WORKSHOP ON

INFORMATION MANAGEMENT IN COMMUNITY WATER SUPPLY & WASTE DISPOSAL

(NEERI, NAGPUR : DECEMBER 11-12, 1974)

Organised by

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE, NAGPUR (INDIA)

in Collaboration with

WORLD HEALTH ORGANIZATION, GENEVA (SWITZERLAND)

WORKSHOP ON

INFORMATION MANAGEMENT IN COMMUNITY WATER SUPPLY & WASTE DISPOSAL

(NEERI, NAGPUR : DECEMBER 11-12, 1974)

Organised by

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE, NAGPUR (INDIA)

in Collaboration with

WORLD HEALTH ORGANIZATION, GENEVA (SWITZERLAND)

C O N T E N T S

P R E F A C E

In the midst of exponential growth of information in every subject, the Information Management calls for deploying a group of techniques for ordered presentation, organization and communication of information, in order to give maximum accessibility and utility to it. It has recently emerged as a discipline itself.

Information management encompasses several activities such as generation, collection, organisation, interpretation, storage, retrieval, dissemination, transformation and use and implies adoption of modern techniques and practices in these areas.

As a discipline, it seeks to devise ways to blend scientific, technological and systems knowledge together for effective transfer of information.

Scientific communities and organisations all over the world are realising the key role of scientific and technical information in social and economic developments of the nation. This realisation has come no sooner. Scientific and technical information today occupies position as a vital national resource. It is necessary that all the available scientific and technical information is fully exploited by scientists, engineers, industrialists, policy makers and all others for identifying the key areas, the quantum of further effort needed and the plan of action. A "communication culture", therefore,

needs to be infused in the "generators" and the "users" of the information. Unfortunately, this was not so far receiving due attention in the planning and execution of our research projects even in the most vital areas of community water supply and waste disposal.

Large sums of money have been allocated by the Government of India towards improvement of the quality of our environment during the Fifth Five Year Plan period (1974-79). Community water supply and waste disposal constitute one of the important aspects in the preservation of the quality of environment. This programme, is however, not likely to get the desired impetus, unless continuous flow of information at all levels is assured. Information from the field if properly collected and compiled will serve as an excellent feed back for planning future programmes. This will be useful to Technical & Scientific Staff as well as to the planners all alike. It is with this idea that the present Workshop on "Information Management in Community Water Supply and Waste Disposal" has been conceived by the Institute so that the various facets of the Information Management in these areas are brought out through exchange of views by the participants. The forum is intended to resolve the plan of action in these fields.

I am grateful to WHO for evincing keen interest in the Workshop and for having prepared a document which could form one

of the important agenda for the discussion at the Workshop. This document is to serve as a guide to countries in different stages, e.g. in development of modus operandi for the establishment and management of an information system on community water supply and waste disposal and the methodology for the collection, storage, retrieval, analysis and evaluation of the data.

I am thankful to Dr. Y.Nayudamma, Director-General, SIR for his support and encouragement in organising the Workshop. I also express my grateful thanks to the delegates from home as well as abroad for participation in the Workshop.

Last, but not the least, I am thankful to the members of the training, information, documentation, liaison and extension Division of NEERI who have worked hard for every detail of the necessary arrangements for organising this Workshop.

(N.MAJUMDER)
DIRECTOR

NEERI

(NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE)

is

a WHO- Regional Reference Center on

- Community Water Supply
- Community Waste Disposal
- Air Pollution

I N T R O D U C T I O N

GENESIS OF THE WORKSHOP

The present Workshop is admittedly an outcome of the deliberations at the meeting of the Directors' of Institutions collaborating with WHO - IRC for Community Water Supply held at Bilthoven, The Netherlands, during April 9-13, 1973 wherein specific activities and projects for R & D work in this area were identified.

Organisation of seminars on administration and management, dissemination of information, selection, translation and distribution of selected technical publications were some of the few areas which were stressed as important for R & D work. It was also resolved that special meetings on these topics may be held in different WHO regions.

OUTLINE OF TOPICS TO BE DISCUSSED

Being one of the Regional Reference Centres of the World Health Organisation International Reference Centres, NEERI has taken the initiative of organising this workshop on Information Management in Community Water Supply and Waste Disposal, with a view to foster greater inter-action between the WHO, the collaborating institutes of the region and the generators, processors

and users of information in these fields. The Workshop aims at discussion in depth on the various facets of the information management. The expertise available for the deliberations, it is hoped, will be able to infuse several ideas and plans to improve upon the existing communication system in these vital fields. As a leading institution in these fields, NEERI has through years shouldered the responsibility both of the R & D work and the communication system.

It is perhaps for the first time that the topic of 'Information Management in Community Water Supply and Waste Disposal' is being discussed on a common platform as a free forum. It is heartening that apart from the representatives from some of the collaborating institutes, those from WHO International Reference Centre and also from the WHO Headquarters at Geneva are participating in this Workshop. A number of experts at national level comprising of engineers, scientists, professors, planners, managers, consultants, documentalists and public relations officers have evinced keen interest in this Workshop and will be taking part in the deliberations.

The subject 'information' covers too wide a spectrum to be covered in two days. In order to have pin-pointed, but exhaustive discussions, the aspects to be discussed are intended to focus attention mainly on the following facets :

1) Characteristics, testing and evaluation of information;

2) Problems of storage and retrieval of information;

3) Communication and dissemination techniques; and

4) Education and training of information workers in the developing countries including administration and management.

Some of the topics which should be given due thought are :

1) How can the results of research and other recorded information connected with the field can best be collected, evaluated, stored, retrieved and made available through the existing documentation techniques practised in this and other fields ?

2) How can the results of the technology assessment, adaptation and tests be best made available to the potential users. What would be the main elements of our activities in information dissemination ?

3) What could form an effective information management system ?

4) Under what conditions and circumstances, would it be possible to mount an effective information activity ?

5) How should the information collection, evaluation and dissemination system be designed in order to place the right information in the right form and as swiftly as possible into the hands of the potential users ?

6) What are the various types of information or data that are required to be collected and the means of evaluation ?

DOCUMENT PREPARED BY WHO

Incidentally, the community water supply and sanitation division of environmental health of the WHO, Geneva has prepared a draft guide on 'information systems for community water supply and wastes disposal' meant mainly for the use of developing countries. It has come for discussion at the most opportune time before the group of experts. A lot of efforts have been put into the preparation of the draft guide and it is hoped that the participants would benefit a great deal from this document.

The forum is expected to provide an ideal opportunity to all concerned to exchange views and ideas and also to check for themselves what more efforts are required to improve the information management systems already in vogue with them.

The deliberations of the Workshop would also help WHO in getting the draft critically examined so that the modifications could be incorporated in the final version wherever necessary.

MODUS OPERANDI

The papers and notes received from different agencies will be first presented and then thrown open for discussion. Besides, the delegates will be expected to feel free to express

their views on various aspects of this field. This discussion would prove as a beneficial background whereafter the delegates will be divided into sub-groups representing the four main areas as indicated above. These sub-groups will examine the matter further in depth and synthesise their thoughts into a coherent component setting out the specific recommendations and suggestions. In doing so it will be necessary to resolve the conflicts of opinions, should they arise, and give rise to final views. These reports of the sub-groups will ultimately be presented at the Plenary Session on December 12, 1974, to enable the participants for formulation of a creative, imaginative, as well as a realistic and practical approach for improving the communication system so as to tune it to the requirements.

The Workshop shall have served the purpose, if the deliberations give rise to resolutions and plan(s) of action.

G. K. Seth

(G. K. SETH)
Convener

TOPICS FOR DISCUSSION

I. Education & Training of information workers in developing countries; including administration & management

II. Communication & dissemination techniques;

III. Problems of storage & retrieval of information;

IV. Characteristics, testing & evaluation of information

and

V. Information systems on the Planning and Evaluation of Community Water Supply and Waste Water Disposal Programmes - Draft Guide prepared by World Health Organization .

. . .

" WORKSHOP ON INFORMATION MANAGEMENT "

(11 - 12 December, 1974)

Programme

11 December 1974 (Wednesday)

9.30 - 10.00 hrs	...	Registration
10.00 - 11.00 hrs	...	Welcome
	...	Inauguration
	...	Key Note Address
	...	Vote of Thanks
11.00 - 11.30 hrs	...	Tea
11.30 - 13.00 hrs	...	Presentation of papers
13.00 - 14.00 hrs	...	Lunch
14.00 - 16.00 hrs	...	Presentation of papers
16.00 - 16.30 hrs	...	Tea
16.30 - 18.30 hrs	...	Presentation of papers
19.00 - 20.00 hrs	...	Entertainment

12 December 1974 (Thursday)

9.15 - 9.30 hrs	...	Formation of sub-groups
9.30 - 11.00 hrs	...	Group Discussion
11.00 - 11.30 hrs	...	Tea
11.30 - 13.00 hrs	...	Group Discussion contd...
13.00 - 14.00 hrs	...	Lunch
14.00 - 15.30 hrs	...	Presentation of reports and Discussion
15.30 - 16.00 hrs	...	Tea
16.00 - 17.00 hrs	...	Valedictory Session

AREA - I

EDUCATION & TRAINING OF INFORMATION WORKERS IN DEVELOPING COUNTRIES; INCLUDING ADMINISTRATION AND MANAGEMENT

TRAINING THROUGH COOPERATION -

A CASE FOR THE DEVELOPED WORLD

J.M.G. van Damme

WHO International Reference Centre for Community Water Supply, Parkweg, The Hague .

INTRODUCTION

In the developing world millions of people, living in dozens of countries, lack reliable drinking water. There is an increasing awareness among international organizations that in order to improve this situation, more energy has to be devoted to problem-oriented action. The developed world can contribute to the solution of the manifold problems in several ways. Training is one of them.

During the last decades, the national community water supply programmes of many countries have been severely hampered by the acute shortage of skilled personnel of all levels. In several countries the rate of education and training by the limited number of professional and technical institutions available is not even sufficient to meet the additional manpower-needs created by the increase in population. Although there is reason to be pleased with the progress being made in various parts of the world in the development of

training programmes, obvious deficiencies still exist in several regions where there continues to be an urgent demand for additional manpower and further training of available employees.

In World Health Statistics Report no. 11 of 1973 the World Health Organization (WHO) tabulated the outcome of a questionnaire on community water supply in developing countries. Table 1* shows in how many countries lack of trained personnel was regarded to be amongst the top five constraints in the construction of community water supply systems. The same WHO report mentions numbers of sub-professionals requiring training during 1972-1976 and the availability of adequate in-country training facilities. For almost 20,000 persons within this category no national facilities are available.

COOPERATIVE EFFORTS

It is obvious that in order to overcome these shortcomings, increasing assistance through all available means is needed. WHO in various ways plays an important role in the education and training of personnel in the public health field. Several other organizations are likewise active in this field.

One course of action is the establishment of national and regional training centres; presumably this may be the way by which in the long run the training deficiencies can be most

*(Page DA-3)

adequately dealt with. One of the tasks of the WHO International Reference Centre for Community Water Supply (IRC) is to play an active role in this development with the help of a network of regional reference centres and collaborating institutions. In doing so the expertise of those directly or indirectly working on these problems in the developed world cannot be overlooked.

Rank of importance	first	second	third	fourth	fifth
Africa (28)	8	1	12	2	2
Americas (22)	3	1	2	4	5
E. Mediterranean (19)	4	4	3	3	1
Europe (2)	1	-	-	-	-
South-East Asia (7)	1	2	-	-	2
Western Pacific (8)	2	2	-	2	-

Table 1 :- Constraints in construction of community water supply. (Explanation first line : in 3 of 28 African countries lack of trained personnel was regarded as the first important constraint, in 1 as the second important constraint, etc.)

Institution building is a long-range matter; additional provision will be needed for the demands of today.

Another approach is the carrying out of special training activities, where use is made of existing facilities for the

training of intermediate and auxiliary personnel for national public services, who in turn would be in a position to train others for similar tasks. Several organizations in the U.N. family are working on such programmes. Among them are the World Health Organization (WHO), the Centre for Housing, Building and Planning of the Department of Economic and Social Affairs (ESA-CHBP), the U.N. Industrial Development Organization (UNIDO) and the Food and Agriculture Organization (FAO).

Through a project as discussed in a WHO/IRC meeting in 1973 it is hoped to initiate in due course such an approach in Africa. It consists of the training of trainers-to-be by a travelling team of regional instuctors. Based on estimates of present and future training needs and existing facilities, this newly trained staff would organize courses and seminars for operators and technicians and the like, with the help of training manuals and teaching aids adapted to the local situation. The experience acquired in Latin America might serve as an example. The travelling team would go from country to country, assessing needs and training trainers in an adaptive way, thus causing a snow-ball effect of training facilities for operators and technicians.

A brief set up of the project has been given in Table 2*. Existing institutions in the countries might house the courses, and again the support and assistance of those experienced in this field in the developed world is crucial. In this context it may also be mentioned that some further preparatory work has already been carried out by the IWSA Standing Committee on Education and Training of Waterworks personnel .

Although this method might lead to results in the short term, it cannot solve the problems of the next year to come.

A method which is gaining more and more interest is centered on the transfer of knowledge and methods by means of demonstration programmes, pilot studies and the preparation of guides and manuals. Such programmes - in the water supply field at present promoted particularly by WHO and its affiliated International Reference Centres with Regional Reference Centres and (national) Collaborating Institutions - are based on existing capabilities within the Institutions. A project concerning the promotion of slow sand filtration for rural areas in developing countries is in an advanced state of preparation. Considerable experience with this method has been built up in several West European countries since the beginning of this century. It will be clear that, in a cooperative effort between workers in the developing and the developed world, to have this method more widely applied, the input of this considerable experience is essential. A brief description of the project has been given in Table 3.(Page DA-7)

*(Page DA-6)

1. nvestigation of present and future training needs and existing facilities in selected countries.

2. Drafting programmes adapted to local situations and the compilation of training manuals, teaching aids, etc., based on existing material e.g. in Latin America.

3. Formation of a pool of professional and/or semi-profressional instructors, as much as possible from the region concerned.

4. Seminars with senior officers in the country concerned in order to agree on needs and on the programmes as prepared.

5. Instruction of trainers-to-be, both by off-the-job and on-the-job training.

6. Training carried out by the newly trained staff, assisted by the pool if desirable, and in a local language if appropriate.

7. Regular continuation of training the trainers in order to enable them to organize follow-up programmes.

8. Evaluation on the base of expected output, application of experience in subsequent countries and dissemination of results.

Table 2 - Travelling Instructor Team

Training Abroad: some Considerations

In December 1973 a regional symposium was held in Addis Ababa on the training of personnel for power and water production and distribution. It was noted during the meeting that the major companies in several French speaking African countries organized training courses in their vocational training centres, but that parallel with these local programmes, African companies,

particularly those with a relatively small staff, used schools and centres in France for training and providing advanced training for skilled technicians.

1.	Compilation of existing knowledge by literature survey, correspondence with experts and visits to plants.
2.	Laboratory research at institutions in a number of developing countries, concerning adaptation to local circumstances.
3.	Construction of experimental filtration plants in small villages in agreement with national policies, and as much as possible using local skills and materials.
4.	Coordinated programme of research and development aspects at the pilot plants, making use of existing facilities and with the assistance of university students.
5.	Development of manuals and guidelines for the design, construction and maintenance of slow sand filtration plants, including measures for variable local conditions.
6.	Training courses on the spot, both for future instructors, supervisors and operators, so as to make sure that experience is transferred, and to enable responsible persons to run the plant properly after it has been transferred as an actual water supply unit to the village concerned.
7.	Seminars to show the advantages of the slow sand filter for developing countries and to promote and encourage the use of this system.
8.	Extension of the project, and initiatives to actually implement slow sand filters on a wide scale.

Table-3: Demonstration Programme on Slow Sand Filtration.

One of the recommendations of the meeting was " that countries which might not have the resources to establish national vocational training centres should seek opportunities

to train their personnel in existing African centres or in countries outside Africa."

Some participants at the meeting attached great importance to training abroad because of the inadequacy or absence of the necessary local training infrastructure. Indeed, very often training at home is just not possible. In spite of an increasing conviction that workers in developing countries can best be trained in their own country, physical deficiencies often force the adoption of alternative methods.

There is, however, another side to this coin. At a previous Congress of the International Water Supply Association in London in 1955 a consideration was brought forward concerning the supervisory and foreman grades of employees. " It is quite common for such men to spend the whole of their working lives with one undertaking. Whilst this enables a man to acquire a wealth of local knowledge, which undoubtedly is of great advantage to his employer, it tends to restrict his general outlook and may result in resistance to any changes which the management may think necessary to introduce. "

It can be added that training should stress the practical aspects of the subjects covered and should preferably take place at well-equipped, and well-run plants. Europe has such plants.

Twinning

Against the background of the foregoing considerations - and without pretending to suggest a new approach or a panacea for training problems - the IRC, in a third approach, is now working on the establishment of bilateral contracts between water supply organizations in developing countries and such organisations in industrialized countries. As an additional method to attack training problems, this "twinning-system" is able to contribute to short term solutions : those of "today and the coming weeks." Table 4* shows the way it works in all its simplicity.

Organizers of the "twinning-system" do realize the drawbacks of training abroad. Consequently, preorientation of the instructor in the country concerned as well as thorough follow-up at the facilities in the trainee's own country, where he is expected to perform his duties, are added. In addition, the approach is meant for practical training for a specific job at the facilities of the twinning organization. Basic theoretical training could be included, but might be better organized at home.

The advantages of the system to the developing country organization are not to be underestimated. Training is carried

*(Page DA-12)

out by those who from day today are confronted with practical problems in their own work and further know the organization concerned and the place where the trainee has to work after training. There is the possibility of intensive follow-up and training can be quickly organized as the need arises. In general well-run facilities are available and any man will be able to receive training at almost any time - not so much dependent on haphazard open places in a training institute or the availability of a course at the time it is needed. In this way this system - in addition to any other possibility which can be used if appropriate - can add to the execution of a training plan for the sub-professionals in the organization.

The exchange of personnel on a bilateral basis - in some cases also desirable to replace the instructor of the trainees during his absence from his normal work - leads to the additional advantage of the possibility of rendering advisory services in operational or exploitational problems by the visiting staff. Advance on optimization of the existing treatment works, new methods of chemical control, on the set up of workshops, or on development plans of distribution networks may be acquired from the experienced staff. It will, on the other hand very well be possible that this advisory activity will also work the other way around.

Also the developed country party benefits from the relationship. In general the opportunity for a man to go to a

developing country to be enlisted in the day today work under very different conditions, may add considerably to his own experience and enlarge his view. The confrontation with less sophisticated solutions, with extrme forms of improvisation, with less availability of skills and materials, with larger risks of delays in the delivery of goods, with larger financial and administrative problems and - last out not least - with a different cultural environment may lead to new thinking with his own problems and inventiveness as to the solution of them. After the missions the expert takes back new experience and this feedback can cause a new approach to the long applied systems in his organization. An important matter, of course, is the moral side of the matter. The relationship can be considered as a form of technical assistance which in many pects can be carried out more practically and more effectively than many other ways of development cooperation. The advantages in the recruitment of new personnel are obvious.

One crucial aspect in this undertaking may be the financial side. In principle twinning presupposes bilaterial contacts on equal level: both benefit and ~~both~~ pay. No salaries and fees are being paid. The non-profit aspect is essential. Basically no funds have to be exchanged. Each party takes care of his own travelling and lodging expenses. If possible, however, assistance might be provided for housing by the respective organizations, which can be agreed upon on and ad hoc basis. Besides

this, student fellowships can be obtained, either from an international organization, or from the Government of the developed country organization. The IRC - acting as broker in the undertaking - sees as one of its tasksto act as intermediary in such matters.

1.	Two water supply organizations, one in a developing country and one in Europe decide to establish bilater ontacts and to cooperate in the solution of personnel and operational problems.
2.	The European organization sends its instructor to the developing country organization in order to learn about the specific problems, to become acquainted with needs and facilities to discuss future training activities, and to lay a basis for the training abroad.
3.	The developing country organization sends one or more of its trainee-sub-professionals to Europe to let them have practical on-the-job training on the basis of brief theoretical explanations.
4.	The trainees go back to their country accompanied by the instructor, o gives follow-up to the European training at the facilities where the newly trained person is expected to perform his work.
5.	During his stay abroad the instructor - now acquainted with the organization concerned - makes his expertise and experience available by " trouble shooting " and advising on exploitation and operational problems if requested.
6.	Having assumed his full responsibilities after departure of the instructor, the newly trained man can rely on the manuals made available to him during the courses, on correspondence with the twinning organization and on further follow-up during subsequent visits of the instructor.
7.	Other sub-professional trainees take the place of their predecessors, who themselves can be considered for further advanced training.
8.	No bills or declarations at the end.

Table-IV: Twinning.

In order to enable the companies to mutually benefit in their actions from a sound experience, gained during an initial period of exchanging knowledge and information, the relationship will in principle have to be extended over a period of, for example, 3 or 4 years. The duration of both the training periods and the mutual visits to the companies will have to be decided upon on an ad hoc basis, depending on the nature of the problems and the results desired.

It goes without saying that the two twin-organizations must be of comparable character: type of water used (groundwater or surface water), rural or urban supply, quantity of water delivered, etc.

Obviously, the trainer who is responsible for the learning period of the trainees should be a most capable person, who at the same time is well able to consider the implications of specific circumstances which distinguish developing countries from industrialized countries.

In the Netherlands where the initiative was first developed, serious interest in this approach has been demonstrated from several sides and in the mean time some experience has been acquired. Several organizations have taken the initiative in exploring the possibilities of such a relationship. It is hoped now that this activity can be extended to other European countries.

On the other hand, through the manifold contacts the IRC has, it has become apparent that many water supply organizations in developing countries will gladly take this opportunity to solve their most pressing training problems. On the basis of a first limited orientation in Africa (assisted by the Inter-African Committee for Hydraulic Studies in Upper Volta) serious interest has been expressed by organizations in countries like Cameroun, Congo, Ghana, Niger, Senegal, Sudan and Zaire. In the establishment of these preliminary contacts WHO has been cooperative in several ways.

Conclusion

The intention of this paper is to bring to the international forum an approach to assist in the solution of a pressing problem, and to stimulate a discussion to ascertain how far the approach of the twinning-system can be of general value. It is hoped that through this down-to-earth system many water supply organizations in the developed world will wish to cooperate with their less privileged colleagues in developing countries.

Literature

Barrett, S.G. and R.S. Fairall. " Training of Waterworks Personnel". Special Paper No. 1 at the Eighth Congress of the International Water Supply Association, Vienna, 1969 .

contd ...

Davenport, H.R. " Training of Waterworks Operators." Subject no. 8 at the Third Congress of the International Water Supply Association, London, 1955 .

United Nations Conference on the Human Environment, Stockholm 1972. Recommendations for action.

Wagner, E.G. and J.N. Lanoix. " Water Supply for Rural Areas and Small Communities." World Health Organization, Geneva, 1959.

Wolman, A. " The Management of Water Supply." Address at the Ninth Congress of the International Water Supply Association, New York, 1972.

World Health Organization. " Community Water Supply". Report of a WHO Expert Committee. Technical Report Series no.420, Geneva, 1969.

World Health Organization. " National Environmental Health Programmes: Their Planning, Organization, and Administration." Report of a WHO Expert Committee. Technical Report Series no. 439, Geneva, 1970.

World Health Organization. "Community Water Supply Programme". Progress Report by the Director-General. Document A25/29, Geneva, 1972.

World Health Organization - " Training of Environmental Specialists." Status Report prepared at the request of the Secretariat of the United Nations Conference in the Human Environment to be held in Stockholm in 1972. Document WHO/EH/71.7, Geneva, 1971.

World Health Organization. " The WHO Programme in Basic Sanitary Services, Community Water Supply and Wastes Disposal. The Advancement and Transfer of Knowledge and Methods." Document CWSS/73.2, Geneva, 1973.

World Health Organization. " Community Water Supply and Sewage Disposal in developing countries." Special subject in World Health Statistics Report, Vol.26, no.11, Geneva, 1973.

WHO International Reference Centre for Community Water Supply. " Meeting of Directors of Institutions collaborating with the WHO International Reference Centre for Community Water Supply." Report of the proceedings. Bulletin Series no.5, The Hague, 1973.

A PLEA FOR TRAINING OF PERSONNEL FOR INFORMATION MANAGEMENT

G.K.Seth, N.Majumder and S.G.Bhat
National Environmental Engineering Research Institute,
Nagpur

Concept of Information

Information is a systematised body of ideas communicated or intended to be communicated or developed for the purpose of self communication or obtained by personal study or investigation.

It is an essential ingradient in decision making and is a vital aspect for any discipline. Field of Community Water Supply and Wastes Disposal is not an exception to this.

There is a mass of information which is being generated and it has to percolate ultimately to the decision makers so as to derive maximum benefits. Besides the information contained in published documents, a large number of information is hidden in unpublished documents such as personal files, operators note books, classified reports etc, which do not see the light of the day. All this information has to be filtered, sorted and the ultimate information thus collected is crucial for the decision makers.

Nature of Information

In view of the inter-disciplinary character of the subject of Community Water Supply and Waste Disposal, the spectrum of information required is very wide. The following table gives an idea of the various items of information that are required to be collected :

Item		Information to be collected
Water Supply(General)	...	Management and Administration, Water Works Operation and Maintenance records, Planning,Financing, Economics, Manpower,Public Relations,Sociological aspects.
Water Resources	...	Surface Water, Ground Water Conservation and Evaporation Control.
Water Collection & Transmission	...	Reservoirs and Intake Wells, Infiltration Galleries, Transmission Mains, Pumping Stations.
Water Quality	...	Physical, Chemical,Biological & Bacteriological Analysis of Water.
Water Treatment	...	Treatment Plants,Pipeline Growths, Pretreatment, Physical,Chemical & Biological Processes.
Water Distribution	...	Planning,Design and hydraulics of Distribution Systems,Storage Facilities, Pump Motors and Engines, Pipe Tubing and Conduits,Pipe Materials,Coatings, Linings & Joints for Water Distribution Systems,Pipe Installation and Maintenance.
Water Use	...	Domestic,Industrial,Commercial,Agricultural,Municipal & other uses of water; Leakage or Loss,Metering, Consumption.
Water Pollution Control	...	Pollution of Surface and Ground Water, Estuarine and Coastal Pollution,Sources of Pollution, Effects on Receiving Water, Public Health, Fisheries,etc; River Surveys & Pollutional Load Studies,Control & Abatement of Pollution.

WASTE WATER

(Sewage and Industrial Wastes)

Examination	...	Quantity, Composition, Physical, Chemical, Biological, Bacteriological, Properties, Sampling, Effluent Standards.
Treatment and disposal	...	
Utilisation, reclamation and reuse of water	...	
Sewage and Plant Equipment	...	Collection Systems, Pumping, Maintenance, Equipment, Storm Water Overflows.

SOLID WASTES

Characteristics	...	Collection, treatment and disposal of refuse, garbage and other solid wastes.

RURAL SANITATION

Present Status	...	Rural Water Supply, Excreta Disposal
		Social aspects

The foregoing table shows the broad spectrum of headings under the process of Community Water Supply & Wastes Disposal.

However, elaborate information is required on each of these aspects. For example, in the field of water supply and distribution we may require the following additional type of information.:

(1) Population served

- Urban
- Rural

(2) Year of commissioning of facility

(3) Agency responsible for operation of the facility

(4) Source of supply

(5) Treatment method

(6) Treatment capacity

(7) Operational schedule

- Continuous
- Intermittent

(8) Types of consumer

- Domestic
- Commercial
- Industrial
- Public Use

(9) Laboratory control

(10) Pumping capacity

(11) Storage

(12) Distribution

(13) Improvement needed

(14) Finances involved

This is only indicative and shows the vastness of information needed. Like-wise, information on several other topics is also required, but has not been enumerated to save space.

Organisations concerned with the problem

A number of organisation such as Municipal Corporations, Local Self Government Departments, Public Health Engineering Departments of various States are directly concerned with the problems connected with Community Water Supply & Wastes Disposal. Besides, there are other organisations such as CPHEEO, (Ministry of Works & Housing), NEERI, Planning Commission, Department of Science & Technology, State Development Boards, Regional Water Pollution Control Authorities which are vitally concerned with these aspects for planning, forecasting and R & D activities. In addition, a number of research proprietary firms and teaching institutions such as All India Institute of Hygiene & Public Health, IITs, VJTI, Engineering Colleges, Universities are concerned with these important aspects.

Present state of affairs

All these organisations are playing their role in different ways in collecting, organising and disseminating

information. But none of them can claim that they have with them all that is required. This may be attributed to factors such as :

(a) Lack of enthusiasm

(b) Lack of proper communication

(c) Absence of proper system for collecting and storing information

(d) Scanty budgetary provision for this aspect

(e) Lack of trained personnel

Training

Of the above mentioned factors, the last viz., the training of personnel needs special emphasis as properly trained people will also be able to overcome to a large extent the other inhibitions in this programme.

The topics which may be taught at the training course may comprise the following :

(a) Importance of information

(b) Nature and type of information

(c) Sources of Information

(d) Methods of collection

(e) Recording and storage - designing of proforma

(f) Concepts of data bank

(g) Retrieval and communication techniques.

The above syllabus is only suggestive and details can be worked out so as to suit the different types of personnel. This training can be imparted to persons at various levels such as top executives, the middle level managers - say Superintending Engineers, Executive Engineers, Assistant Engineers and the Technicians such as Water Works Superintendent, Operators etc, all of whom are concerned in some way or the other with the collection, storage and dissemination of information. The duration and the syllabus of these training courses will have to be suitably designed depending upon the level of trainees.

Conclusions

The free flow and transfer of information can be effected if we could convince the decision makers about the vital role played by 'Information' in this wide field. Much can be achieved if our information system is managed by properly trained personnel and that alone can deliver the goods in a proper manner. This is possible if suitable training is injected to persons at various levels and only then we can expect to get the right type of information at the right time and in a right manner.

AREA - II

COMMUNICATION & DISSEMINATION TECHNIQUES

INFORMATION MANAGEMENT AT INTERNATIONAL LEVEL

J.M.G. van Damme

WHO International Reference Centre for Community Water Supply, Parkweg, The Hague .

...

1. Introduction

As one means to arrive at a better exchange and transfer of technical and scientific information and knowledge an institutional network for communication flow through international cooperation has been set up by the WHO. The WHO International Reference Centre for Community Water Supply (IRC) acts as coordinating centre of this network.

It is felt that information management involves the performance of a broad range of activities as they are carried out by the IRC. Some experiences in the information field of the International Reference Centre are being discussed in the following sections. First some background information is given after which in a brief description of IRC's activities some aspects of information management are being touched on .

2. Objectives and organization of the IRC

Within the framework of the WHO programme concerning community water supply, it is the objective of the IRC to stimulate and consolidate efforts directed towards the improvement and development of water supplies in both industrialized

and developing countries. In connection with the serious problems in the latter a great deal of IRC's activities will apply to this category of countries.

The IRC endeavours to fulfil its objectives as the nexus of a worldwide network of Regional Reference Centres (RRC's, at present two, at Nagpur, India and Lima, Peru) and Collaborating Institutions (CI's, at present 31). The activities are carried out in cooperation with its host institute, the Netherlands Government Institute for Water Supply, as well as many other organizations and institutions in and outside the Netherlands.

The targets of the IRC fall under two main headings :

(a) Information exchange

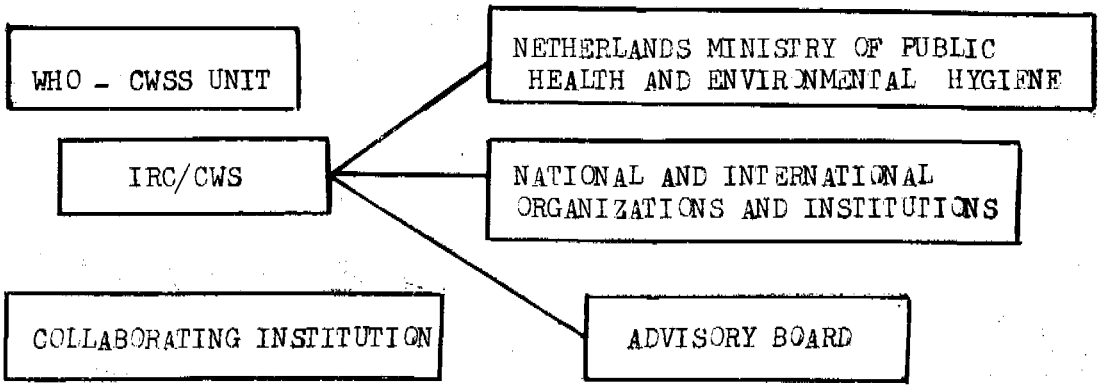
The collection and dissemination of information on community water supply, including the transfer of knowledge to developing countries; the preparation of codes of practices, training manuals and state-of-the-art papers; and the training of scientific and technical workers and others by the planning and implementation of training programmes and courses and the exchange of research workers.

(b) Research and development

The identification of research needs and institutional facilities, and the promotion of research and development in

various aspects of community water supply, including the preparation, conduct and coordination of research and development and demonstration projects, and the transfer of knowledge and methods in the same context.

The IRC contacts can be visualized as follows:



It has already been proven that the system of International and Regional Reference Centres in a network of Collaborating Institutions, can deliver a valuable contribution to the improvement of weaknesses in communication existing all over the world, and through this can accelerate the activities leading to better water supply services. This approach has been brought forward in the Ad hoc working group on rural potable water supply and sanitation of UNICEF, UNDP, UNEP, IBRD, WHO, IDRC and OECD as a basic system to provide "channeler's functions" which are indirect ways of exchange of information between producers and users.

In principle it provides an appropriate infrastructure to make possible the transfer of information and methods from industrialized to developing countries and the initiation and coordination of research, development, demonstration and training programmes; two aspects which should be linked tightly together.

Two new developments, both indirectly resulting from the recommendations of a "Meeting of Directors of Institutions collaborating with the WHO International Reference Centre for Community Water Supply", organized by the IRC in 1973, will lead to an improvement of the practical output of the system.

(a) For 1975 it has been planned, that the Dutch Government will more than double its financial support for the IRC, which will then amount to approximately US $ 400,000.- (excluding certain facilities). The number of permanent staff can then be increased to ten persons.

(b) A sound definition of the aims of the network, the means of collaboration and communication and a specification of tasks of IRC, RRC's and CI's is now in preparation. One aspect, of great importance, is the functioning of the Collaborating Institutions as national focal points with regional

coordination and assistance by the RRC's and with overall support of the IRC. Both in formation exchange and the cooperation in research and development work, this set-up should form the basis of the network. In addition the extension of the network in order to arrive at a better geographical distribution on the one hand and the inclusion, if possible, of more institutions and organizations within one country (especially large ones) on the other hand, is now in study. Finally, the selection of suitable institutions and organizations in the network is now receiving attention.

It is expected that as of 1975, when the IRC will be able to considerably increase its staff, better planning and division of tasks within the network, and a further improved output will be attained. Further follow-up of the recommendations of the meeting of Directors of Collaborating Institutions can then be taken in hand. In order to arrive at an improved organizational structure, it is intended to change the status of the IRC to that of a foundation later in 1975.

3. Main activities in 1973 and 1974.

3.1. Projects

3.1.1. Slow sand filtration for developing countries

The great importance of slow sand filtration for

developing countries was expressed during the Meeting of Directors of Collaborating Institutions, which took place in April 1973 at Bilthoven. In the recommendations of the Bilthoven Meeting further study of this type of filtration and its adaptation to tropical and semi-tropical circumstances w as credited with the highest priority.

For practical reasons it was decided to divide the programme into two stages:

In the first stage data collection, surveys, preliminary studies and design work will be performed. Also included are laboratory investigations prior to construction of pilot units to be carried out by Collaborating Institutions. The second stage covers the set-up of the pilot plant which also serves as a demonstration model for a village supply and all further field work. Training courses and seminars with demonstrations will conclude the programme.

The preliminary work has now been completed and actual work is expected to start before the end of 1974. Collaboration has been prepared with organizations and institutions in Ghana, India, Kenya, Sudan and Turkey. Special aspects will be studied in Thailand and Latin America. The local participation in this project is essential. Funds are being made available by the Ministry for Development Cooperation of the Netherlands. The results and prospects of

the project will be regularly evaluated. No do bt this project can form an important step in the information transfer of appropriate technologies to developing countries.

3.1.2. Water dispensing devices and methods

In accordance with an agreement with the International Bank for Reconstruction and Development (World Bank) a study is being undertaken with the objective of identifying ways and means for the dispensing of water at public watering points, in order to avoid wastage of water. The devices are those types considered suitable for use in urban and rural w ater supply systems in the developing countries.

Roughly speaking the study will involve two areas of investigation:

(a) to identify all devices currently in use, previously employed or suggested for use by designs, ideas, patents or models, and which can be used in urban and rural water systems for the public dispensing of water to people;

(b) to determine methods and approaches for the control of public watering points which rely on certain operational and administrative techniques to dispense water to the public.

A guide reviewing the findings, will be published in due course, which will be distributed on a large scale.

3.1.3. Water re-use

With the cooperation of a number of parties, the IRC is now in the process of organiing a project, the objective of which is to arrive a coordinative research effort regarding short and long term health effects and technological aspects of the reclamation of waste water and the use and control thereof.

The project consists of:

1. the compilation of a state-of-the-art review on the basis of a comprehensive literature study and a review of current work in different parts of the world;

2. the preparation and organisation of a small working session of representatives of authorities active in research and development as to the use of renovated waste water, in order to obtain an inventory of present knowledge, needs and plans for research, development and construction in the various countries, and to preliminary develop a coordinative programme with as many participating institutions and individuals as considered possible, to be followed up after the meeting. This will be financed through a "framework for funding."

The meeting will be held in January 1975.

3. the formation of a permanent contact group as follow-up of 2 for the performance of coordinated efforts and the exchange of information with as many investigations as possible. This will include the organization of documentation services and publication of a quarterly Abstract on Re-use, to be dealt with by the secretariat of the IRC, assisted by a consultant;

4. the promotion of research on health aspects of water re-use and related subjects; the organization of an expert meeting after 2 years, to evaluate current and performed work. Plans are now in an advanced stage and activities are scheduled to start in late 1974.

This project will hopefully lead to a well organized exchange of information on this new research activity.

3.1.4. Other projects

Elements of project proposals discussed during the mee ting at Bilthoven are being executed or are in the course of preparation. The programmes will be accelerated as soon as more staff in 1975 is available. This follow-up of meetings in which much energy has been invested is regarded as a basic condition for proper information management.

3.2 Meetings

Within the framework of a WHO project, IRC convened a meeting on the health aspects of the use of polyelectrolytes in water treatment and of plastic pipes for distribution networks. Seventeen specialists from both industrialized and developing countries took part in the discussions, which led to the two technical IRC publications "Health aspects relating to the use of uPVC pipes for community water supply", and "Health aspects relating to the use of polyelectrolytes in water treatment for community water supply," both of which contain a number of recommendations.

As soon as the French editions have been distributed, further follow-up to the recommendations of the mee ting will be given.

3.3. Publications

3.3.1 Newsletter

The Newsletter, which is being made available to subscribers at no cost, appears to be a useful medium for the dissemination of information of general interest and for the exchange of news between IRC and the Collaborating Institutions as well as many other institutions and organizations. At present the Newsletter has a monthly

circulation of approximately 2,500 copies in English, 2,200 copies in French and 2,000 copies in Spanish, (the latter was made possible through an agreement with the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS), Lima, Peru, concerning translation into Spanish and dissemination in Latin America). The success of the Newsletter is being ascribed to its extensive mailing list which is continuously updated, its publication in three languages, its compactness and its free of charge distribution.

3.3.2 Bulletins

Another regular series is the IRC Bulletins, giving reviews of institutional facilities, training programmes and research activities at Collaborating Institutions and other organizations.

A general paper " Information on Collaborating Institutes" and six bulletins have been issued so far : (1970)

Bulletin no. 1 " Community water supply research 1971 " (1971)

Bulletin no. 2 " Training courses in community water supply " (1971)

Bulletin no. 3 " Community water supply research 1972 " (1972)

Bulletin no. 4 " The story of CPHERI (Central Public Health Engineering Research Institute), Nagpur, India." (1972)

contd ...

Bulletin no. 5 " Meeting of Directors of institutions collaborating with the WHO International Reference Centre for Community Water Supply. Report of the proceedings. (1973)

Bulletin No. 6 " Community water supply research 1973 " (1973)

3.3.3 Technical papers

In the IRC technical paper series, in which scientific and technical information is being published, the following papers have been issued :

Technical paper No. 1 " Plastic pipe in drinking water distribution practice, a bibliography" (1971)

Technical paper No. 2 " The suitability of iodine and iodine compounds as disinfectants for small water supplies" B.C.J. Zoeteman (1972)

Technical paper No. 3 " The purification of water on a small scale." Also in French. (1973)

Technical paper No. 4 " Health aspects relating to the use of uPVC pipes for community water supply" (1973)

Technical paper No. 5 " Health aspects relating to the use of polyelectrolytes in water treatment for community water supply" (1973)

Technical paper No. 6 " The potential pollution index as a tool for river water quality management" B.J.C. Zoeteman (1973)

3,4 Information and documentation

One of the tasks of the IRC is to establish and keep up-to-date a pool of information concerning the water supply field, (and possibly in a future stage also the waste water field), to function as a " mailbox" and nexus for organizations, institutions and persons who need information, and to supply information on its own initiative or to mediate in the exchange of scientific and technical knowledge and information. Several approaches for information collection and transfer have been tried out thus far, in order to arrive at an effective system adapted to the circumstances concerned.

The following facilities are available at the IRC :

- a documentation system/data bank which is in development. The function of the IRC is unique insofar as emphasis is being placed on unpublished reports and publications which are difficult to obtain on the one hand and problems in developing countries on the other. For the time being a mechanical equipment is applied which is also in use at the International Reference Centre for Wastes Disposal and which is in study at the Regional Reference Centre at Lima, Peru.

- handling of requests for information. Partly as a result of announcements in the Newsletter each year hundreds of requests for information are dealt with either directly or with the cooperation of members of the network or others. Essential for this service is promptness of handling.

- dissemination of material and publications, which are received in bulk from any source, especially for Collaborating Institutions .

- publications (see 3.3) .

As soon as more staff becomes available in 1975 more emphasis will be laid on this aspect of IRC's work.

The transfer of knowledge through training could not as yet be attended to because of the lack of specialized staff. Contacts have already been established, however, concerning :

- specific assistance to a number of countries ;
- a training programme for instructors by a travelling training team ;

contd ...

3.5 Miscellanea

A number of additional activities are being carried out :

- collaborative programme with the University of Oklahoma on data collection of " Practical Solutions in drinking water supply and water treatment for developing countries" followed by a technical workshop at the IRC in May 1975 .

- coordination of field trials and testing of new technologies, and methods by institutions in or outside the network, e.g. simple technologies, methods for water quality tests, etc., as part of the information exchange range : collection/ evaluation/ review/ dissemination.

- organization of joint efforts. At present an attempt is being made to establish bilateral contacts between water supply organizations in developing countries and industrialized countries, concerning cooperation and training and advice on operational problems; this aspect has been further dealt with in " Training through cooperation - a case of the developed world", and is usually called " twinning."

4. Conclusion

(1) Transfer, evaluation and adaptation of existing technologies and related " extension" activities can best be dealt with through active worldwide cooperation of existing entities in an organizational framework set up for that purpose and through coordination by one or more nexuses. Each country or group of countries (especially developing countries) should be represented in that frame-work. Each national representative should have strong contacts with relevant entities in his particular territory and act as a focal point in that country.

The net-work described in the foregoing chapters is such a frame-work in the development stage. This net-work should gradually be further enlarged, modified and better organized. Ideally, funds should be made available for each representative (next to project funds), to build up the necessary infrastructure in the institutions. Project implementation forms an essential activity in such a frame-work.

(2) The coordinating body (IRC) should, on the basis of continuously incoming information as to needs and problems, develop new adaptation and demonstration projects, thus giving guidance to financing agencies wishing to make funds available for the development of water and sanitation facilities. At the same time this body should be active in coordinating information and documentation work.

This body should have direct relationships with WHO and working contacts with other organizations. Liaison with as many organizations and institutions as possible must be maintained. This body, which should deal with both water supply and waste water, should also work closely together with UNEP-IRS.

(3) Ways and means of efficient and effective transfer and adaptation of technology on a broad scale need careful consideration. A first question is which technology should be transferred. Information as to new findings, developments or applications is not readily available or easy to obtain. Contacts with suppliers of such information should be systematized, regular and personal. Time must be allocated, albeit limited, and considerable attention must be given to motivating the suppliers as this aspect plays an important role.

A second point is that evaluation and testing of the technology concerned is essential. A frame-work of persons and institutions must be available to do the work and funds should be raised.

A third question is to whom the technology should be transferred. In this aspect local involvement is important and contacts should be maintained at the working level.

A fourth point is follow-up. Training courses should be organized to ensure continuity and through demonstration programmes and seminars the new idea must be "sold" and be developed in a snowball effect.

Decisive aspects in information exchange are the organizational implications as described above, which can not be overlooked in efforts to improve information management.

(4) Up-todate information on community water supply is lacking in most developing countries, at both the national and local levels. Few countries have programmes for the systematic collection, analysis and reporting of such data. Thus the construction and evaluation of projects depends on data that are assembled on an ad hoc basis. The Network for Community Water Supply as discussed in the previous

sections, should assist countries in improving their water supply programmes through the use of more effective techniques in this field. The IRC uses its " transferring capacity " to take from the report of a WHO Expert Committee(*) five points for consideration :

1. The Group endorsed the recommendation of an earlier Expert Committee, urging governments to start recording community water supply information, not only for their own use but also for that of other countries and of international agencies concerned with the development of community water supply programmes.

2. Since it is useless to collect data unless they are made available to those who need them, governments should encourage the prompt publication of information compiled by specialized departments or other agencies, and designate a national centre where both the data and their sources would be recorded for the information of potential users.

3. Where different agencies are responsible for different aspects of a national water supply programme, they should be required to co-ordinate their activities in order to avoid duplication of the data collected. Agencies that are not directly concerned with water

* World Health Organization Technical Report Series, 1972, No.490, p.16.

supply but possess data on this subject should make them available to the agencies responsible for water supplies. Furthermore, adjacent countries with common water systems should co-ordinate the gathering of data of common good e.g., in warning of river pollution.

4. Data are needed at the local, regional, national and international levels and should be readily available from one level to another .

5. The collection and recording of data are essential aids to, and responsibilities of, management. Data arising out of the management of the water supply system at the local level should be condensed, presented in the form of an annual report, and promptly published and distributed. Such reports show the efficiency and effectiveness of the system, help to sustain public interest, and stimulate the improvement of existing systems as well as the creation of new facilities.

Through active cooperation the above described network will be able to give follow up to these recommendations and the conclu- which are hoped to emanate from the present Workshop.

...

COMMUNICATION AND DISSEMINATION TECHNIQUES

R.K.Saraf and G.K.Seth
National Environmental Engineering Research Institute,Nagpur

1. Introduction

Community water supply and waste disposal is a major activity in the field of environmental engineering, a discipline oriented towards providing a healthy environment to live in. Pollution which is an inherent twin of human efforts for prosperity manifesting into industrialisation and urbanisation, touches every fringe of human activities. Hence, adequate information on environmental pollution and control is necessary.

Adequacy, however, can differ from one entity to another. For those who are to organise and execute projects to ensure adequate treatment and disposal to water and wastes, detailed information on mechanism(s) of treatment is necessary to develop well-suited know-how. For those charged with the responsibility of construction of installations for the purpose, knowledge of the design criteria, specifications, availability of resources, cost economics will be essential. For those who matter in making these facilities available to communities, awareness of the possible ills of pollution and information on the types of remedies available is desirable for motivation to go in for the remedies.

Thus, tasks in the field of community water supply and waste disposal are a joint venture of the R&D Institutions, Government Departments, Industries, Municipal Corporations and Local Bodies. Success depends to a large extent on the effectiveness of permeability of information between these agencies.

2. Information Needs and Availability

Information Needs in community water supply and waste disposal can be summarised under the following broad headings :

Community Water Supply

Water resources, quantitative assessment; qualitative analysis in terms of physico-chemical, biological and microbiological characteristics; water quality standards for domestic, industrial and recreational uses; type and extent of treatment required to update raw water quality; distribution network, augmentation, deployment of indigenous resources; & cost economics.

Waste Disposal

Qualitative and quantitative assessment of wastes; modes of disposal; assimilative or self-purification capacity of receiving waters; type and extent of treatment to render them innocuous to preserve ecobalance;

feasibility of recovering by-products; usefulness of end products; re-use; deployment of indigenous resources; & cost economics.

Thanks to the vigourous R & D efforts, mainly a post-independence phenomenon, considerable background information and competent indigenous know-how exists now to handle a majority of situations in this field. While it would be inappropriate to say that the information is locked up in isolated compartments in the various agencies, it is nonetheless true that dissemination and communication links still leave much to be desired. For translation of information into "action", information management aspect needs to be fortified.

3. Milestones in Information Management

Information management has three milestones : transmitter, receiver and channels of transfer. It calls for efficiency on the part of transmitter to know areas where information is completely, partly or not available and efforts to fill up the gaps. On the part of the receiver, an aptitude for change in view of the forthcoming information is anticipated. The channels of transfer are meant to build up and develop confidence and capability of the transmitter and the receiver.

A salient feature of the process is that transmitter and the receiver are interchangeable. In other words, a feedback is an important aspect of information management. It grows information generation process and tunes its utility.

4. Communication and Dissemination Techniques

The techniques commonly adopted are :

4.1 Publications

4.2 Symposia and Seminars

4.3 Consultancy

4.4 Free exchange of information

4.5 Publicity

4.6 Collaboration

4.7 Extension; and

4.8 Training and education.

These are briefly highlighted in the paragraphs to follow.

4.1 Publications

Publications are excellent means of bringing information to books so that it can be read and used. Recorded information in the form of publications is by far the best known and most widely practised medium for dissemination.

While bringing out publications, it is essential in order to make them effective, to keep in view the likely range of readers and the version as well as distribution should be arranged accordingly. For example, for education of masses illustrative folders, leaflets will be more effective rather than Annual Reports, Brochures, Technical Digests which will be sought more by those who are keen to know activities of an institution. For practising engineers, scientists, entreprenuers, however, none of these will serve an adequate purpose. What they shall be looking for will be publications like a house journal, a guide and a manual which will provide all scientific and technical details for solving their specific problems. Author and editor have a big responsibility to tune the publications to the needs of the anticipated users.

4.2 Symposia and Seminars

These are known to provide an ideal opportunity for all concerned to come on a common platform and have an excellent forum for : (i) exchange of information to pinpoint areas of thrust; (ii) getting awareness of the latest R&D trends; (iii)building up personal/institutional contacts; and (iv) streamlining both the R & D activities and information transfer. Mobility of information is enhanced multifold through participation in the symposia and seminars. Besides organising seminars on subjects with broad coverage such as community water supply, community waste disposal or water pollution control, an institute will do

better also in organising seminars on specific topics e.g. water supply from tube wells, evaluation of rural latrine designs, treatment of fertiliser wastes, where those preoccupied with seeking solutions could be invited to participate. The forum would enable pin-pointed discussions and help a great deal in increasing acceptability of the new methods by providing every minute details on the theoretical as well as practical aspects.

4.3 Consultancy

This work is usually organised in a need-oriented manner and hence chances of acceptability of the new information for adoption are the highest. It is all the more so because this involves committment on the part of both the transmitter and the receiver.

Wherever the information is disseminated or communicated as a consultancy service the following code of conduct is essential both for the consultant and the receipient. The consultant must develope an outlook in catering to the needs of the receipient right from generating the information upto ensuring that the latter is able to actually adopt it independent of the consultant. Mutual association from start to end alone will develope adequate confidence and enhance acceptability.

It may be quoted here as an instance that in National Environmental Engineering Research Institute, (NEERI), Nagpur, this

practice has revealed growing confidence, motivation and entrepreneuel capability of beneficieries in participation in the R & D programmes of the Institute and exploitation of the indigenous know-how.

4.4 Free Exchange of Information

The most prevalent practice to-day particularly in respect of unpublished information is to provide it only upon request. Hence, information is put to a restricted use to that extent. Quite often, an entity needing information is not able to tap all the sources for want of information on the possible sources.

There is a need to develop a culture that every source generating new information should freely pass it on to all the entities to whom usefulness can be anticipated. In case of priced publications, the contents or subject index can be thought of for suchafree exchange.

4.5 Publicity

After developing capability, adequate publicity is essential for proper "image building". It helps masses to know the activities, standing in terms of capabilities and thus ensures awareness which is a pre-requisite for efficient communication and dissemination of the information. Audio-visual aids

have a good place in this endeavour. Publicity brings recognition as long as it does not outwit the actual accomplishments.

NEERI has harnessed this facet in right proportion and, as a result, it occupies a prominent place, as a resource for solving environmental engineering problems, both at the national and international levels.

4.6 Collaboration

Collaborative effort, a joint venture as it might be termed synonymously, is recognised as a mode for effectiveness in R & D tasks. Besides R & D tasks, it might as well be extended to nomination of personnel on various committees, inter-agency effort for information management, organisation of training or refresher courses, extension lectures, exchange of personnel etc. Each of these will enhance permeability of information from one agency to another.

4.7 Extension

This activity implies that the transmitters or generators of information actually move to the area of the field personnel or users and demonstrate utility, viability and advantages of the new information. In NEERI, for example, extension centres in the form of Zonal Laboratories serve as a catalytic

agents for information transfer. On-the-spot investigations and resulting information is offered almost like "home-delivery" of the know-how. Even temporary extension centres are operated to tackle particular problems and these are wound up after fulfilling the task requirements.

4.8 Training and Education

It matters very little, howsoever excellent R & D work an organisation might be doing to generate new information, unless it helps to infuse enlightenment and adequate skills in the personnel directly involved in implementation. Cases are not rare where the sanitary installations reveal poor performance and the reason can be attributed to lack of the trained personnel.

Training courses are a rich resource for motivation and for imparting necessary skills for efficient performance.

Training programmes need to be dynamic in the sense that earlier programmes should yield place to new ones depending upon the needs of the profession.

5. Summary

Commonly adopted communication and dissemination techniques are highlighted to bring out their salient features. These modes have a great role in successful transformation of information for benefit to communities at large in the form of satisfactory provision of water supply and waste disposal systems.

COMMUNICATION GAPS - FIELD ENGINEER'S POINT OF VIEW

Paritosh C. Tyagi
Local Self Government Engineering Department,
Lucknow (U.P.)

1.1 An item of news regarding American Water Works Association published in the October-December, 1974 issue of the journal of Indian Water Works Association reads as under :

> " After 93 years of its existence, 20 years of talk, 3 years of intensive study, 2 years of fund raising compaign and one year of design and construction, the American Water Works Association has at last achieved its long cherished dream - a home of its own..."

1.2 The above description is typical of all projects which are born out of the will of a society and implemented through collective effort. It is interesting to note that the various phases of the project are such that progressively more activity is done in shorter time. It is not a matter of chance. How the will of a society ultimately takes shape in a completed project, depends in a large measure on effective communication between various persons/authorities/agencies at work.

1.3 There are four major aspects of every project which relate to the subjects of sociology, law, finance and engineering. In the instance regarding AWWA, these are represented respectively by such commonplace words as talk, study, fund-raising and construction. The relative number of years for each of these aspects or phases show clearly how the progress on the project is accelerated from generating public will, to working out necessary procedure, to making arrangements for money, and to designing and constructing. One can perceive the strengthening of communication among the workers through these activities.

2.1 A field engineer in water supply and waste management sector receives communications from :

(a) higher authorities,
(b) subordinates,
(c) implementation agencies like contractors,
(d) public,
(e) related organisations in such fields as -
    (i) administration,
    (ii) legislation,
    (iii) implementation including operation,
    (iv) surveillance, and
(f) research

The communication gaps between the field engineer and the above mentioned parties is depicted in a tabular form on Annexure-I and discussed in the succeeding paragraphs.

2.2 The basic unit operating in the field is taken in this discussion to be the divisional engineer. The higher authorities for the basic unit are the direction officers and the Government. The subordinates for the divisional engineer are his assistants and juniors. These have matters going back and forth. Public and their representative interject matters at various levels when they are agitated over an issue. The activities of the related organisations and research are concurrent with the activities of the field engineer in water supply and waste water disposal sector.

2.3 It is a common experience that a paper is passed on at several levels before it reaches the person who is to verify or present factual information. By then, the time remaining to be allowed for collection of data and submission of report is often insufficient to do justice in the matter. Basically, a good deal of relevant information remains lying at peripheral level and it escapes being sent upwards for desired action.

2.4 In a large number of cases, collection of information is made through prescribed periodic returns. The proformae for such returns are quite elaborate. Over a period of time, the various items and columns of the proformae are well understood but the collection of information, its

checking and compilation gets assigned to lower levels in the hiearchy. This process continues so that more and more returns are prescribed to collect a little additional information each time and each return repeats a large number of details in an attempt to make it self-contained. The increase in the number of returns on the one hand and the lowering of the level at which they are dealt result in a situation in which the information becomes hopelessly inaccurate and obsolete. Several columns are left blank and considerable amount of information is repeated without correction for updating. Once the information furnished in a return is found to be unreliable, no good use can possibily be made of such information and the various returns as aforesaid serve little purpose. What is worse, this stream of returns from lower to higher level makes the travel of any letter from the higher to lower level really difficult just as it is difficult to swim upstream in a fast flowing river. In short, the mismanaged communication of periodic returns obstructs useful communication.

2.5 The communication gap between the subordinates and the superiors is in part explained by the position described above. In addition, there is the fear-complex in the subordinates which inhibits them from stating a fact which would incriminate themselves. Quite often, the language

used in the progress reports is deliberately kept vague and ambiguous. Such information are difficult to analyse and interprete. Thus, although a communication may exist, it is as good (or as bad) as if it did not exist.

2.6 The communication between the field engineer and the implementation agencies such as contractors, suppliers of equipment and machinery and other organisations hired for the purpose, is within the frame of an agreement. Essentially both parties attempt to safeguard their position in terms of money. This relationship is attended by the greatest amount of effort and vigilance, because lapses can be measured in terms of money. Timely completion of works, progress without impediment and successful proformance of completed works are in the interest of both the parties. Therefore, there is very little communication gap between them.

2.7 The communication between public and the field engineer of water supply and waste management sector is similar to that between public and field officer of any development agency. This relationship is primarily influenced by the extent and effectiveness of benefit that the development activities give to public. Such benefits may accrue to a person as an individual or as a member of community. The responsiveness is greater if the benefit

is more to the individual than to the community. The communication between the public and the field engineer can take a number of forms, both direct and indirect, and may be presented by an individual or a group or an organisation such as a newspaper. The gap in such communications is mainly caused by a prevailing suspicion in public about the intent and purpose of development activities. Such suspicion is aggravated by unexplained delays in execution and by the inaccessability of the field engineer to the public.

2.8 Commonly, a satisfactory grievance procedure is missing and the field engineer follows ad-hoc procedures. He gets little professional assistance from any one else on the subject of public relations. The field engineer has inherent handicaps in working as his own public relations officer except that he is fairly well-informed. As a result, the communication between him and the public is intermittent, uncertain and its quality and nature depends very much on his personal nature.

2.9 The field engineer in water supply and waste management sector is one of the partners in health, although few among the health workers would recall him. He is, as if, disowned by public health and unclaimed by engineering.

There are several organisations related intimately to the objective of his work. Such organisations relate to public health, occupational health, town and country planning, industrial development, municipal administration etc. The communication linkages are mainly of administrative nature and gaps exist on account of ineffective coordination and half-hearted partnership.

3.1 One method for bridging the communication gap between the related organisations and the field engineer is to secure a specialist from the related organisation whereby a mix of professional skills suitable for proper development in water supply and waste management sector is obtained.

Yet another method for covering communication gap is the use of training. Training in its wide form will include seminar, symposium, workshop, and orientation courses, besides the courses of formal instruction.

3.2 An important related organisation which is worthy of separate mention is that of research. The travel of knowledge from laboratory to field has been found to take longer than from the class room to the field. As a result technical application in the field are partly absolete. A good deal of effort is necessary to remove the communication gap between

the research worker and the field engineer. The National Environmental Engineering Research Institute has done commendable work in this direction. Their Technical Digests brought information in a form and extent which could be utilised by the field engineer. However, this has largely remained a one-way traffic. This activity would be of greater benefit if the technical digest is distributed to a larger number of field engineers and a system is developed to invite and process the views expressed by field engineers.

3.3 Another organisation working in this field, although in the same campus, is the Indian Association for Water Pollution Control who have been publishing a monthly news-letter. This news letter is in itself a very useful publication but has two limitations :

(a) it does not adequately cover the field of community water supply, and

(b) its abstract service is in a large measure ' abstract ' for the field engineer.

3.4 The field engineer is already burdened with routine. His attention is difficult to be arrested by fresh looking items outside the fold of routine. His performance is judged by yardsticks which do not evaluate his attention on technological improvements and economy. He appears to be bothered by his superiors, overlooked by his subordinates, pestered by his agents, harassed by public and neglected

by other workers in the field of environmental health. Where does the solution lie ? In better understanding, which is the result of better communications.

...

Annexure-I

Communication levels in various subjects required and obtained between Field Engineer and others

The party communicating with the Field Engineer	Sociology	Law	Finance	Engineering
1.	2.	3.	4.	5.
1. Higher	Ac	Bc	Ab	Ab
2. Subordinate	Ac	Bc	Ab	Ab
3. Agency	Bc	Bb	Bb	Ab
4. Public	Ac	Ac	Bc	Cc
5. Related organisations	Bc	Ac	Ac	Bc
6. Research	Bc	Nn	Nn	Ac

NOTATION & NOTES

1. A, a stand for Good
2. B,b stand for Fair
3. C,c stand for Weak
4. N,n stand for Non-existent
5. Capital letters denote communication level required
6. Small letters denote communication level obtained

IMPOSSIBLE REQUIREMENTS FOR A PROFESSIONAL PERIODICAL TO MEET

J.Lieffering
Keuringsinstituut voor Waterleidingartikelen,Kiwa N.V.

If a professional periodical must be on a high scientific level, but also wants to be of topical interest and, besides, pleasantly readable, it has to meet almost impossible requirements.

In fact, scientific articles frequently do not stand out by their topicality or readability and topical news from the specialized field mostly does not draw the attention of scientists, who are, moreover, of opinion that everyone will anyhow read that in which they are interested.

When the integration of these wishes turns out to be impracticable, a well-considered division will have to be made. For the biweekly journal for water supply and discharge water treatment, published under the name of H_2O by the Dutch associations and institutions in the sector of water works and discharge water purification, this means the following :

The associations, organizations and institutions institute together an advisory board for the editors, with whom this board has a meeting two or three times a year to advise and stimulate the

two editors, both working part-time. In addition, the editors can appeal to the expert knowledge of these members of the advisory board (and the people with whom they co-operate) by consulting them between whiles on articles offered for publication.

Every issue contains at least two or three long scientific articles, followed by a number of items of less scientific importance, such as notices of institutions and associations that use the periodical as their official organ. In the middle of the paper there are four blue pages containing "news". Before and after all this there are just as many advertising pages - which must cover the cost of the periodical - as there are editorial pages.

Besides, one of the organizations adds a press cutting paper containing news from the daily press, so that the readers know what is written in the press about this branch of industry.

The editors are not short of copy matter, which may among other things be due to the fact that the journal also publishes lectures which were held at the meetings of the organizations. The fee - 50 guilders per page of 1000 words - has obviously no restraining influence.

It is only the scientific articles that are a source of anxiety to the editor deciding upon the ultimate contents of the periodical. Not because their scientific level is insufficient. On the contrary, they are in general quite up to standard, but the style and the form in which they are written often leave much to be desired.

At first the editor tried to re-write the text, sometimes in consultation with the author. These efforts, however, proved to yield rather poor results: the readers did not notice the improvement and the authors were, in spite of all, not pleased with the re-written text of their articles.

That's why this method was dropped. Nobody was grateful to the editor for his work. On the contrary, it only resulted in frustrated authors.

The editorial staff is therefore much pleased with the possibility that the University of Technology of Delft offers by allowing future engineers of health technique every year to deliver a lecture on the standard which scientific articles should satisfy.

Readibility is the prime requisite. It is impressed upon students that they should always realize that they only write to be read. It is exclusively for this purpose that they must set pen to paper.

This makes it necessary to try and draw the reader's attention by telling immediately, in the beginning of the article, what he has found, discovered, done or achieved that is worth printing, so that the reader shares in this new development. Without this starting point the author will seldom succeed in writing an absorbing scientific article.

The same applies to summaries, which mostly indicate what the author is writing about, but often fails to tell at what result he has arrived, although this is exactly the justification of his inviting the reader's attention.

By brining this home to the younger generation of engineers, the editors hope to make the scientific part of the journal more readable.

In contrast with many other technical journals, all figures and illustrations belonging to the articles are not redrawn to get unity in the style of drawing. It is thought that the cost of this procedure and the delay it causes do not offset the optical effect.

The summaries, which are classified according to the UDC system, will later form part of a monthly survey of literature, in which those 10 water companies participate

that are sufficiently equipped for it, so that they can together cover the entire specialized field in the best possible way. Last year the issues of over 100 periodicals were regularly read, 1330 issues and 335 books being extracted as far as necessary, which resulted in 2215 summaries of 100 words on an average. Twelve water companies and two other (industrial) undertakings availed themselves of the opportunity to take out an annual subscription to the summaries of the pool against payment of 100 and 200 guilders respectively.

CONSUMER CONTACTS AND PUBLIC RELATIONS

S.V.Patwardhan
University of Roorkee,
Roorkee (UP)

India is wedded to democratic socialism. She has to cater for 600 million people, seventy percent of whom are still illiterate. Most of the public utilities such as water supply, sanitation, electricity supply, transportation, communication etc. are owned and managed by local bodies or respective governments. The paying capacity of the consumer and the resources of the local bodies are far from adequate and as such the utilities have to be run on most economical and efficient basis. In a democratic set-up, consumer is indirectly the policy maker. There can not be two opinions that well informed and satisfied consumer will be a great asset to the utility. His active co-operation can then be easily sought. This has to be one of the important targets of the utility.

It will be worthwhile to assess whether the present utilities have been successful in achieving this target. If so, how far and if not, why not ? The author had an opportunity to study the working of some public utilities dealing with water supply. The study revealed that the consumer as a class was not happy with the working of the utility. Many of the consumers were ignorant about its working.

Active participation of the consumer was not even aimed at. In certain cases the consumers showed a hostile attitude. In one of the symposia arranged to discuss the rate structure of the utility one of the speakers objected to the word "Public Utility" and said they are public harassment institutions.

The reasons for failure in building good public relations may be numerous but the most common one is an unhealthy approach of the utility towards the consumer. Most of our utilities are not consumer oriented. The importance of developing good public relations is under estimated. Practically no efforts are made for achieving this and as such well planned information transmission service is non-existing and consumer contacts go uncared.

The relationship between the consumer and the utility results from the contacts between the two. Well planned and carefully executed contacts play an important role in building good consumer relations. The objective of these contacts should be to keep the consumer well informed and satisfied. It should also give an opportunity to the consumer for self education about the working of the utility. The closeness created by such contacts can then result in the active participation and co-operation from the consumer.

The consumer contacts could be grouped as routine ones and occasional ones. Routine contacts include new connection, meter

reading, bill despatch and bill payment. In the occasional contacts stoppage of service for emergencies or major repairs, complaints and its attendance, action on defaulters, control of supply, construction of major work, contacts with the utility employees, are of significance. To obtain the desired results a contact should be properly analysed, well planned and carefully executed. The approach that may be helpful is illustrated here.

The contact of the consumer while asking for a new connection is usually the first formal contact. Its analysis will show that :

1. The consumer is in need
2. Usually due to inadequate information he does not apply in time
3. Due to red tape in the procedures he becomes impatient, and tries short cuts
4. The opportunist exploit the situation. They exaggerate the difficulties for their own benefits
5. A class of agents who act between the consumer and utility gets established and keeps the consumer ill-informed and away from the utility
6. These agents corrupt the employees and the reputation of the utility gets adversely affected

Once the analysis is done the process of planning can take shape. The prospective consumer needs correct information about the procedure, time involved and persons to be contacted. He will normally contact his neighbour who has a connection. His consumer

card can serve the purpose of transmitting correct and needed information. On the back of this card this information could be given so that the new consumer is well informed.

The time required could be optimised by applying optimising techniques. The consumer is in need and some advantage of this situation could be taken. He is usually asked to come to the utility office personally to sign an agreement or bond. This brings him in direct contact with the utility and its authorities. To save his time and to utilize it fully, as soon as he enters the office door, the sign boards should lead him to a specially designed waiting hall. In this hall on a table, blank forms of the bond are kept and a fully filled illustrative bond is also kept. This helps him to fill the blank form himself. The hall contains charts, certain models etc. so that he feels interested and the process of self education is initiated. The authority dealing with his application calls him and discusses with him his requirements and problems, indicating him in the process the expectation of the utility from the consumer. The authority also makes it sure that he has read the important matter from the bond. Depending upon his interest and the interest of the utility he is introduced to the different personnel who are likely to come in contact with him for future contacts. Sometimes he is taken round the works. He gets an assurance that he will get the connection by a particular date. The visit ends by handing

over to him a token gift to commemorate his joining the utility as its member. But the contact does not end. The authority incharge should be a well trained one which can get back the information that the connection has been made before the target date and contacts the consumer to know the short comings. It is important to see that the cycle is complete and the contact is well established. Thus the process of planning and careful execution is complete. Inadequate planning, careless handling and uncontrolled exploitation by the middle agents is usually responsible for creating a wall between the consumer and the utility which is difficult to penetrate. The importance and significance of such a contact can not be over emphasized.

This process of analysis, planning and careful execution could be applied to every contact. The contact of meter reading is a different type of contact. Here the employee of the utility is given an opportunity to meet the consumer or his representative. The meter reader has to be trained for his job to make best use of this contact. It has four aspects; (1) Consumer relations (2) Information transmission (3) Feed back (4) Check and control.

To achieve good relations he has to care for smallest things like closing the gate while coming out, or hanging the consumer card back properly etc. If reading is on higher side he should enquire about reasons for excess consumption and should offer for testing of meter. Such an enquiry reveals much more in case of a

defaulter. In case of a usual customer it gives him a hint that next bill will be higher thus removing in the bud the cause of complaint for higher bill. If there is any complaint meter reader can transfer it through the meter book back to the office promptly. Meter reader can satisfy any querry of the consumer if he is versatile. Thus it could be seen that taking a reading is only an occasion for contact but its proper planning and execution could achieve much more.

Receiving the bill is not a happy contact. If it reaches in the end of a month it upsets the consumer. The language of the notice and penalty for not paying in time, hurts him. This unhappy contact if properly planned could be made more tolerable. The back of the bill is a useful space. It could be used with three objectives :

1. To amuse the consumer
2. To keep him informed
3. To promote to do his duty

A joke, a humerous slogan, an illustrative carton will create interest and the bill will be well received. Properly worded notice will tempt him to pay his bill in time.

The three illustrations indicate that a little care taken in analysis, planning and executing the contact is of great help in establishing healthy public relations.

In case of certain contacts general care is of a great advantage. The contact between the consumer and the employee of the utility takes place quite often. A proud, well informed and satisfied employee is an asset. His cooperation in this regard is most valuable. Every contact needs proper analysis, design and careful execution. If this is done, it should be possible to build up good public relations - a target that every utility has to aim at for economical and efficient functioning.

...

AREA - III

PROBLEMS OF STORAGE & RETRIEVAL OF INFORMATION

DISSEMINATION OF RECORDED INFORMATION IN COMMUNITY WATER SUPPLY & WASTE DISPOSAL : NEERI'S CONTRIBUTION

S.G.Bhat and S.K.Kesarwani,
National Environmental Engineering Research Institute,Nagpur

INTRODUCTION

Information is the essential ingradient of decision making. Modern society continuously generates information and absorbs it for betterment in every walk of life. Scientific and technical activities take place in a complex environment and need specific information to give rise to further information.

As a result of observation and experience, a spark of idea is generated in the human mind. When it is supported by the experimental trials, the idea takes the form of a raw data. The data are recorded, analysed and sorted, correlated and worked into the body of scientific knowledge or information. Scientific information is suggestive of new observations and experiences whereby knowledge grows still further. This knowledge returns to the communication system as new 'information'. Thus it serves as a nutrient for any scientific and technical activity. The information flows through various channels such as : (i) oral communication, (ii) discussions at conferences and seminars, (iii) exchange of personal correspondence, (iv) through institutionally organised communication system like publications

viz. journals, reports, standards, patents, proceedings of the conferences which, in turn, are disseminated through various tools such as abstracts, indexes and current awareness services etc.

Thus, knowledge bank in any field is its published literature. There is an enormous growth of published literature that the phenomena has been described as "Information Explosion." This is as well true in the field of environmental science and technology of which Community Water Supply and Waste Disposal is an important aspect. According to Mr.D.B.Baker, Editor, Chemical Abstracts, there has been 74% growth in the number of papers abstracted under 'Sewage & Waste Section' of the Chemical Abstract during 1968-71.

USERS & TYPE OF INFORMATION

All personnel, may be a technician, an engineer, a scientist, a planner, an administrator in the field of Community Water Supply and Waste Disposal, need information in this field. The information needs vary from person to person and from situation to situation depending upon the problem faced. Various types of information requirements have been enumerated in annexure-I & II. The examples given are not exhaustive and are only indicative.

APPROACHES TO INFORMATION

No matter how well-versed a person is in this field, the information new to him is continuously required. Moreover, to keep himself aware of the current developments he needs a selective service. In his day-to-day work he is faced with a specific problem. He has to find data, technique, process or theory to aid his solution for which many a times he finds that his fund of knowledge is not adequate. On certain occasions he has to make a thorough survey of a subject that is new to him and need to extract from documentary mass of information on a high proportion of available information.

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE

NEERI is one of the national laboratories functioning under the C.S.I.R., Ministry of Science & Technology, Government of India. It is engaged on a wide variety of research problems and investigations connected with :

- water treatment and distribution
- sewage treatment and disposal
- industrial waste treatment
- water pollution control
- rural sanitation
- solid wastes disposal

To act as a clearing house for the latest available knowledge and know-how in the field, to disseminate results of research and experiments and to maintain liaison with local, national and international agencies are some of the important objectives of the Institute. Thus, in addition to it being a research centre the Institute is also an information centre disseminating information in its widest sense.

The information service of the Institute not only caters to the internal needs of NEERI's scientists but also to other R & D groups, industries, municipal corporations and local bodies at village level and also the research centres at I.I.T.'s and Universities.

Various research bodies, Government and Semi-Government Organisations, local and State Engineering Departments require information for their day to day work. In addition to the materialistic users who want to implement the recent advances and products of research in their day-to-day jobs the academic and research staff of the Universities and research organisations who are carrying out fundamental as well as applied research also need information for their work. The users can broadly be classified under three categories :

1. Those who are carrying out research in the field
2. Those who are carrying out research in the disciplines which have got an indirect bearing to the problems connected with water supply and wastes disposal

Post-graduate students and teachers from engineering, medical and technological institutes, department of chemistry, biochemistry, pharmacy, botany, zoology, geology, come under this category.

3. Those who are utilizing results of research in their day-to-day work. This category comprises of various industrial organisations, field engineers, technicians, corporations, and other municipal bodies.

INFORMATION SERVICES OF NEERI

Pre-requisites of Information Services

For a research organisation like NEERI with so heavy a mandate it is but natural that it should have a well-equipped and well-organized library poised to serve the information needs towards fulfilment of its objectives. To cater to the needs of various types of users, information has to be culled and gleaned from different sources of recorded knowledge which is available in a bewieldering variety of documents, Conventional and non-conventional e.g., books, periodicals, reports trade literature, standards, patents etc. Aware of the above mentioned facts, it has been the endeavour of the Institute to plan its library activities so as to build up an exhaustive collection of various types of documents not only to meet the

demands made on it by its own clientele, but also to project itself in the future as a national depository and clearing house for documents and information covering the wide compass of environmental engineering and allied disciplines.

The programme concerning acquisition and organisation are geared in such a way as to ensure continuous inflow of relevant documents and their effective organisation. These operations have got a close interaction with Library & Information services and they form the very foundation of these services.

READY REFERENCE SERVICE

This is a personal service to readers in helping them to find the documents containing the information of their interest or to find out the required information itself from the documents at the shortest time. The request may range from the simple facts or figures, background material, description of an object, process, method, formula or a concept to extensive literature search. These enquiries are recorded in a separate sheet - known as information work sheet, wherein the details of the nature of querry, sources consulted and source/sources wherein the information was located are recorded. These sheets enable us to analyse the types of querries, requirements of users and thereby helps to build up a good collection besides serving as a guide for repititive types of enquiry.

CURRENT AWARENESS SERVICE

An important component in any system of documentation is the mechanism of continuous analysis and prompt announcement of current literature. To meet this end the Institute brings out a fortnightly publication entitled " Guide to Current Literature in Environmental Engineering and Science " wherein a major portion is devoted to community water supply and wastes disposal. This publication contains a list of references selected after careful scanning of more than 250 journals from all over the world for the purpose regularly. The entries are arranged according to the conveniently chosen subject headings, supplemented by subject index and a list of journals scanned. This service caters to the researchers, field engineers, university professors, industrialists from India to keep themselves abreast of what is 'New' in the field. In order that this service should be accessible to all those who are interested in the field the subscription has been kept within an easy reach.

ENVIRONMENTAL ENGINEERING-NEWS INDEX

The daily news papers are considered to be the most current amongst any published source of information. News papers as well as news items from other sources are systematically scanned and those related to environmental engineering are provided to concerned people.

BIBLIOGRAPHICAL CONTROL OF INDIAN LITERATURE IN THE FIELD

During the past few years there has been a growing awareness of the importance of Community Water Supply and Waste Disposal in the country as a result of which there has been an ever increasing flow of published information on this vital subject. Hence a need was felt for a systematically planned bibliographical control of the emanating literature. To fulfil this need the Institute has started bringing out comprehensive " Annual Bibliography of Indian Literature in Environmental Engineering and Science ", wherein papers published in Indian & foreign journals as well as papers presented at various conferences, seminars etc. are included. It may be mentioned here that the proceedings of many conferences are never published and information about papers presented may not reach the users at all. Through this bibliography readers can come across such literature which otherwise might not come to their notice.

NEERI being a regional reference centre for : Community Water Supply and Waste Disposal it is its responsibility to communicate information about the work carried out in India. The appearance of this comprehensive bibliography afford a unique opportunity to take a bird's eye view of the contribution which India has made in the field. Bibliography covering the year 1971 is already published and that for the subsequent year will be out shortly.

SELECTIVE DISSEMINATION OF INFORMATION

This is a personalised service, in which scientists of the Institute are informed about the existence of most nascent literature which may be relevant to their needs. At present a manual SDI Service is being operated. A user's profile giving details such as name of the research worker and his associates and the field of his interest with appropriate key words is maintained. Immediately on receipt of a document they are scanned for their contents and matched with the subject interest defined in the users profiles and notification of relevant references are sent to the users through " Library Flash ". At present this service is restricted to the research workers of this Institute only.

LITERATURE SEARCH & COMPILATION OF BIBLIOGRAPHIES

Information about the work done in a particular field is provided by carrying out literature search and compilation of ad-hoc bibliographies on specific topics. This service is extended to research workers from outside organisations both from India and abroad.

RESEARCH IN RETROSPECT

Environmental Engineering being a comparatively new science the research work in the field in India got impetus after the establishment of NEERI (Formerly, CPHERI) in the year 1959. Since then the results of R & D efforts carried out by the Institute were communicated to various periodicals, symposia proceedings, technical reports, technical digests etc. It was, therefore, thought necessary to bring at one place information about all such literature which emanated from the Institute. The Institute has recently compiled a publication entitled " CPHERI Research in retrospect 1959-1973 " - A Bibliographical Review which presents a bibliographical picture of 700 publications in diverse subjects including Community Water Supply and Waste Disposal.

'BUYERS GUIDE TO WATER SUPPLY & WASTE WATER DISPOSAL:EQUIPMENT & SUPPLIES '

Practising engineers, corporations, municipalities, administrators and all other concerned with the purchase of equipment and supplies in this field are always in need of information about " where to buy ". This guide serves the purpose. The guide is being up-dated and a revised edition will be published shortly.

REFERRAL SERVICE

When a particular information is not readily available the enquirer is directed to the outside source whereform he can get the required information. This service is rendered by consulting reference sources such as Directory of Scientific Research Institutions, Directory of Scientific Research in Indian Universities and Annual Reports of the Organisations. To cite one example, for detailed information about ceramic candle filters for water treatment, it is advantageous to the enquirer if he is directed to the Central Glass & Ceramic Research Institute, Calcutta who had developed this process.

PROPOSED SERVICES

It is intended to extend the present activities in the field of information dissemination to make it more fruitful and effective. A few such services are highlighted below :

Data Bank

The data which is collected by various agencies is usually burried in files and does not have easy access. However valuable data is available in scattered form such as newspapers, Government documents, and in symposium proceedings. With a view to systematically collect and retrieve

it for future use the Institute contemplates to maintain a'data bank'which can be used to retrieve required data in future. Preliminary work in this direction has already been started.

Retrospective Bibliography

While the information about the projects completed as well as research in progress is of immense use it is many a times imperative for a research worker to ascertain what work has already been done elsewhere particularly in his own country. It is also necessary to take a bird's eye view of the work already done. To fulfill this need it is proposed to compile a retrospective bibliography of work done in India for the last 60 years. The work is in progress.

Reprographic Services

The researchers many a times would like to have a copy of a certain document for his day to day use. Necessary facilities for providing the ready made copies of required documents are being extended by procuring a electrostatic photocopying machine which would instantaneously provide copies of the required documents.

Breaking the Language Barrier

It is said that fifty percent of the World's Scientific Literature is in languages other than English. In order to break this barrier it is proposed to establish contacts with various translation centres so as to procure the translation of a required document.

Mechanization

At present the services provided by NEERI are manually operated. However mechanization of some of the operations is contemplated.

Compilation of Registry of Research in Progress

It is a well known saying about the right hand not knowing what the left hand does. This is many a times the case in the research in Community Water Supply & Waste Disposal in which a large number of persons are engaged. The research worker is always interested to know about what work his counterparts in outside organization are carrying out. The compilation of this registry will go a long way to provide this information. The Institute already started collecting information about the activities of various organizations who are engaged in work relating to this field. The information so collected will enable the Institute to co-ordinate the research work carried out in the country in this field.

Thus, NEERI is seized with the information needs in the field and striving for catering to it in every possible manner.

'Annexture-I'

(Nature of Information Required)

Externally Generated Information

1. Population figures of particular city, village etc. Rural and Urban Population.
2. Number of towns served with protected water supply.
3. Per capita consumption of water.
4. Per capita income.
5. Quantity and type of raw water resources.
6. Water requirements for various purposes such as recreation, fire fighting, drinking,industries.
7. Type of treatment.
8. Service reservoirs, type, number, size and location.
9. Types of pipes (mains), joints & fittings.
10. Availability of Chemicals for water treatment, their manufacture, costs etc.
11. Pipe material.
12. Physical, chemical, bacteriological standards for water quality.
13. Epidemiological data.
14. Reuse of waste water, requirements & potential.
15. Cost of community waste disposal.
16. Disposal and use of treated wastewater and sludge.
17. Production and use of various chemicals which are possible pollutants.
18. Effluent characteristics of various industrial wastes.
19. Number of sewage treatment plants in the country.
20. Number of towns having sewerage system.
21. Number of sewage farms in the country.
22. Number of oxidation ponds in the country/state.

Institutional Information

1. Disinfection techniques for small community water supply.
2. Number of patents obtained by the organization in the field.
3. Names of officials of the Institute who are represented on various committees of I.S.I. such as water sectional committees, public health engineering equipment committee.
4. List of projects completed by the Institute.
5. List of current projects of the Institute.
6. General information about the activities of the Institute.
7. Information about Institute's publications, their price , circulation.
8. Future plans of the Institute
9. Apportionment of funds on various projects - costing etc.

...

'Annexture-II'

(Some typical Information Problems Actually Handled)

Water

1. Ratio of water available from surface and ground water resources in India.
2. Any article on Bamboo tube well.
3. Phosphates & Silicates - their significance in water.
4. Water for fire fighting.
5. Fluoride bearing areas of Maharashtra.
6. Sources of raw water, how much polluted it is, and what type of treatment is given - Information about a particular part of a country.
7. Research needs of the future in the field of water supply.
8. Total number of towns which are having protected water supply.
9. Population covered by piped water supply.
10. Background information about radial flow filter with design.
11. Taste & odour in water supplies.

Waste Water

1. A list of journals wherein articles of recovery & reuse of Lignin form pulp mill waste could be found.
2. Ore quality of a steel plant.
3. Utilization of Fly ash.
4. References on reuse of water from textile wastes.
5. References on leachets from refuse dumps.
6. Surface aerators.
7. Chromium waste.

General

1. Names & addresses of the organizations dealing with rural sanitation in India.
2. Temperature of Florida State.
3. Chemical formula of 'Chlorinated Lime'.
4. Chemistry of toxic wastes.
5. Rural industries in Vidarbha.
6. Methods for detection of dieldrin.
7. Regeneration of activated carbon.
8. Total quantity of hides & skins produced in India per year.
9. Number of animals slaughtered in India in a year.

Area - IV

CHARACTERISTICS, TESTING & EVALUATION OF INFORMATION

COLLECTION, ANALYSIS AND STORAGE OF INFORMATION FOR WATER SUPPLY MANAGEMENT BASED ON PRELIMINARY SURVEY IN RAJASTHAN

P.S.Rajvanshi, R.K.Bhargava
Public Health Engineering Department, Rajasthan, Jaipur
and V.P.Thergaonkar
NEERI Zonal Laboratory, Jaipur

INTRODUCTION

The area of Rajasthan State is 3,42,214 sq km and it is the second largest state in the country. It is sparsely populated. The density of population varies from 4/sq km in Jaiselmer district to 184/sq km in Bharatpur district. The total population is 25,765,806 out of which 82.37% reside in rural areas. The total number of inhabited village are 33,305. 2490 villages are uninhabited. The population of the villages varies from one thousand to fifteen thousand persons. Most of the villages have population below 1000. Following table gives population-wise distribution of villages(1).

Population	No. of villages	Percentage
Less than 200	8,771	82.86
200 to 499	11,010	
500 to 999	7,817	
1000 to 1999	4,008	17.14
2000 to 4999	1,524	
5000 to 9999	165	
above 10000	10	

The Aravali range passes from south-west to north-east. This devides the state into two parts viz. the north-east which is mostly desert and south-east which is plain. The state consists of 26 districts out of which 8 are desert and 6 semidesert. The annual rainfall varies from 10 to 20 cm in the desert districts and 70 to 100 cm in south-eastern district like Banswara and Udaipur. The western and northern districts are generally under the grip of drought due to low and erratic rainfall. Besides, the difficult geographical condition, sparse population is also a problem. Water supplies of such areas shall be expensive and prohibitive in cost.

WATER SUPPLY MANAGEMENT

Most of the rural and urban water supplies are run departmentally by the State Public Health Engineering Department. Besides, the maintenance Divisions the department has Investigation, Drainage and Planning Divisions.

Department maintains three laboratories stationed at Jaipur, Kota and Jodhpur. The laboratories assist in investigation and selection of new sources for water supply and suggest proper treatment for surface sources. Once the schemes are commissioned, they monitor water quality by conducting chemical & bacteriological tests. They have also played an important role during emergencies like epidemics and maintain water quality when raw water deteriorates due to droughts etc.

Before independence, piped water supply existed only in four cities which were capitals of the former princely states. Now, by the end of the IV Plan almost all towns have piped water supplies. In rural sector the number of villages covered are 4233. Besides, reorganisation of urban schemes, about 6000 villages shall be covered at the end of the V Plan.

SOURCE OF WATER SUPPLY

There are few perennial rivers like Chambal and Banas. Impounded lakes and ponds also serve as source of water supply. However, surface sources are limited and most of the water supplies are from ground water. Rajasthan is rich in minerals. Important among them are : lead & zinc in Zawar, gypsum in Jamsar, soapstone in Jamwa Ramgarh, Calcite in Jaipur, mica in Bagor, felspar in Tatarpur, barytes in Jamroli, copper in Khetri, tungstun in Degana, flourspar in Sanota and rock phosphate in Kota etc. Geological strata plays a major role in shaping the ground water quality. It is, therefore, necessary to analyse water of these tracts for the chemical ingradients expected of these minerals. In a recent survey, for example, large number of villages have been found to be suffering from endemic flurosis. Many villages reported of guinea-worm infestation. Some places in Western Rajasthan are known to have high nitrate concentration.

Also with increased use of fertilisers increase in nitrates is expected. Some waters are likely to contain inorganic nitrates. There is, therefore, need for investigation and marking out areas for fluorides, for nitrates and other parameters so that management may effectively deal with the problems.

During rains, sub-soil flow exists in Alluvial valley fills along the natural drainage lines, wells or infiltration galleries constructed in such locations, yield sufficient quantities during rainy and winter seasons which also prolong in some cases during summer months, particularly in normal rainfall years. During drought years, a problem is generally faced in the summer season about the adequate supply of water when the demand is at its peak. It shall be necessary to artificially recharge these water supply sources so that adequate water is available during summer. Monthly yield data of these sources is required to be collected. Stream gauging should be done to get a complete data for quantity of water available during the year. With this data low height anicuts to artificially recharge the sub-soil flow as well as to provide measures to make conjuctive use of surface water with it, may provide a fitting answer to the problems at low cost.

In eastern Rajasthan there are river like Parbati, Parwan, Kalisindh, Gambhir, Berach and Banas etc. which have not been adequately tapped so far. These rivers are to be gauged and data

has to be collected at different points near the supply points mostly at the townships located along or near the river course. Based on the data small reservoirs can be designed along the river basin in which water can be stored partly above the ground level and partly in the sub-soil. These reservoirs can serve as water sources for adjoining areas. If this idea is put into practice it will save huge expenditure on transporting of water from large distancesthrough the pipe lines. The present practice to construct bigger reservoirs which are seldom filled to the capacity due to erratic rainfall is not sound and economically desirable.

COLLECTION OF INFORMATION FOR WATER SUPPLY

It was thought desirable that a preliminary survey of all villages for the water quality may be undertaken, so as to get an idea of water supply problems of Rajasthan. This survey was conducted in the year 1973-74 to identify:

1. Iron affected areas
2. Fluoride affected areas
3. Brackish & saline areas
4. Inadequate & difficult areas
5. Guinea-worm affected areas

Water samples were examined for items 1,2, and 3 in three laboratories. Water depth data was collected while the area was surveyed.

Collection of samples for guinea worm incidence was not undertaken as the time required for such collection was insufficient. For this, oral surveys were conducted and information was collected. This data alongwith that available from Director of Medical & Health Services were combined to give a picture of guinea worm infestation.

WATER SAMPLING, IDENTIFICATION OF VILLAGES AND ANALYSIS

Till 1973, State PHED Laboratories had analysed thousands of water samples, but with a limited purpose of selecting or rejecting a source. Beyond this the data was not used. The data was lost due to two main reasons. Firstly the same village was pronounced and spelt differently; and the other was that there were more than one village having the same name. There are eight Hamirpurs in one block of Jhunjhunu. It was therefore necessary to codify the villages in some way so that the results can be stored properly for any future reference. This was done by relating the village names & numbers by census name and code numbers of 1971. The same of 1961 census were used for the district for which census reports of 1971 were not available. This system of identification has an advantage that other relevant records like population, roads and electricity could be available if desired.

Samples were collected block-wise from each village of the State. There are 232 blocks. A very large number (about 30,000) of samples were to be collected. Due to difficult terrain and for economical reasons, many-a-times samples had to be collected on foot or on bicycles. Therefore, it was not possible to collect samples from all wells of a village . The most common public well was therefore selected for sampling. All the bottles were labelled to identify the village, Panchayat, Tehsil and District alongwith code number.

Since the purpose of preliminary survey was to identify disease affected and brackish areas, stress was given on estimation of iron, fluoride, chloride and total dissolved solids. Whenever the time permitted, complete analysis of few samples was also done. The samples were analysed as per Standard Methods (2).

CLASSIFICATION OF RESULTS OF PRELIMINARY SURVEY

Nearly 30,000 villages have been covered under this survey. Comprehensive data of water quality for iron, fluorides, chlorides and total dissolved solids is not available. Then the problem was to classify the water quality. There are various standards prescribed by W.H.O. and by Government of India, Ministry of Health. A quick appraisal of data showed that both these standards would be too rigid for arid and semiarid districts of Rajasthan. Therefore, following standards were used to group the results.

	Acceptable	Medium	Excessive
Fluorides	0 - 1.5	1.6 - 3.0	above 3.0
Chlorides	0 - 250	251 - 1000	above 1000
TDS	0 - 1000	1001 - 2000	above 2000

(Results expressed in mg/l)

While there was no intention to change the standards prescribed by the Government, these standards were adopted for practicability.

FLUORIDES

The permissible standards prescribed by W.H.O. for fluorides is 1.5 mg/l. The limits as suggested by Ministry of Health, Government of India, is 1.0 to 2.0 mg/l. The standards prescribed by Government are little liberal. It is true that when toxic constitutuents are considered, the standards ought to be strict and on safer side. Moreover, in these standards the effect of temperature which induces higher in-take of drinking water and other ions which aggravate or ameliorate fluorosis effect, have not been considered. It has also been reported (3) that association of high carbonates with fluoride aggravates fluorosis. In Jhunjhunu district the water is rich in bicarbonates and deficient in calcium and fluorosis effect was observed even at the concentration of 0.7 mg/l. Noting the above facts a medium range of 1.6-3.0 mg/l may appear excessive. But these should be

considered keeping in view : (a) the ill-effects of fluoride at the concentration of 1.6 - 3.0 mg/l, (b) high number of villages falling in this range.

The toxic effects of fluorides are well known and at concentration between 1.6 - 3.0 mg/l it is mostly expected to give mottling of teeth. Crippling flurosis at this concentration has not been reported so far. A large number of villages were found to have fluorides above 1.5 mg/l. By sorting out the villages having fluorides between 1.6 - 3.0 mg/l and above 3.0 mg/l the problem has been projected in two parts. The priority for treatment of water should be to those villages which have fluorides above 3.0 mg/l. At a later stage, treatment for medium group having fluorides between 1.6 - 3.0 mg/l can be provided.

Most affected districts were found to be Jhunjhunu, Sikar, Nagour , Jalore, Pali, Ajmer and Jaipur. The highest fluorides have been reported from Banks Patti in Nagour District. Highest fluoride recorded is 20 mg/l in the villages of above district.

CHLORIDES

In some districts like Banswara in Rajasthan water have low chlorides. Most of the villages have waters ranging

between 20 - 150 mg/l. In most of the desert and semidesert districts high chlorides are present. In Rajgarh block of Churu district samples have chlorides ranging between 1000 - 6000 mg/l. The average daily intake of chlorides by man is 15 gm of sodium chloride. As such, the salt intake from drinking water may not be enough and high chloride waters may be taken without any visible harm. Primary consideration for chlorides therefore shall be for taste. Different people feel taste of chlorides at different level and also they get used to the taste. The water of low level chlorides may be preferred but in case no alternative source is available, the higher limits have to be accepted.

TOTAL DISSOLVED SOLIDS

While chlorides have been separately determined other chemical constituents could not be analysed. The determination of total dissolved solids therefore assumed importance. The presence of mineral matter was reflected in TDS. Many parts of Rajasthan are low in chlorides and calcium but high in sodium and carbonates. Though alkalinity, hardness and sulphates had not been determined, their presence could be visualised by low or high TDS. Here also as in other parameters, W.H.O. standards cannot be followed due to the reasons that most of the water supplies or wells fall above excessive limits of 1500 mg/l.

GUNIEA WORM

The infestation occurs from those drinking water sources which contain infected cyclops. When a patient suffering from guniea worm having open blisters walks down to baories or diggies, ponds or other similar sources, he emits larvae in large numbers in that water. These larvae are ingested by cyclops and mature within these hosts. When these cyclops are consumed, through drinking water, the larvae leave the host and become active. This enters the sub-cutaneous or intermuscular connective tissues especially in lower extremity. When it matures it punctures the skin and escapes the body. The cycle completes when embryos are discharged again in water. On an rough estimate there are three million embryos per worm. It is obvious that main cause of spread of disease is by access of suffering humans to water sources.

According to the surveys conducted by Medical & Health Department, ten districts are super endemic, another ten are intermediate endemic. Out of remaining six districts, 4 are lower endemic and two are practically free from these disease.

NITRATE

One of the important chemical constituents which could not be analysed on mass scale is nitrate. However some information is available from the daily analysis of samples

received in the laboratory at Jaipur. Most of the samples contain nitrates between 5 to 10 mg/l as N. However, high nitrates are not uncommon and from some parts in Churu district, nitrates upto 700 mg/l, have been reported. The toxicity of wells having such high nitrates is not in doubt. They are fatal in many cases and villagers have marked such wells and left the use for any purpose. But those wells having nitrates below lethal level are to be explored and marked.

No cases of methaemoglobinemia has been brought to the knowledge but this may be largely due to absence of artificial feeding. The data is being statistically examined by the laboratory. However some broad classification is available from the planning Division of the Department and is given below :

1. Villages having water with TDS more than 2000 mg/l.	3748
2. Villages having fluorides above 3.0 mg/l.	1085
3. Villages having waters of salinity above 1000 mg/l.	3739
4. Villages suffering from guniea worms infestation.	6145

STORING OF INFORMATION

The Tehsil-wise Khasra maps (maps with village boundries) were available in census books of each district.

They were joined and blocks maps were carved out from them. The quality determined for one well in a village was assumed to be valid for the whole village. One map of each Panchayat was marked for fluorides, chloride &total dissolved solids and different concentrations were shown by different colours. Waters were classified in different groups as follows. Waters having any or all parameters higher than the acceptable limits have been grouped together in group C. Waters having all or one parameter in medium quality have been put together in group B. Waters having all parameters within acceptable limits are in group A. These groups have been marked in one map. Iron where found was marked in the final map. This cumulative effect can be seen at a glance on any map. A brief report has been prepared and sent to the executive engineers, who surveyed the areas. These officers have collected information regarding depth of the wells and guniea worm incidence.

CO-ORDINATION OF INFORMATION

The State Public Health Engineering Department has so far compiled master plans for all the 26 districts of Rajasthan. These include chemical quality of ground water, potential yield of these wells and contain proposals for different water supply schemes for villages which suffer from either inadequate water quantity or from brackish or fluoride water. In preparation of these plans, block-wise reports compiled by Rajasthan

Ground Water Board on groundwater conditions has also been utilised. These reports include geology, occurence and exploitable groundwater potential. The department keeps in constant touch with Central Ground Water Board for such information.

There is further scope and need to analyse these ground waters for occurence of trace elements of public health significance.

It is, therefore, necessary to find out methods to concise the huge data on water quality collected by State Public Health Engineering Department. The suggestions towards this end shall be wel-come by the authors.

CONCLUSIONS

1. The results of this preliminary water quality survey have become voluminous. Only broad based conclusions have been drawn by the Planning Section. But to have an accurate idea of the water quality a scientific statistical analysis is imperative. Attempts are being made in Jaipur laboratory to formulate these results in concise form.

2. Though the depth of the wells have been noted it is necessary to augment this information with hydrological data of the underground table. For hilly areas steam gauging and monthly yield data of water sources should be collected.

3. Detailed water quality surveys for trace elements can be undertaken on the experiences based on this survey.

REFERENCES

1. Census of India 1971 & 1961 (Rajasthan) Part II-A. Published by Director of Census Operation, Rajasthan.

2. Standard Methods for the examination of Water and Waste Water, 13th Edn., APHA, AWWA & WPCF.

3. Water Quality and Incidence of Fluorosis in Jhnjhunu district of Rajasthan, V.P.Thergaonkar, and R.K.Ghargava, Indian Journal of Environmental Health, April, 1974.

....

Water Supply and Sewerage Facilities in Rural and Urban Areas

D. Raguraman
National Environmental Engineering Research Institute,
Nagpur

Information on Water Supply and Sewerage facilities in rural and urban areas is useful in the assessment of progress made in our national water supply and sanitation programme and in our further planning and implementation of schemes.

At attempt was made to collect the information from various states of India on the extent of provision of water supply and sewerage facilities and replies were sent to us by 7 states only. The availaole information is presented below and certain broad conclusions were made.

Table-I Some Demographic Characteristics of India, States and Union Territories

State/Union Territory	Population (in'000) 1971	Proportion of Urban Population in 1971 (per cent)	Proportion of rural population (per cent)
	547,950	19.91	80.09
Andhra Pradesh	43,503	19.31	80.69
Assam	14,958	8.87	91.13
Bihar	56,356	10.00	90.00
Gujarat	26,697	28.08	71.92
Haryana	10,037	17.66	82.34
Himachal Pradesh	3,460	6.99	93.01
Jammu & Kashmir	4,617	18.59	81.41
Kerala	21,347	16.24	83.76
Madhya Pradesh	41,654	16.29	83.71
Maharashtra	50,412	31.17	68.83
Mysore	29,299	24.31	75.69
Nagaland	516	9.95	90.05
Orissa	21,945	8.41	91.59
Punjab	13,551	23.73	76.27
Rajasthan	25,766	17.63	82.37
Tamil Nadu	41,199	30.26	69.74
Uttar Pradesh	88,341	14.02	85.98
West Bengal	44,312	24.75	75.25
Andaman & Nicobar Islands	115	22.77	77.23
Chandigarh	257	90.54	9.46
Dadra & Nagar Haveli	74	0.00	100.00
Delhi	4,066	89.70	10.30
Laccadive, Minicoy & Amindivi Islands	32	0.00	100.00
Manipur	1,073	13.19	86.81
Meghalaya	1,012	14.55	85.45
Arunchal Pradesh	468	3.70	96.30
Pondicherry	472	42.04	57.96
Tripura	1,556	10.43	89.57
Goa, Daman and Diu	858	26.44	73.56

Table-II Position of Water Supply and Sanitation

	Maharashtra	Madhya Pradesh	Kerala	Bihar	Karnata	Punjab	Assam
No. of villages/towns with pipe Water Supply(%)	R.496 Villages U.161 Towns	9.1% 59.5%	9.2% 13.5%	8% -	- 94%	- 43%	8.65% 25%
Population with Water Supply (%)	Rural 2.97 Urban 92	9.62% 67%	29.6% about 68.75%	6% 68%	12% 86%	4.6% 69%	6.1% 20%
Number of villages/towns with Sewerage(%)	Rural Nil Urban 9 Towns	Nil 7.25%	Nil little	14 No. 19.5%	Nil 8%	Nil 25%	Nil Nil
Population with Sewerage(%)	Rural Nil Urban 59.25	Nil 7.35%	Nil 8.5%	Trace 47%	Nil 32%	Nil 65.5%	- -

Table-III Water Supply and Sewerage in different States

Sl. No.	Name of State :		Maharashtra	Madhya Pradesh	Kerala	Bihar	Karnataka	Punjab	Haryana	Assam	Meghalaya
1.	Population	Rural	346.12×10^5	348×10^5	196.1×10^5	506.8×10^5	221×10^5	102.66×10^5	332.12×10^5	136.3×10^5	9.64×10^5
		Urban	149.69×10^5	68.54×10^5	25.9×10^5	56.54×10^5	71×10^5	32.07×10^5	68.09×10^5	13.27×10^5	1.47×10^5
2.	No. of villages/towns with piped water supply	Ru.	490	6625	429	1100	400	343	713	2212	4856
		Ur.	161	81	19	101	58	78	61	10	6
3.	Pop. served with water supply	Ru.	10.1×10^5	33.5×10^5	35.3×10^5	11	19.1	2.88	10.00	833000	200314
		Ur.	137.59×10^5	45.97×10^5	17.77×10^5	38.56	4.79	2.98	16.30	262000	1000
4.	No. of villages/ towns with sewerage	Ru.	Nil	Nil	Nil	2	Nil	Nil	Nil	Nil	Nil
		Ur.	9	10	3	3	15	45	24	Nil	Nil
5.	Pop. served with Sewerage	Ru.	Nil	Nil	Nil	0.10×10^5	Nil	Nil	Nil	Nil	Nil
		Ur.	88.76×10^5	5.33×10^5	1.00×10^5	4.55×10^5	23.97	21.02	12.40×10^5	Nil	Nil

Period reported 1955- 1974

Table-IV Urban Water Supply - Percentage of Population served and Forecast of future workload

Sl. No.	Name of State	Population (1961)	Percentage served by water supply system		Percentage not served by water supply system.	Forecast of amount required to complete water supply (Rs Crores)	
			Adequately	Inadquately		As furnished by the State	As revised on*a common basis
1.	Andhra Pradesh	62,61,130	26	41	33	23.70@	23.70
2.	Assam	8.89,080	9	24	67	1.26	4.80
3.	Bihar	39,15,300	34	19	47	9.50	14.30
4.	Gujarat	52,80,450	30	33	37	2.33	19.10
5.	Jammu & Kashmir	6,01,958	43	14	43	0.15	2.00
6.	Kerala	25,35,574	24	18	58	50.00	10.70
7.	Madhya Pradesh	46,29,276	33	14	53	3.16	17.50
8.	Madras	89,91,318	£	54	46	82.00	46.60
9.	Maharashtra	110,28,852	40&	20	40	36.40@	36.40
10.	Mysore	51,87,105	25	62	13	16.70	18.20
11.	Orissa	11,11,058	9	24	67	8.00	5.60
12.	Punjab	40,79,100	32	25	43	17.00	17.00
13.	Rajasthan	32,33,215	27	18	55	8.37	12.90
14.	Uttar Pradesh	94,76,118	30&	15&	55	37.70@	37.70
15.	West Bengal	80,95,535	55&	25&	20	100.00+	100.00 ++
16.	Delhi	23,44,051	90&	10&	0	28.00	28.00 ++
17.	Himachal Pradesh	63,811	-	32&	68	1.40@	1.40
18.	Tripura & Manipur	1,70,359					
19.	Andaman & Nicobar Islands	4,099					
	Total	779,07,439	-	-	-	426.37	395.95
	OVERALL AVERAGE		33.9	26.3	39.9		

*Forecast based on a per capita cost assumed as Rs 60/-in the case of new schemes and Rs 45/- in the case of improvement schemes,
@ Same figure as in Col.6(b) has been adopted under Col.6(a) due to want of data.
++ Same figures as in Col.6(a) has been assumed under Col.6(b)
& Figures are tentative due to want of data. +, Forecast anticipated from W.H.O.Team's work
£ All Urban Schemes are in need of improvement.

AB 5

Table-V Urban Water Supply & Sewerage No. of Towns Surveyed
(Year 1960)

Sl. No.	Name of State	Urban population			Number of Towns with			Number of Towns		No. of villages
		Corporation towns	Municipal towns	Panchayat towns	Adequate water supply	Partial Water supply	No Water Supply	Sewerage full or partial	No Sewerage	
1.	Andhra Pradesh	1	62	119	13	23	146	1	181	9260
2.	Assam	-	41£	-	3	8	30	-	41	24658
3.	Bihar	1	76	-	21	-	56	4	73	
4.	Gujarat	1	101	101	38	102	52	8	195	
5.	Jammu & Kashmir	-	2	19	2	9	8	-	21	
6.	Kerala	1	29	165	-	7	187	1	194	4590
7.	Madhya Pradesh	3	135	-	32	21	85	11	127	70000
8.	Madras	1	66	151	nil	35	167	6	212	
9.	Maharashtra@	..	..	..	..	..	..	..	..	
10.	Mysore	1	180	-	1	176	4	4	177	
11.	Orissa	-	64	-	9	24	31	2	62	48400
12.	Punjab	-	178	-	1	38	139	13	165	17106
13.	Rajasthan	-	138	52	18	5	151	3	187	31295
14.	Uttar Pradesh	-	135	‡	73			15		111722
15.	West Bengal@	2	87	33‡	34			7	115	60000
16.	Delhi	1								
17.	Himachal Pradesh@									
18.	Tripura & Manipur@									
19.	Andman & Nicobar Islands@									

* Data not complete @ Data not received from the State but tentative figures shown where available

‡ * Notified and town areas. £ Including 22 Towns Committees.

Table-VI Urban Sewerage - Percentage Population Served and Forecast of Future Workload

Sl. No.	Name of State	Population	Percentage Served by Sewerage System		Percentage not served by sewerage system	Forecast of amount required to complete sewerage schemes (Rs Crores)	
			Adequately	Inadequately		As furnished by the States	As revised on* a common basis
1.	Andhra Pradesh	62,61,130	..	19	81	47.60+	47.6
2.	Assam	8,89,080	-	-	100	5.20	6.1
3.	Bihar	39,15,300	-	7	93	12.85	30.7
4.	Gujarat	52,80,450	4	6	90	1.58	39.9
5.	Jammu & Kashmir	6,01,958	-	-	100	4.80+	4.8
6.	Kerala	25,35,574	-	7	93	20.00	19.9
7.	Madhya Pradesh	46,29,276	12	13	75	2.25	31.4
8.	Madras	89,91,318	-.	22	78	114.00/49.60+	67.9
9.	Maharashtra@	110,28,852	40@	15@	45	10.40	34.6
10.	Mysore	51,87,105	15	6	79	19.00	8.7
11.	Orissa	11,11,058	2	-	98	24.00	31.3
12.	Punjab	40,79,100	-	16	84	18.00	24.7
13.	Rajasthan	34,33,215	-	18	82	58.70+	58.7
14.	Uttar Pradesh	94,76,118	20@	10@	70	31.80 =	31.8=
15.	West Bengal@	80,95,585	50@	20@	30	10.50	10.0£
16.	Delhi@	23,44,051	90@	10@			10.5++
17.	Himachal Pradesh	63,811	-	-	100	2.00	2.00
18.	Tripura & Manipur	1,70,359	-	-			
19.	Andamans & Nicobar Islands	14,099	-	-			
	Total	779,07,439				432.28	500.20
	OVERALL AVERAGE		20.6	11.2	68.2		

* Forecast based on a per capita cost assumed as Rs 80/-in the case of new schemes and Rs 60/- in the case of improved schemes

+ Same figure as in Col.6(b) has been adopted in Col.6(a) due to want of data.

++ Same figures as in Col. 6(a) has been assumed under Col. 6(b) due to want of data.

@ Figures are tentative due to want of data. = As forecast in the W.H.O.Team's Report for Greater Calcutta.

£ Tentative figure for sewering other urban areas in West Bengal.

AB 7

Summery and Conclusions

1. In India, large number of population lives in rural areas.
2. From the data sent by 7 States, about 8-9% of the villages was covered by protected water supply. About 3-13% of the rural population has been provided with protected water supply. No sewerage has been constructed in rural areas.
3. From the data sent by 7 States, about 68% to 90% of the urban population has been provided with protected water supply and 13-94% of the towns has been covered under protected water supply. About 32 to 65% of the urban population has been provided with sewerage, covering about 7-25% of the towns. In some States, less percentage of population sewered has been observed.
4. As per the report of the National Water Supply and Sanitation Committee in 1960-61, the Urban and Rural forecasts of the expenditure towards water supply and sanitation were about Rs 1000 crores and Rs 600 crores in 1961.

REFERENCES

1. Data collected by NEERI.
2. Report of the National Water Supply and Sanitation Committee 1960-61, Ministry of Health, Government of India.

Area-V

INFORMATION SYSTEMS FOR PLANNING AND EVALUATION OF COMMUNITY WATER SUPPLY AND COMMUNITY WASTEWATER DISPOSAL PROGRAMMES

- DRAFT GUIDE BY W.H.O.

This document, copies of which will be made available to the participants of the Workshop subsequently as soon as these are received from WHO, is proposed to be discussed in details during the deliberations at the Workshop.

The Guide is being developed with a view to serve as an aid to the Governments, particularly of the developing countries, "... by providing technical knowledge about what basic information is generally needed (or not needed) in the planning evaluation process, by presenting typical forms and data summery formats which may prove useful in collecting and presenting data; by listing potential sources of information; by presenting the methodology to either collect new information or reduce source data to usable form; and by providing guidance relating to the organisation framework and resources required for the entity to collect, evaluate and disseminate this information."

WHO will be looking for constructive suggestions from the participants which could be considered for revising the draft guide before it takes a final shape.

...

LIST OF PARTICIPANTS

1. Anwikar (Dr.) A.K.,
Scientist,
NEERI, NAGPUR-20.

2. Appukuttan, Nair D.,
Chief Engineer Public
Engineering Department,
TRIVANDRUM (Kerala).

3. Agrawal (Dr.),G.D.,
Professor, Civil Engg.Dept.,
Indian Institute of Technology,
KANPUR (UP.) 208016 .

4. Arunachalam, P.
Chief Public Health Engineer,
Ex-offic Addl.Secretary to
the Govt. of Meghalaya,
SHILLONG - 793 001 (Meghalaya).

5. Baldev Singh,
Chief (Technology Utilization),
CSIR, Rafi Marg, NEW DELHI-1 .

6. Bhat, S.G.,
Documentation Officer,
NEERI, NAGPUR - 440 020 .

7. Bhatnagar, V.K.,
Accounts Officer,
NEERI, NAGPUR-440 020 .

8. Bhole (Dr.) A.G.,
Asstt.Professor,
V.R.C.E., NAGPUR .

9. Bulusu, K.R.,
Scientist, NEERI,NAGPUR-20.

10. Chhabria, .D.,
Senior Engineer,
Dorr-oliver (India) Ltd.,
Chakala, Andheri (East),
BOMBAY-400 093 .

11. Chalapati Rao(Dr.) V.,
Scientist, NEERI,
NAGPUR-440 020 .

12. Choudhari, D.V.,
Asstt.Engr.,
Nagpur Water Works,
Near Patwardhan
High School, Nagpur.

13. Chaudhari, L.M.,
Additional Chief Engineer,
P.W.D. Pub.Hlth. Branch,
HARYANA - Ch ligarh

14. Choudhari,J.J.,
Superintending Engineer,
Head Office,
P.W.D. Public Hlth. Branch,
HARYANA . Chandigarh

15. Choudhari, R.C.P.
Senior Superintending Engr.,
Engineers India Ltd.,
4, Parliament Street,
NEW DELHI -110 001 .

16. Chaudhari (Miss.)K.W.,
Scientist, NEERI, NAGPUR-20.

17. Dabadghao, S.B.,
Scientist, NEERI, NAGPUR-20.

18. Dave, J.M., Scientist,
NEERI, NAGPUR-440 020 .

19. Gurg, R.P.,
S.O.(SD-2), E.S. Laboratory,
Phase II Colony,
Rawatbhata - 323 305
(via) Kota (Rajasthan) .

20. Handa, B.K.,
Scientist, NEERI, NAGPUR-20.

contd ...

21. Gupta (Dr.), B.P.,
Deputy Commissioner,
Nagpur Municipal Corpn.,
NAGPUR .

22. Ingawale, R.T.,
Superintending Engineer,
Nagpur Public Health Circle,
Mount Road,
NAGPUR

23. Kesarwani, S.K.,
Library Officer, NEERI,
NAGPUR-440 020 .

24. Khare, S.T.,
Chief Engineer (PH) and
Joint Secretary, Irrigation
and Power Department, Govt. of
Maharashtra, Sachivalaya,
BOMBAY - 400 032 .

25. Khosla (Dr.) A.,
Senior Specialist,
Office of the Environmental
Planning & Coordination,
Department of Science & Technology,
New Mehrauli Road,
NEW DELHI .

26. Krishnamoorthi (Dr.) K.P.,
Scientist, NEERI, NAGPUR-20.

27. Lie ering, J.,
Public Relations Officer,
Testing & Research Institute of the
Netherlands Wa Undertaking,
Kiwa Ltd., PO Box 70., ijswisk, 2109,
NETHERLANDS .

28. Majumder (Prof.) N.,
Director, NEERI, NAGPUR-20 .

29. Mayur (Dr.) Rashmi,
Director,
National Institute for Training in
Industrial Engineering, Vehar Lake,
BOMBAY - 400 087 .

30. Mohanrao (Dr.), G.J.,
Scientist, NEERI, NAGPUR-440 020 .

31. Narasimhan, N.M.,
Clerk-of-works,
N.E.E.R.I.,
NAGPUR-440 020 .

32. Nayudamma (Prof.) Y.,
Director General,
Scientific & Industrial
Research, Rafi Marg,
[redacted] - 110 001 .

33. Nigam, R.C.,
Senior Specialist in
Environmental Planning
and Coordination,
Department of Science
and Technology,
Technology Bhavan,
New Mehrauli Road,
NEW DELHI - 110 029 .

34. Paramasivam, R.,
Scientist, NEERI,
NAGPUR - 440 020 .

35. Parhad (Dr.) N.M.,
Scientist, NEERI,
NAGPUR - 440 020 .

36. Parthasarathy, S.,
Scientist-in-charge,
INSDOC, Hillside Road,
NEW DELHI - 110 012 .

37. Raguraman, D.,
Scientist, NEERI,
NAGPUR - 440 020 .

38. Rahman (Prof.) A.,
Chief (Planning),
Council of Scientific
& Industrial Research,
Rafi Marg, NEW DELHI .

39. Rajvanshy, P.S.,
Additional Chief Engr.,
Public Hlth. Engg. Dept.,
2, Civil Lines,
JAIPUR-302 006 (Raj.)

contd ...

40. Ra , B.B.,
Deputy Adviser,
CPHEEO, Nirman Bhawan,
NEW DELHI - 110 001 .

41. Rao, C.S.S.,
Administrative Officer,
NEERI, NAGPUR - 440 020 .

42. Rao (Dr.) N.U.,
Scientist, NEERI,
NAGPUR - 440 020 .

43. Rau, B.B.,
Deputy Adviser,
C.P.H.E.E.O.,
Ministry of Works & Housing,
NEW DELHI .

44. Rotkar, B.V.,
Member Secretary,
Maharashtra Prevention of
Water Pollution Board,
Mu farabad Hall,
Pro t r Road, BOMBAY-7 .

45. Saraf, R.K.,
Scientist, NEERI,
NAGPUR - 440 020 .

46. Saxena, G.M.,
Head, Chemical Department, ISI.
' Manak Bhawan',
9, Bahadurshah Zafar Marg,
NEW DELHI -100 001 .

47. Seth (Dr.) G.K.,
Scientist, NEERI,
NAGPUR - 440 020 .

48. Siddiqi (Dr.) R.H.,
Scientist, NEERI,
NAGPUR - 440 020 .

49. Subrahmanyam, D.V.,
Division of Env.Hlth.,
WHO, 1211, Geneva-27,
SWITZERLAND .

50. Subrahmanyam (Dr.) P.V.R.,
Scientist, NEERI,
NAGPUR - 440 020 .

51. Swaminath, K.K.,
Senior Consultant,
Administrative Staff
College of India,
Bellavista,
HYDERABAD - 500 004 .

52. Swamy, P.S.,
Adviser,
Public Hlth. & Env.Engg.,
Ministry of Works and
Housing, NEW DELHI - 1 .

53. Swarnakar, N.G.,
Workshop Superintendent,
NEERI, NAGPUR - 440 020 .

54. S.K. Titus,
Scientist,
NEERI, NAGPUR - 440 020 .

55. Trivedi, R.C.,
Chief Scientific Officer,
Pub.Hlth.Engg. Laboratory,
BARODA .

56. Tyagi, P.C.,
Superintending Engr.(HQ.)
Office of the Chief Engr.,
Local Self Government
Engineering Department,
LUCKNOW (UP.)

57. Van Damme (Dr.) J.M.G.,
Manager,
WHO International
Reference Centre for
Community Water Supply,
13, Parkweg, The Hague,
THE NETHERLANDS .

58. Water Research Center (Rep.)
Stevenage Laboratory,
Elderway, Stevenage,
Hertfordshire, ENGLAND.

59. Yennawar, P.K.,
Scientist, NEERI, NAGPUR-20.

...

C R E D I T S

1. ACCOMMODATION & TRANSPORT

1. Murthy, Y.N.
2. Srinivasan, T.K.
3. Gharote, S.P.
4. Joshi, M.W.
5. Khan, A.A.
6. Sharma, R.S.

2. AUDITORIUM

1. Bhave, V.R.
2. Apte, V.R.
3. Sundersingh, E.P.I.
4. Wachasunder, S.D.

3. PRINTING & PUBLICITY

1. Nandgaonkar, K.M.
2. Shrivastava, H.K.
3. Kasture, V.M.
4. Chandansingh

4. RECEPTION & INFORMATION

1. D'Souza (Mrs) I.
2. Pande, Miss S.B.
3. Shivde, (Mrs) S.A.
4. Pardhi, G.G.

5. REFRESHMENT

1. Srinivasan, T.K.
2. Palandurkar, P.B.
3. Amol Singh

6. REGIONAL COORDINATION

1. Arora, Dr. H.C. (U.P.)
2. Dhaneshwar, R.S. (W.B.)
3. Mishra, R.P. (Delhi)
4. Murthy, Y.S. (A.P.)
5. Rajagopalan, S. (Gujarat)
6. Raman, V. (Maharashtra)
7. Sastry Dr. C.A. (Tamil Nadu)
8. Thergaonkar, V.P. (Rajasthan)

7. SECRETARIAL WORK

1. Damodaran, B.
2. Khan, H.
3. Kulkarni, A.W.
4. Swaminathan, G.
5. Dafade (Mrs) P.D.
6. Devki, Miss P.V.

...