an example can serve the highest priority project investigating the impact of rural water supply in developing countries, aiming precisely to prove if, or why, it is beneficial for poor inhabitants of underdeveloped rural communities to drink sufficient amount of a reasonably clean water. Somehow we do not try to prove the same for the people living in Geneva or Paris or in Warsaw. For those developed communities the bulk of work concentrates on how to improve and not if i.e. it concentrates at the first place on technology.

It doesn't mean that I do not notice several important technological projects listed as being currently under elaboration. However they do not cover the whole range of most important technological problems but only a few chosen subjects. I am convinced that a real possibility exists to achieve such an acceleration in the rural water supply development that it will overtake a booming rural population increase in the developing countries. But to reach this difficult goal a radical expansion is needed both in the scope, range and the organizational structure. The activities will have to be brought nearer to the executive practice needs with due priority given to technology development, evaluation-testing in a variety of field conditions and dissemination in a form consumable by actual user.

I have not mentioned above as an immediate priority the studies of economical justification of the rural water supply programmes for developing countries. This is because it is absolutely impossible to draw true conclusions in this subject without establishing from the field of a sound knowledge about the reasons causing failures and maintenance troubles in many rural water supply schemes. These reasons are very often non-technical and can be discovered only from practice.

To reach the necessary high level of efficiency in carrying out the new programmes it will be inevitable to build up a strong and energetic organization. From the beginning it must be provided with a recognized degree of authority and prestige by the sponsoring UN agencies to help in assuring collaboration of the UN member governments and their national specialized institutions. This can greatly increase a much needed base of the new organization and allow to implement a certain world strategy instead of only advising. I am thus very much in favour of the proposal presented by Burton, Idelovitch and Maystre in the conclusions of their report on "Technology assessment and research priorities for water supply and sanitation in developing countries". The idea of the UN Task Force formation is excellent provided that, in addition to the name, all the sponsoring UN organizations will render as well sufficient help including necessary financial support for expansion of activities especially in the field.

### Technological Investigations

Organizational aspects of the programme of technology adaptation and testing.

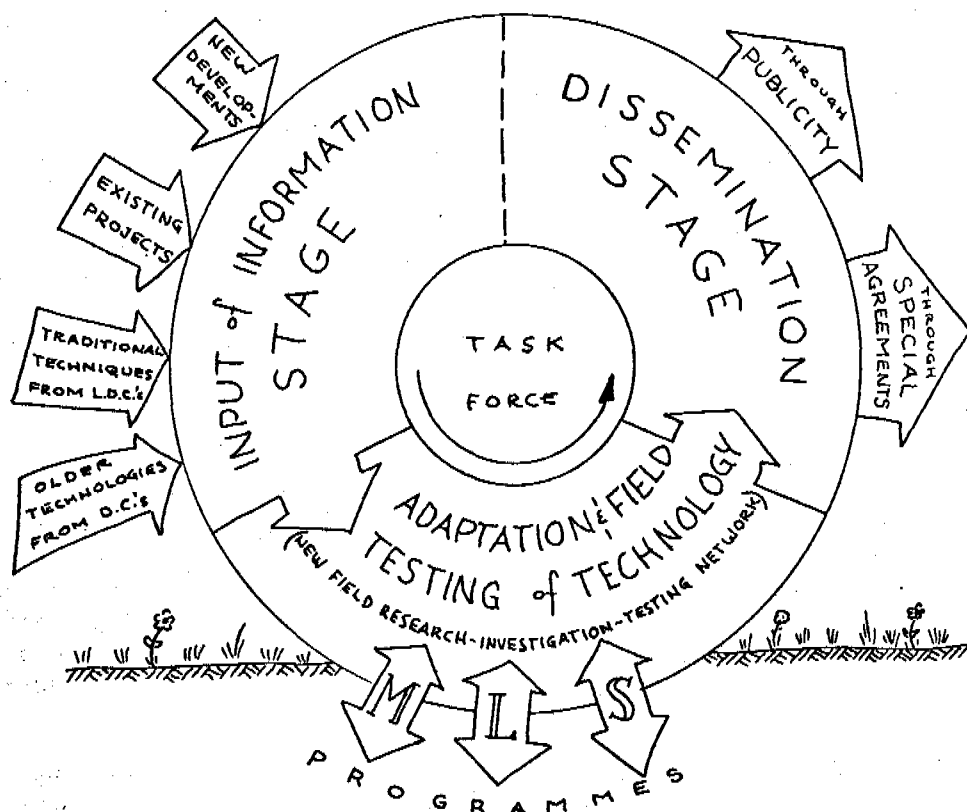
As was already mentioned in a present state-of-the-art report, the problems of technology in general, and technology adaptation and testing in particular, receive rather insufficient attention even in the most developed organizational structure established within the World Health Organization. The existing network of the WHO collaborating institutions in the developing countries is composed mostly of high level research institutions localized in or in the vicinity of big cities. Those institutions have never been responsible for direct execution of rural water supply schemes and sanitation projects in truly up-country village conditions. In many developing countries a vast difference exists in all aspects between conditions in more advanced parts of the country and the whole rest of it. In such a situation the input of information on real needs and the most important problems facing the executive people in field has little chance to be sufficient.

Thus the organizational problems require much attention in the new programme of technology adaptation and testing. Taking for granted that coordination leading towards joint action of all the UN sponsoring organizations will be achieved soon, the next important step would be to assure collaboration with the majority of the national, multi-national, religious, and private organizations currently working in the field of rural water supply and sanitation. They form together an enormous potential and possess an experience and personnel which could form in the beginning of the new programme of technology adaptation and testing a nucleus of new organization at the crucial "grass-roots-level".

The technology transfer programme cannot be looked upon separately from the whole problem of rural water supply and sanitation for developing countries. The whole problem I can see divided into three parts or rather into three main stages of the system.

To set such a system into efficient motion we will have to assure in the first stage:

1. constant input of information on all the new developments in the modern technology which can possibly be adapted for utilization in the developing countries obtained mainly from the developed countries;
2. constant input of information concerning water supply and sanitation projects, already implemented in the developing countries, giving data about failures and successes in various environmental conditions, obtained from the developing countries of course;
3. additional input of information from the special studies on the traditional technologies and methods utilized in the past or currently by small communities in developing countries, obtained from the universities, missionary societies, etc. In my opinion this is a very promising source of ideas for successful schemes;
4. additional input of information from the special studies selecting simple and reliable but less modern technologies and equipment used in the past in developed countries obtained from developed countries.



This kind of mass "input" collection and selection cannot be performed by the present size of the WHO-IRC network with relatively only few collaborating institutions. This organization will have to be expanded and tailored for the task: the information collection process will have to involve all the governments and other institutions wishing to show good will in the field of foreign aid (developed countries) or wanting to benefit from the internationally subsidized water supply and sanitation development programmes (developing countries). For some donors the prestige of taking part in the Task Force's actions can be quite a powerful initial agitating force.

With the proper organization of the information input collection, selection and reproduction (i.e. internal dissemination to the field investigation and testing units) being set out, the next important part of the system can be made operational: the adaptation and field testing stage. At this stage the various technologies based on the information input data will have to be thoroughly evaluated, equipment and machinery tested in a full range of the environmental conditions which can be encountered in the countries subjected to the programme.

Adaptation and field testing cannot be done in Europe or North America nor even in the capital cities of the developing countries. It needs the new kind of a rationally established network of field research, investigation and testing units, (FRIT).

I see them not as prestigious "ivory towers" located more for the reason of an easy accessibility by journalists than for their utility. They should be chosen at a place selected as representative for a certain environmental zone. This network must finally cover with the zones a whole range of basically different environmental conditions of the developing world. Each FRIT unit will have to be directly involved in a rural water supply and sanitation execution programme of the country in which it is established. As the most advantageous I can see establishment of the unit by enlargement and up-grading to new functions of an already existing regional level executive office. After some years in the FRIT service such a unit would gradually be handed over entirely to the national staff to continue as national field research centre. The International Unit if still needed in this zone would be established in another country with similar conditions.

Some units will have to be developed above the level of a standard FRIT unit and possibly remain in a close contact with the neighbouring good university. They would perform more comprehensive environmental-spatial development research as well as supervision and advisory work for the smaller units. Of course, this would be in addition to the normal water supply construction and testing programme.

I strongly believe that through the involvement of each FRIT unit in actual implementation of the national rural water supply and sanitation programme we can assure that those establishments will always remain in touch with real difficulties and true needs of the area they represent.

An additional, but equally important, function of those units will be training of the personnel for the national rural water supply and sanitation programmes of the area. From my experience with the technical assistants trained in various countries and working in the field I came to a firm opinion that training of those people in an advanced country gives rather poor results and the best, quickest and the cheapest way of raising the field staff qualifications will be a well organized in-service course in the conditions similar to their country of origin. I think that only the university level specialists from developing countries need to pass their studies in North America or Europe, but even they, before they occupy the high ranking posts at home, will need to undergo post-graduate training in the FRIT unit located in their respective zone.

The last, but possibly the most difficult part of the system, would be the dissemination stage. Main function of this stage will be assuring that all the work done at the earlier stages of the world programme is finally reaching the addressee: a rural and a poor suburban dweller in a developing country.

I would propose to differentiate two elements of the practice needed here:

1. dissemination through publicity - ~~already being performed by the WHO-IRC network-- on a limited scale;~~
2. dissemination through special agreements - which need to be organized from the beginning.

I do not feel competent enough to discuss this problem in detail at this very early stage. I think that the organization existing within WHO, sufficiently expanded to meet the needs of the information input stage which were discussed earlier, can possibly handle also the dissemination through publicity work. Publications which can be helpful in the executive practice would undoubtedly gain a worldwide popularity and influence on technology in developing countries. But it will be definitely not enough to assure a success of the world programme.

I think that the dissemination process will have to include also special kinds of formal agreements with the governments as well as with other big organizations concerned e.g. international banking institutions and their subsidiaries. Those agreements will have to be attractive enough for the governments of the developing countries to be looked upon by them with an interest e.g. by providing a clearly defined assistance to those who conform and collaborate with the Force.

Technological aspects of the programme of field research, investigation and testing, FRIT

It would be a very difficult task for me to say in this short paper something new about rural water supply and sanitation techniques after a very comprehensive brief summary has been produced by I. Burton, Y. Maystre and E. Idelovitch in their report on "Technology assessment and research priorities for water supply and sanitation in developing countries" (IDRC-Ottawa, 1973). Moreover I don't think that the discussion on technical details or particular technologies would help the Panel meeting to achieve its main goal: preparation of an outline of the broad world programme. So the particular problems mentioned below are included merely as an illustration of more general ideas.

To approach more closely the very complex problem of the rural water supply technology adaptation and testing in the immense variety of the conditions encountered in the world I propose to divide these installations into three main groups according to size and to analyze each of them separately:

"M" group = medium size installations including installations supplying water to single villages, poor suburban settlements and the small towns, with several hundred to few thousand inhabitants;

"L" group = large size schemes, including large water supply systems serving several villages, the whole districts, development zones or larger towns with several thousand or even several hundred thousand inhabitants;

"S" group = small installations which include installations for individual water supply without distribution servicing the population of very small or scattered settlements.

All three of the above mentioned groups of water supply schemes and installations are equally important but in the conditions of developing countries they require a much different approach in all stages of implementation: beginning with pre-investment studies, survey and investigations, the design itself, later the construction and finally servicing and maintenance.

This is because the singular impact exerted by such investments, their spatial and social effects and costs of a possible error are much different in each group. Lack of the rational technical criteria, established standards and sometimes even of maps or reliable demographic data makes planning, designing and executive work here a difficult task in any case. With the large installations, however, having a strong impact on the future development of the whole regions, it is necessary to carry out individual, complex preparatory studies by highly qualified professionals. When dealing with the small installations "the must" is to leave the whole work to be done by a "bare-foot-engineer" after proper preparation and training programme.

For these reasons the technology adaptation and testing programme should be organized into three parallel and equally important programmes carried out by the FRIT units in all the environmental zones.

"M" Programme:- Medium size schemes currently dominate in the national rural water supply programmes and so a substantial amount of information from the existing installations can easily be gathered by the FRIT units and the results published relatively soon e.g. in a form of catalogue or manual.

The leading task of this programme would be a preparation of the practical guidelines and standards or criteria permitting the technician and technical assistant level specialist to choose a correct kind of the scheme, carry out a design, construction and maintenance of it without necessity of the outside professional help.

Both efficiency in construction and reliability in operation as well as economy of these schemes can be much improved in the process of technology adaptation and testing by the FRIT network through introduction and promotion of: standardization of equipment and methods, introduction of local production of so far imported material and equipment, type drawings, precasting of elements, etc.

Within this programme, certain techniques based on traditional methods used in some developing countries can be developed, with the limited help of the modern technology, into a very promising installation. For example, the "Charco-dams", permeable dams with drainage intake, under-river-bed wells and drainage following an example of East-African elephants, underground "weirs" etc. together with many other solutions from different parts of the world, after being tested in various conditions, developed and properly "advertised", can open the chance of getting permanent water to many small communities.

"L" Programme:- Technological problems in this programme are quite similar to those in the Programme "M", but they are much easier to solve: In the large schemes much larger sums of money and the high level personnel are involved in both construction and maintenance. The solutions do not need to be extremely cheap and extremely simple here.

In this programme, especially for a drought stricken area where generally large water supply systems are built, the most urgent need is to establish rational guidelines for a correct spatial planning of the schemes. The water supply system in the arid climatic zone becomes tremendous, even if unconscious, driving force forming the population into a certain settlement pattern. It can be used to form a rational spatial order, optimal to the area development capacity.

Establishing of the criteria for such an "active" planning will be undoubtedly a very difficult task. But there is no other way of assuring that the money spent for construction of the large water supply systems will not bring about after few years in operation the effects quite detrimental to optimistic expectations: growth without development. Overpopulation, overgrazing, collisions of conflicting interests are too often causing erosion, deforestation and other unexpected phenomena leading in some cases to irreversible degradation of the environment and deterioration of the human living conditions.

The best utilization of the development funds (through obvious and clearly defined general development of the area) can only be obtained by the introduction of the joint development programmes. Large water supply systems should never be constructed alone. The "L" Programme could gain additional importance by introducing and testing the joint development projects, including: agricultural, industrial, educational, public health, sanitation, transportation, etc. projects as one spatially coordinated venture. Generally favourable attitude of the arid zones population towards water supply can mobilize the necessary initial public support for the whole "bunch of innovations".



"S" Programme:- The importance of this project cannot be overestimated. With the scattered pattern of population dominating in many developing countries, these installations can be for many people the only chance of getting reasonable quantity of safe water. I believe that especially in this programme remarkable results can be reached soon by joining fragmented so far efforts and experience of many smaller organizations, religious missions, bilateral aid agencies, etc.

The main initial tasks of this programme ought to be:

- a) bringing the selected simple and reliable technologies into the hands of millions of "bare-foot-engineers" in the villages, and
- b) through the commonly accepted community development policy within each nation to achieve a "chain effect" phenomena in small self-help water supply construction.

The very necessary first step in the "S" Programme will be collection of the data about "old" traditional techniques from both developing and developed countries.