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# PROVISION OF SAFE WATER SUPPLIES TO RURAL COMMUNITIES IN SOUTH-EAST ASIA

Report on the Technical Discussions  
held during the  
WHO Regional Committee for South-East Asia  
Denpasar, Indonesia  
3 to 9 September 1974



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PROVISION OF SAFE WATER  
SUPPLIES TO RURAL COMMUNITIES  
IN SOUTH-EAST ASIA

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REPORT  
ON THE  
TECHNICAL DISCUSSIONS  
HELD DURING THE TWENTY-SEVENTH SESSION  
OF THE  
WHO REGIONAL COMMITTEE FOR SOUTH-EAST ASIA  
FROM 3 TO 9 SEPTEMBER 1974  
IN  
DENPASAR, INDONESIA

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THE REPORT<sup>1</sup>

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TABLE OF CONTENTS

	<u>Page</u>
1 INTRODUCTION	1
2 REVIEW AND ASSESSMENT	1
2.1 Inadequacies	1
2.2 Epidemiological hazards	1
2.3 Deficiencies in planning	1
2.4 Targets of the United Nations Second Development Decade (1971-1980)	1
2.5 A region with the greatest needs	2
2.6 Institution building	2
2.7 External assistance	2
3 RECOMMENDATIONS	2
3.1 Strategy plan	3
3.1.1 Targets	3
3.1.2 Priorities	3
3.2 Plan of action	3
3.2.1 Assessment studies	3
3.2.2 Organizational aspects	3
3.2.3 The possibility of a single water supply and sanitation authority	4
3.2.4 Operation and maintenance	4
3.2.5 Local participation	4
3.2.6 Transfer of knowledge and methods	4
3.2.7 Programme evaluation	4
3.2.8 Role of the health department	4
3.2.9 External assistance	5

## ANNEXES

1 Proposed agenda for the technical discussions on provision of safe water supply to rural communities in South-East Asia	7
2 Guidelines for the technical discussions on the provision of safe water supplies to rural communities in South-East Asia	9
3 Working paper for the technical discussions on the provision of safe water supplies to rural communities in South-East Asia	11
4 Rural water supplies in South-East Asia: Background paper for the technical discussions	17

## 1 Introduction

Under the chairmanship of Mr T.S. Swamy (India) and with Mr Praphorn Charuchandr (Thailand) elected as Rapporteur, one full-day session on 5 September was devoted to the technical discussions on the above subject. The group met again on the morning of 6 September to consider and adopt the recommendations.

The discussions followed the agenda approved by the Regional Committee (Annex 1) and centred round the guidelines (Annex 2) and a working paper (Annex 3), supported by a detailed background paper (Annex 4) as well as country reports (SEARO/EH/74.1-10) and other background papers.

The Chairman, initiating the discussions, made some general remarks on the rural water supply situation in his country and in the Region as a whole, and asked the participants to describe the general situation of rural water supply in their countries. This review was followed by an item-by-item discussion on the agenda as provided in the guidelines. In addition to the participants in the technical discussions, Mr Shigeharu Takahashi of the World Bank, Jakarta, and Mr H. McAleer, of US AID in Jakarta, who attended as observers, also took part. The Regional Director made some helpful observations at different stages of the discussions.

## 2 Review and Assessment

The situation in the Region was reviewed, in order to identify the problems and the following critical considerations and major constraints were noted:

### 2.1 Inadequacies

The present state of rural water supplies in the Member countries showed grave inadequacies and an increasing backlog against growing community needs.

### 2.2 Epidemiological hazards

Cholera was entrenching itself in most countries of the Region, and other water-borne and filth-borne enteric infections were taking a heavy toll through morbidity and mortality, crippling the productive capacity of the population, discouraging the acceptance of family planning and retarding the growth of tourism and the national economy. There was also general lack of awareness of the importance of rural sanitation as a necessary concomitant of rural water supply.

### 2.3 Deficiencies in planning

The nature, scope and size of the rural water supply problem were yet to be assessed in many countries; the absence of long-range plans accounted for deficiencies in planning policies and procedures, drawbacks in the institutional framework, and lack of direction in mobilization of needed resources.

### 2.4 Targets of the United Nations Second Development Decade (1971-1980)

Attainment of the global target of the United Nations Second Development Decade, as recommended by WHO and accepted by the Member countries, did not seem feasible in most countries of the Region under existing shortages of finances, manpower and material resources. There was an urgent need for national plans, not only in terms of objectives but

also in terms of effective policies and procedures to reach such objectives.

## 2.5 A region with the greatest needs

The South-East Asia Region was the WHO region with the highest population and with the highest ratio of rural to total population, with the largest number and highest densities of agricultural communities forming the backbone of the national economies, and with the greatest needs in respect of safe water supplies in particular and community health in general.

Out of the projected total rural population for the Region of 874 million in 1980, only some 180 million could be expected to have access to safe water. This was a matter of special concern to governments in shaping their future programmes.

## 2.6 Institution building

Under the auspices of WHO, IBRD, UNDP, UNICEF, the United Nations Environment Programme (UNEP), the International Development Research Centre and the Organization for Economic Co-operation and Development (OECD), a panel of experts would meet at WHO Headquarters in Geneva in October 1974 to prepare a medium-term programme (five to ten years) of international action involving research and development and the collection, adaptation, transfer, diffusion and utilization of technical information, to encourage progress in rural water supply and sanitation. The recommendations of the panel would be submitted to international, bilateral and national agencies, which would be invited to participate in the implementation of the programme.

The participants welcomed this development and expressed the hope that the international agencies would increase the scale of their current assistance to help to meet the needs of developing countries.

## 2.7 External assistance

The group was greatly encouraged to hear the views of the participants from IBRD, UNICEF and US AID on the policies of their respective organizations regarding future assistance to rural water supply programmes, and particularly welcomed the increased interest of IBRD in this field in recent years.

## 3 Recommendations

It was considered that meeting the urgent need for accelerating the present pace of provision of safe rural water supply should be recognized as of the greatest importance in reducing the continuing high incidence of water-borne diseases. The importance of rural water supply and sanitation as a social infrastructure for the economic growth of the nations should underlie future planning. The extensive backlog between rural water supply needs and actual coverage should be dealt within the shortest period practicable in disease-prone and water scarcity areas.

In the light of the above considerations, the following recommendations were made:

3.1 Strategy plan

3.1.1 Targets

National targets for rural water supply and sanitation must be defined and a policy outlined for their inclusion in national development plans.

3.1.2 Priorities

Suitable priorities must be set so as to secure the desired social infrastructure for improving socio-economic conditions in rural areas.

3.2 Plan of action

3.2.1 Assessment studies

- (a) Assessment studies are needed in order to formulate long-term and short-term objectives.
- (b) A system for collecting and analysing information on rural water supplies is needed in order to make such studies and to keep the plans up to date.

3.2.2 Organizational aspects

- (a) The financial, manpower and material needs of the short and long-term plans should be assessed, and appropriate administrative, managerial and technical services for their implementation established.
- (b) Necessary measures must be instituted for developing the manpower and providing the materials needed for short-term and long-term programmes. The provision of public health engineering consultants who would introduce new ideas into rural water supply and sanitation schemes could result in more economical projects.
- (c) All possible resources should be mobilized for financing a continuing programme from national capital and revenue budgets and special levies where possible; from local participation in the form of cash/labour/materials/water rates/deferred payments/or any other forms; and from external aid such as with expertise/equipment/materials/soft loans. The funds required should be allocated and used without being diverted, in order to achieve the aims of the declared policy.
- (d) Rural drinking water supplies should be developed in conjunction with all irrigation schemes, thereby effecting considerable economies. Moreover, increased farm profits from irrigation schemes could help pay for drinking water supplies.

3.2.3 The possibility of a single water supply and sanitation authority

It may be desirable to establish a centralized water supply and sanitation authority, with necessary legislative and financial support, to administer the entire programme.

3.2.4 Operation and maintenance

It is essential to build up a suitable organization which will ensure the competent construction, efficient and fool-proof operation and maintenance of completed facilities, and effective surveillance of drinking water quality.

3.2.5 Local participation

Behavioural studies and health education are necessary to stimulate local participation and involvement in the provision of water supplies, in an effective programme of rural sanitary latrines and in the hygienic collection and disposal of waste water. Sociologists, behavioural scientists and public relations experts should be associated with the programme to make the local involvement more effective.

3.2.6 Transfer of knowledge and methods

It is important to develop national institutions for collecting, appraising and disseminating technical information to operational agencies. National institutes should carry out pilot studies and develop prototypal models for adapting measures for reducing costs, for labour-oriented techniques and for simple disinfection devices suited to rural needs, as well as for the formulation and implementation of training programmes.

3.2.7 Programme evaluation

It is essential to evaluate programmes at suitable intervals and to assess cost effectiveness, consumer interest and involvement and the progressive financial and economic viability of projects.

3.2.8 Role of the health department

Irrespective of the authority responsible for the rural water supply programme, the health department should play its special role in respect of (i) water quality standards and surveillance, (ii) programme evaluation, (iii) fixing priorities for endemic and problem areas, (iv) sanitary disposal of excreta and wastes, and (v) health education and community involvement.



3.2.9 External assistance

International and bilateral agencies should be encouraged to increase their direct technical assistance to Member countries in the following ways:

- (a) in making assessment studies;
- (b) in the establishment of information systems and programme formulation, implementation and evaluation;
- (c) in identifying and helping to meet specific needs for multi-lateral or bilateral assistance by way of expertise, equipment, materials and soft loans;
- (d) in setting up research and training centres and collaborating laboratories;
- (e) in assisting training programmes, including programmes for the production of manuals and training guides;
- (f) in establishing health criteria and codes of practice, and
- (g) in the local production of materials.

In addition to providing assistance itself, WHO should act in a co-ordinating capacity in respect of assistance received from these and other sources.

**ANNEXES**

ANNEX 1

PROPOSED AGENDA FOR THE TECHNICAL DISCUSSIONS ON  
PROVISION OF SAFE WATER SUPPLY TO RURAL  
COMMUNITIES IN SOUTH-EAST ASIA\*

- 1 Identification of the Problem
  - 1.1 Populations with and without access to safe water
  - 1.2 Epidemiological hazards
  - 1.3 Deficiencies in current planning policies and procedures
  - 1.4 Constraints
  - 1.5 Essence of the problem
  
- 2 Strategy for Solution
  - 2.1 Defining national targets
  - 2.2 Setting priorities
  - 2.3 Allocation of funds
  - 2.4 Mobilization of resources
  
- 3 Plan of Action
  - 3.1 Assessment studies
  - 3.2 Short-term plan for immediate needs
  - 3.3 Feasibility appraisals
  - 3.4 Institution building
  - 3.5 Development of material resources
  - 3.6 Mobilization of financial resources
  - 3.7 Role of health departments
  - 3.8 Water quality aspects
  - 3.9 Operation and maintenance

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\*Issued as document SEA/RC27/5 Rev.1, on 19 July 1974

3.10 Health education: behavioural studies and public relations

3.11 Programme evaluation

4 International and Bilateral Assistance

ANNEX 2

GUIDELINES FOR THE TECHNICAL DISCUSSIONS ON  
THE PROVISION OF SAFE WATER SUPPLIES TO RURAL  
COMMUNITIES IN SOUTH-EAST ASIA\*

1 Identification of the Problem

- 1.1 What is the present state of rural water supply in your country in respect of present coverage, immediate and prospective plans, and expected achievements against the United Nations Second Development Decade targets?
- 1.2 What is the extent and nature of water-borne and filth-borne diseases attributable to lack of safe water supplies and sanitation?
- 1.3 To what extent do the following operate as major constraints against a rural water supply programme in your country: (i) lack of an organized programme for rural water supply; (ii) absence of national targets; (iii) low priority in national development plans; (iv) insufficient financial resources - internal and external; (v) shortage of manpower and material resources; (vi) inadequate institutional framework and managerial skills, and (vii) lack of local interest and participation?

2 Strategy for Solution

Based on your appraisal of the problem, would you consider that fixing of a national target and formulating an effective programme for its achievement should form the main strategy for future action?

3 Plan of Action

- 3.1 In view of the major constraints, would you consider that the following actions would accelerate the development of the rural water supply programme?
  - 3.1.1 Assessing financial, material and manpower requirements and making an effective short-term plan as an advance phase of a long-term rural water supply programme.
  - 3.1.2 Deciding on the priorities among the rural water supply schemes and preparing a phased programme.
  - 3.1.3 Including rural water supply in national development activities (where it has not already been done) and according it a higher priority and allocation of adequate funds.
  - 3.1.4 Establishing a single national water supply and sanitation authority to administer the programme.

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\*Issued as document SEA/RC27/13, on 19 August 1974.

- 3.2 What are the measures necessary and possible to supplement available manpower resources, particularly in regard to managerial skills?
- 3.3 How best can your country's material resources be augmented to meet the needs?
- 3.4 What are the funding possibilities compared with the funds needed for the rural water supply programme? Can a special tax be levied to augment the resources? Is external financing by way of soft loans possible?
- 3.5 Irrespective of the authority in which the responsibility for the rural water supply programme is vested, what are the steps necessary to enable the health department to play its special role in respect of: (i) water quality standards and surveillance; (ii) programme evaluation; (iii) priorities for endemic areas; (iv) sanitary disposal of excreta and waste water, and (v) health education and community participation?
- 3.6 What measures would you advocate to foster research into new methods for economy in rural water supply design, operation and maintenance? Will the establishment of a collaborating institution help in the more effective flow of information between countries?
- 3.7 What are the specific spheres of activity in which your country may need international and/or bilateral assistance in respect of rural water supply?

ANNEX 3

WORKING PAPER FOR  
THE TECHNICAL DISCUSSIONS ON THE PROVISION OF  
SAFE WATER SUPPLIES TO RURAL COMMUNITIES IN  
SOUTH-EAST ASIA\*

1 Identification of the Problem

1.1 Populations with and without access to safe water

In 1970, the total population of the Member countries of the Region (excluding the DPRK) was about 851 million, of which 693 million (81%) were rural. Hardly 10% of this rural population had access to safe water supplies. By 1980, the rural population is expected to reach 874 million, an increase of 26%.

The vast mass of the unserved rural population depends on any available water sources, such as rivers, canals, ponds, tanks, crude wells and step wells, all subject to risks of contamination and aiding disease transmission. In many areas, locally available water sources contain salts such as fluorides, sulphates, iron or manganese, in quantities deleterious to health; excessive chlorides in local ground water make it undrinkable and accentuate the drinking-water problem in many areas. In addition, there are vast areas in the Region where water scarcity is chronic, owing to difficult hydrogeological conditions, and where people have to trek for miles and make arduous climbs to fetch water for survival.

1.2 Epidemiological hazards

Classical cholera has long been endemic in parts of India and Bangladesh. In recent years it has been replaced by the *El Tor* strain, which is entrenching itself in most countries of the Region. Enteric infections, water and filth-borne, take a heavy and regular toll through morbidity and mortality. Illness resulting from the lack of safe water and sanitation is probably much more widespread and severe than is apparent from recorded vital statistics, because of deficiencies in reporting and recording cases. In large populations affected by infectious hepatitis, filariasis, guinea worm, hookworm, polio and fluorosis, lasting damage to the health of crucial age groups is suffered, and the productive capacity of the work force is thus crippled. The socio-economic ills affecting disease-prone populations are retarding national progress.

1.3 Deficiencies in current planning policies and procedures

Rural water supply, despite an increasing recognition of its importance, is yet to receive due priority in the development plans of some of the countries of the Region, and national targets for the Second

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Development Decade have yet to be finalized. In such cases, annual funding operations rest on *ad hoc* provisions, without a committed outlay in a long-range plan. In many cases, engineering activities suffer, without trained task forces; programme implementation is entrusted to several different agencies, and maintenance of completed facilities does not receive proper attention. In some countries, the organizational set-up has yet to build up the managerial and administrative skills needed to help in the progressive mobilization of financial, material and manpower resources. External assistance is sometimes used in isolated projects or programmes without being integrated into a total plan. In most of the countries, local motivation and participation are lacking, in the absence of proper health and social education and public relations. There is also a lack of proper dialogue between the different ministries - health, works, local government, planning, finance and others interested in rural water supply as a social infrastructure, and this situation results in a fragmentation of efforts in current implementation programmes.

#### 1.4 Constraints

A major constraint in the rural water supply programme in many of the countries is that the nature, scope and size of the problem are unknown. The absence of a long-range plan, with defined targets, leads to insufficient internal financing and inadequate external assistance. Deficiencies in the institutional framework are allowed to continue, with shortage of manpower and material resources. Public interest and participation remain dormant.

Inter-ministerial and inter-departmental co-ordination to mobilize support and promote a sustained programme are often lacking. The programme also suffers from a lack of proper co-ordination among the agencies in charge of design and construction, operation and maintenance, and public involvement and participation.

#### 1.5 Essence of the problem

The global target for the United Nations Second Development Decade, as recommended by WHO and accepted by the Member countries (WHA25.35), is to provide adequate safe water to 25% of the rural populations by 1980.

In most countries of the Region this target does not seem feasible under existing constraints of financial, manpower and material resources. There is an urgent need for national plans, not only in terms of objectives but also in terms of effective policy and procedures to secure such objectives.

### 2 Strategy for Solution

#### 2.1 Defining national targets

The basic need is to define the national targets for rural water supply and sanitation and to outline a policy for their inclusion in the national development plans.



## 2.2 Setting priorities

Priorities must be set for implementing rural water supplies and sanitation as an integral part of national development plans, as the desired social infrastructure for improving the national economy cannot be achieved without a healthy population.

## 2.3 Allocation of funds

It is equally essential to allocate and use the required funds, without diversion, to ensure implementation of the programme in keeping with the declared policy.

## 2.4 Mobilization of resources

The mobilization of financial, manpower and material resources and the setting up of an effective organization must receive proper attention if the established targets are to be attained.

## 3 Plan of Action

### 3.1 Assessment studies

A country-wide assessment of the work already carried out and the work yet to be done should be made by national experts, with external help as needed. This will identify the scope, extent and magnitude of the long-term programme to be integrated with the national development plans for a phased implementation.

### 3.2 Short-term plan for immediate needs

Concurrently, a short-term plan can be formulated, where this has not yet been done, as an advance phase of the long-term plan for the period 1975-1980 and beyond. The short-term plan should cover areas endemic for cholera and other enteric diseases and other "distress" areas, as a priority. The choice of engineering designs and operations will be governed by maximum cost/effectiveness and coverage of population for the initial investments. Operations could include sanitary improvements to existing open dug-wells and conversion of step wells into draw wells; provision of shallow tube wells with handpumps in needy areas; simple infiltration wells or galleries to draw safe supplies from unsafe raw water sources; piped supplies where necessary, and exploitation of deep ground water, including reliable disinfection of supplies by simple, constant-feed chlorination appliances as appropriate.

### 3.3 Feasibility appraisals

Each country should assess the financial, manpower and material needs of the short-term plan and, with the help of international experts where required, draw up engineering proposals, plan for manpower mobilization and training, and develop material resources. During this period of gestation, assessment and sectoral or master plan studies can also be initiated, to pave the way for a planned implementation of a programme to continue beyond 1980, with special

emphasis on the long-range development of institutions. Where needed, aid for such studies could be sought from WHO, UNDP, UNICEF, the IBRD and the Asian Development Bank.

### 3.4 Development of institutions

The structuring of the organization for technical, administrative and managerial activities for short-term and long-term needs will be planned by the Member Governments, and the necessary manpower task forces built up. Some of the countries are self-sufficient in manpower skills and training facilities; others may need to expand their available resources in stages; some may need supplementation by external skills. Future needs could be met through higher training in selected regional centres, the expansion of sub-professional training locally, and the setting up of short-term training programmes for assistant engineering staff. Management needs call for special attention and must encompass promotional functions and public relations to ensure optimum local participation.

### 3.5 Development of material resources

With the exception of India, most of the countries of the Region would seem to depend on imports to supplement their resources of local materials. Efforts to improve the quality of local products, to expand indigenous production, and to organize new manufactures in order to replace imports with local resources, would pay rich dividends. Savings in imports could be used to increase the financial allocations for the programme from internal resources. Economies in design by the use of concrete or plastic pipes should be explored in the light of local possibilities.

### 3.6 Mobilization of financial resources

The capital costs of construction of rural water supplies under the phased programme, the costs of operation and maintenance, the costs of the manpower for construction, operations and management; the capital investments for expansion of local manufactures, and the costs of popularizing an effective rural sanitation programme should all be analysed in relation to the successive stages of the total programme. Funding possibilities may then be explored according to the needs at different stages. Internal resources from national capital and revenue budgets and special levies; local participation by way of cash, materials, labour, water rates, deferred payments, etc.; external financing consisting of equipment, expertise, materials or soft loans from lending agencies; and other possibilities will need to be examined, depending on local conditions.

International lending agencies such as the International Development Association (IDA) and the Asian Development Bank (ADB) are becoming increasingly willing to provide specific soft loans against well conceived rural water supply programmes. For instance, a substantial loan from IDA to the proposed rural water supply programme in the difficult and problem areas of Uttar Pradesh in India is reportedly under consideration.

The most positive and unfailing source of potential funds must, however, be the community itself. The mode of service often decides the extent to which the public is willing and able to pay for the essential service. A supply piped into the home secures willing payment, whereas there is reluctance to pay for a supply delivered at a public stand pipe. Careful studies of public reaction are necessary in designing and servicing rural water supplies.

### 3.7 Role of the health department

Rural water supply and sanitation are not merely engineering activities but are an integral part of a total environmental health programme. Irrespective of the agencies responsible for the activity, health agencies have a positive role to play in programme formulation, selection of priority areas, choice of rural sanitary privies and household waste disposal measures, organization of health education to suit local conditions, and programme evaluation.

### 3.8 Water quality aspects

The WHO International Standards for Drinking Water Quality are followed by most countries of the Region. Safety of the rural water supply should be the main objective; refinement to its physical and chemical qualities can be a secondary consideration, depending on the quality of the local sources, relative costs of treatment measures and consumer tolerance based on habitual use. Laboratory control, monitoring and surveillance may not be practicable for rural water supplies except in the case of piped systems. Quality control by reliable disinfection of the source and supply must therefore be ensured.

### 3.9 Operation and maintenance

The most essential requisite for the success of the entire programme - whether it is modest or massive in size - is competent operation, efficient maintenance and enlightened management. Laxity or negligence in the operation and maintenance of the rural water facility can jeopardize safety and continuity of the supply to the entire community, be it from a simple sanitary well, a handpump or a piped supply from a regional system, and can deny the consumer the expected benefit from the capital invested. The management aspect of the programme should therefore emphasize, at all stages of implementation, the building up and training of a competent task force to ensure proper operation and preventive maintenance of the facilities.

### 3.10 Health education - behavioural studies - public relations

Health education has to be attuned to the psychology of the rural community if it is to be well received. Studies should be made of local behavioural patterns and of the influence of the local economy on the motivation for personal and communal hygiene. These can help in planning health education to stimulate local involvement, cost-sharing and interested participation in a sustained rural sanitation programme. Health educators, social scientists and economists could help to decide on the scope and content of such studies and subsequently to shape public opinion and attitudes towards the programme,

in order to ensure its successful implementation. The services of specialists in these fields should be continuously employed in the programme in all stages - conception, formulation, implementation and evaluation.

### 3.11 Programme evaluation

The effectiveness of programme implementation and the progressive realization of objectives must be periodically assessed as an essential part of the programme. As most of the countries are yet to initiate long-term rural water supply programmes, evaluation needs special emphasis.

## 4 International and Bilateral Assistance

Undoubtedly, there are specific spheres in which international and bilateral agencies can play an important and useful role in the future programme of activities in this field. It would be expedient, as a first step, to identify, in the different countries of the Region, possible spheres which may qualify for aid from WHO, UNEP, UNDP, UNICEF, UNIDO, ILO, the IBRD and the ADB, jointly and severally, and then to co-ordinate such external aid as may be forthcoming to the maximum advantage of the recipient country. WHO assistance can be sought to identify and highlight priority areas for such external aid.

ANNEX 4

RURAL WATER SUPPLIES IN SOUTH-EAST ASIA:  
BACKGROUND PAPER FOR THE TECHNICAL DISCUSSIONS\*

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ANNEX 4

BACKGROUND PAPER FOR THE TECHNICAL DISCUSSION\*  
RURAL WATER SUPPLIES IN SOUTH-EAST ASIA:

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TABLE OF CONTENTS

	<u>Page</u>
1 INTRODUCTION	21
1.1 A retrospect	21
1.2 The contrast	21
1.3 Basic requisites for national economy	21
1.4 Low priorities	21
1.5 Shift in emphasis	22
1.6 Evaluation of the problem	22
2 FINANCIAL AND ECONOMIC ASPECTS OF RURAL WATER SUPPLY	22
2.1 Urban and rural sectors	22
2.2 Factors in financial and economic appraisals	23
2.3 Productive work force capacity	23
2.4 Special aspects	24
2.5 Progressive financial and economic viability	24
2.6 Investment criteria	24
3 REVIEW OF THE REGION	25
3.1 Population distribution - urban and rural	25
3.2 Rural population with access to safe water	25
3.3 Unserved populations and problem areas	26
3.4 Public health aspects	26
3.4.1 Vital statistics	26
3.4.2 Cholera	26
3.4.3 Other diseases	27
3.5 Institutional structures	27
3.6 National targets versus targets in the Second Development Decade	28
3.7 Types of schemes and <u>per capita</u> costs	29
3.8 Operational and maintenance deficiencies	30
3.9 Manpower resources	30
3.10 Material resources	30
3.11 Local technology - transfer of knowledge	31
3.12 Consumer involvement and participation	31
3.13 Rural sanitation and drainage	32
3.14 Regional imbalances	32
4 ANALYSIS OF CONSTRAINTS	33
4.1 Limitations imposed by the GNP and national economies	33
4.2 Planning policy and procedures	33
4.3 Financial resources and allocation	33
4.4 Organizational gaps	34

	<u>Page</u>	
4.5	Manpower and material deficiencies	35
4.6	Local participation	35
4.7	Water quality aspects	35
5	SUGGESTED WORK PLAN	36
5.1	The objective	36
5.2	Strategy plan	36
5.3	Plan of action	37
5.3.1	Assessment studies	37
5.3.2	Priorities for short-term plan	37
5.3.3	Feasibility appraisals	37
5.3.4	Build-up manpower task forces - acquisition of expertise	38
5.3.5	Regional training centres	38
5.3.6	Water quality standards and surveillance	38
5.3.7	Mobilization of funds - revolving funds	39
5.3.8	Supply methods and rate setting	40
5.3.9	Legal framework	40
5.3.10	New techniques	40
5.3.11	Stimulation of local industries for rural water supplies	41
5.3.12	Health education - behavioural studies - public relations	41
5.3.13	Application of knowledge	41
6	MULTI-LATERAL AND BILATERAL ASSISTANCE	41

#### TABLES

1	Population distribution in the Region (1970-1980)	43
2	Status of rural water supply - global versus national targets	44
3	Some basic vital and health statistical information in the Region	45
4	Institutional structure for rural water supplies in the Region	46

#### Appendix

	Summary status of rural water supply in the Region, as projected for 1970-1980	47
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## 1 Introduction

### 1.1 A retrospect

The development of community water supplies and sanitation in the industrially developed countries has been accelerated by their expanding economies. New knowledge of water-borne and filth-borne diseases has hastened the process: the application of the knowledge was made possible by society's ability to pay for its needs. Expanding facilities followed in the wake of improved engineering techniques; adopted initially as compulsory aids to health, they soon became part of the way of life of the community, and a harmonious blending of economic and social progress was thus made possible.

### 1.2 The contrast

The developing countries of the world in general and of South-East Asia in particular have been far less fortunate. Their political emancipation carried several inherited burdens. Their poor economies have inhibited progress. A runaway growth of population operates as a deadweight. Financial, material and manpower resources are yet to be developed. National development plans face many constraints. It is therefore not surprising that present levels of community health and sanitation are alarmingly low.

### 1.3 Basic requisites for national economy

Community health is acclaimed as the foundation for national productivity and economic prosperity. The absence of safe water supplies and the use of unsafe water sources are the twin perils currently undermining rural health in most developing countries, and particularly in the populous areas of the Region; lack of drainage and of sanitation accentuates the sickness and mortality rates amongst the communities.

Man's environment affects his thoughts and his habits. Art and culture cannot flourish amidst squalor, filth and sickness, and economic prosperity can have no significance unless it provides hygienic living conditions. Man's social and cultural development will respond, however, to the removal of environmental deterrents to community health and personal hygiene. Water supply and sanitation facilities are rightly recognized as the social infrastructure necessary to sustain and advance a national economy.

### 1.4 Low priorities

For a variety of reasons, rural water supply and sanitation seem to have gone by default in national plans. Under a health or public works budget, public health consciousness tends to be represented by the number of hospital beds and the quantity of equipment. Often a drink of safe water is more difficult to obtain in a rural health centre than the latest antibiotic medicine. Overall planning for a

common health objective has proved difficult, as individual sectoral advances replace the unified approach. This situation has led to major distortions in planning. Hospitals without adequate safe water and with crude plumbing and primitive sanitation facilities are not uncommon. Schools with poor arrangements for drinking water and sanitation are the rule rather than the exception. Rural water supply has seldom been able to compete for priority with other engineering or developmental activities.

### 1.5 Shift in emphasis

The pace and magnitude of the development programme for each country must be related to the social and economic benefits accruing, in order to justify the investment of social capital needed. Past neglect in the field of water supply and sanitation has left serious gaps in the development efforts of countries of this region, and has revealed the fallacy of planning for economic progress and industrial prosperity for populations over 80% of whom are exposed to perpetual environmental perils from unsafe water and poor sanitation. It is significant that the sphere of rural community water supply is now receiving increasing attention from international lending and aid-giving agencies. Economists and social scientists, planners and administrators are now concerned with this problem; with the rapid strides taken by the developing countries in recent years in their national development plans and with the catalytic stimulation offered by international and bilateral agencies, the importance of safe water supplies for community well-being and national progress is gaining increasing recognition among governments and people alike. The selection of this topic for the technical discussions to be held during the twenty-seventh session of the Regional Committee in itself highlights this point.

### 1.6 Evaluation of the problem

The above considerations suggest that now is the time to review the current state of rural community water supplies in the Region, to assess current programmes in relation to the goals of the United Nations Second Development Decade, to identify shortfalls and problem areas, and to examine feasible measures for improving and reaching the targets. The nature and extent of present constraints which impede progress will call for a special analysis of financial, material and manpower resources, as well as the institutional framework, the policy and procedures for planning, community involvement, and the limits of internal and external funding permitted by local economies. The object of this background paper (which has been prepared from country information papers) is to present relevant aspects of this problem for discussion. These now follow.

## 2 Financial and Economic Aspects of Rural Water Supply

### 2.1 Urban and rural sectors

Community water supplies were installed in the affluent societies of the industrially developed countries even without proof of their

economic benefits. The limited resources of the developing countries, however, necessitate selective investment, and any advocacy of community water supplies based on popular notions of "felt needs" and emotive appeals may fail to secure priorities in the face of competing demands. Economists would seek proof of economic and social benefits to match the "opportunity" cost of the moneys to be invested in community supplies. The concept of "bankable" projects, is, however, applicable mostly to urban populations, where the "captive" communities may be more or less amenable to the fiscal and managerial conditions necessary to satisfy the financial and economic viability of such projects. Rural water supplies and sanitation, on the other hand, belong essentially to the social infrastructure for promoting national economy.

## 2.2 Factors in financial and economic appraisals

The following is a cursory review of the methods of financial and economic appraisal applicable to community water supplies. If a programme is said to be financially feasible, the implication is that it is self-liquidating, i.e., it eventually pays for itself. Its economic feasibility requires that the economic value of its "benefits", to whomsoever they accrue, should exceed the economic value of its "costs", by whomsoever they are met. In this way the social and welfare aspects are reflected. The "discount rate" applied to such projects should balance "time preference" and "productivity": that is, the present preference for investment must be justified by adequate future returns, and the current input of resources should generate a larger or more highly valued future output of resources. The cost and benefit estimation would envisage "benefits" - direct, indirect and intangible by way of improvements in conditions attributable to the programme as a whole, including identification of the various social groups bearing the cost and enjoying the benefit. Social prices or "shadow pricing" may have to be applied in assessing the economic benefits. The economic investigation would identify and compare the costs and benefits, measured by the differences in conditions which would prevail with and without the project (the overall return being the difference between "with" and "without"). A financial and economic appraisal of a community water supply programme will thus involve the analysis of a wide spectrum of "causes and effects", much of which may not be practicable in the case of rural projects.

## 2.3 Productive work force capacity

Admittedly, it is difficult to quantify the economic benefits of these basic facilities. They do not stand in isolation but are part and parcel of the socio-economic fabric of society. They form an integral part of the social capital needed to secure a climate in which development can move forward. A productive work force - one not plagued by disease and debility - is essential for social and economic development. It is seldom realized that the bulk of the produce cultivated by a sick peasant may be metabolized by the very worms which infest him and keep him sick. It has been estimated that disability, premature death and

other related factors may reduce the work capability per million population of a developed country to one third that of a developing country\* (without taking into account the use of power, tools and other resources).

#### 2.4 Special aspects

Some interesting questions arise in considering the economic aspects of water supplies, particularly in rural areas. Are community water supply and economic growth mutually complementary? Which precedes the other, and to what extent? Is the community entitled to a minimal amount of water as a social service - as a "merit want", like education and health clinics - especially where people are too poor to pay for it? How is one to distinguish between desirable wants and real merit wants? When dominant market criteria do not justify social investment in a water supply, where the poor are unable to pay, a vicious circle results, in which poverty breeds sickness, which prevents earning, and the poor get poorer. Although the goal of planning for water supplies should be maximum cost effectiveness rather than maximum cost-benefit ratio, a minimal water supply as a "merit want", with a levy on those able to pay, may benefit the entire community, both rich and poor, and justify itself by removing a focus of health risk from the area.

#### 2.5 Progressive financial and economic viability

Under present conditions, local contribution to construction, operation and maintenance remains an abstract philosophy in most countries of the Region. Thailand alone reportedly has consumer cost-sharing arrangements in respect of rural piped water supplies (see Section 3.12). With the growing momentum of the rural water supply programme planned for the coming years, however, Member countries may have to give serious consideration to providing for such a contribution. A minimal five-gallon *per capita* supply from public stand pipes cannot be permanently satisfactory to rural aspirations in an improving national economy. Sooner or later, local demands will increase for a more liberal *per capita* supply, piped into the home. Present strategy should include procedures for generating consumer involvement and contributions in easy stages so that supplies are gradually augmented, against progressive local cost sharing. In the initial stages, however, the social benefits accruing from minimal supplies to satisfy the "real merit" needs of the poorer rural population must be the justification for the investment as social capital, supplemented by marginal consumer contribution where possible. This subject deserves study in depth as part of the overall planning philosophy.

#### 2.6 Investment criteria

Market criteria dominate current decisions on priorities. Visible and quick monetary returns influence planning and distort priorities. The economic benefits and social gains accruing from rural water supply and

\**Wld Hlth Org. techn. Rep. Ser.1974, No. 541*

sanitation are seldom considered, much less evaluated. Planners have yet to recognize the inherent value of community health as a compulsive and complementary factor in transforming other advances into socio-economic gains. Averting epidemics and creating conditions for freedom from disease are not isolated sectoral advances in a country's plans; they are a part of the broad infrastructure which supports and ensures the successful culmination of all other advances. A radical reorientation of the "investment philosophy" governing such facilities would be justified by the results. There is an alarmingly widening gap between the spectacular advances of modern technology and the environmental deficiencies, which have a dampening effect on development in the rural areas of the Region.

### 3 Review of the Region

#### 3.1 Population distribution - urban and rural

The total population of the Member States of the Region was about 851 million in 1970\*, made up of 158 million (18.6%) urban and 693 million (81.4%) rural inhabitants. By 1980, the total rural population is expected to reach a figure of 874 million - an increase of 26.1% (see Table 1).

India's rural population alone accounts for 64% and an estimated 63% of the regional total for 1970 and 1980 respectively; the corresponding figures for Indonesia are 15% and 15% and for Bangladesh 10% and 11% respectively; Thailand and Burma account for 8% and Nepal and Sri Lanka 3% of both the 1970 and the estimated 1980 population of the Region; the figures for Mongolia and Maldives are fractional; full particulars are still awaited from the DPRK.

Throughout the Region, except for minor differences, a community is defined as "rural" by the number and density of the population; over certain units a community is considered to be urban. The other characteristic of population in a rural community is that most of the people are engaged in agriculture.

#### 3.2 Rural population with access to safe water

Table 2 shows the state of water supplies in the individual countries. Bangladesh, with a predominantly rural population of 93%, leads, with 26% of its population having access to reasonably safe water, mostly in the shape of inexpensive tubewells with handpumps. In Burma, 13% of the 23 million rural population has access to safe water; the figure in the case of India is only 9.7%; Thailand has 10%, and Sri Lanka has 15% of the rural populations so far served by safe water; in Indonesia and Nepal, less than 2% of the rural communities reportedly have access to safe water. Altogether, some 620 out of the 693 million rural population (1970)\* are yet to be provided with reasonably safe water. By 1980, the ten-year gap will have added another 181 million to the population to be served.

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\*excluding the DPRK

### 3.3 Unserved populations and problem areas

Rural communities without access to safe water fall into different categories. The vast mass of them may depend on any unprotected water sources, far or near, such as rivers and canals, ponds and tanks, local depressions, crude pit wells, dug wells and stepwells, all subject to potential risks of contamination and serving as sources for the transmission of disease. In many areas of the Region, locally available water sources carry heavy concentrations of chemical salts, deleterious to the health of the consumers. High concentrations of fluorides cause endemic fluorosis among the communities; excessive chlorides, calcium and sulphate ions from gypsum deposits and iron and manganese salts in ground waters render the water unsuitable for drinking and cause intestinal disorders. In addition, chronic water scarcity prevails in vast areas of the Region owing to difficult hydrogeological conditions, where the people have to trek for miles and make arduous climbs to procure a minimal quantity of water for survival.

In India, in a comprehensive survey, out of a total of 576 000 villages, some 152 500 (with a total population of about 60 million) have been shown to fall under the difficult/scarcity/health problem areas, and thereby to qualify for priority attention during the fifth-plan period (1974-1979). It will be necessary to carry out similar country-wide studies to identify rural communities in categories appropriate for relief in most of the other countries of the Region.

### 3.4 Public health aspects

#### 3.4.1 Vital statistics

The major health problem in the countries of the Region is the high incidence of water-borne and filth-borne enteric diseases. The shortage or absence of safe water and sanitary facilities, poor personal hygiene and lack of sanitary discipline provide an unending means of transmission and a growing reservoir of infection. Current procedures for the reporting and recording of vital statistics are deficient. In many of the countries the remoteness of the rural communities from centres of authority and surveillance and the deficiencies in logistics and manpower skills militate against accuracy and completeness in data collection and compilation. Cases attributable to unsafe water can seldom be identified and analysed with certainty. Illness due to a lack of safe water supplies is probably much more intensive and widespread than is apparent from recorded vital statistics under such conditions.

#### 3.4.2 Cholera

The Ganges and Brahmaputra Deltas have long been the home of classical cholera, and there have also been sporadic outbreaks in other countries of the Region. In recent years, the hardier El Tor strain has taken over and is entrenching itself in the Region. Outbreaks of El Tor cholera have, however, demonstrated everywhere the efficacy of safe

water supplies as a self-contained defence. Valid cholera vaccination is, in fact, no longer a requirement for entry into the more advanced countries, which rely on the high standard of general sanitation and personal hygiene as a more dependable defence. Developing countries, too, are coming to see that, in combating cholera, money and effort should be directed principally towards improvement of general sanitation and personal hygiene. A WHO cholera research project in the Philippines recently carried out a field evaluation of the effects of basic water supply and sanitation facilities on cholera, which clearly established that both facilities, in combination or even singly, can arrest and reduce the incidence of cholera to a significant degree. In one developing country, where cholera struck for the first time last year, it was found that the number of cholera cases was far lower in villages with a comparatively safe water supply than in adjoining villages without such a supply.

A recent report of a WHO expert committee\* has drawn pointed attention to the perils of continued neglect of community water supply and waste water disposal facilities. It states "...Enteric diseases are widely endemic in most of the developing countries and exact a heavy toll in mortality and morbidity. The number of cholera cases reported to WHO in 1971 reached about 162 000 - the highest since 1953. Undoubtedly there was considerable under-reporting; in fact, reported cases represent only the tip of an iceberg, of which the very substantial submerged part is made of mild and asymptomatic cases that can cause widespread infection...".

### 3.4.3 Other diseases

Enteric fevers, dysenteries and diarrhoeas levy a heavy toll annually in the countries of the Region, leaving a trail of sickness and disability. Dracontiasis is prevalent in several parts of India and Nepal, afflicting whole communities served by stepwell sources and ponds. Hookworm infestation debilitates large populations in the Region, as a result of gross pollution of the soil by human excreta. Lack of proper disposal of waste water, again, encourages the breeding of mosquito vectors of disease under favourable climatic conditions; as a result, endemic filariasis is widespread in parts of the Region, with a high level of morbidity. In addition, endemic fluorosis is prevalent in significant groups of the population in different areas of the Region owing to the presence of excessive fluorides in the local water sources. Table 3 shows at a glance the health status in the Member countries in the Region.

### 3.5 Institutional structures

Table 4 lists the government ministries and engineering departments in charge of rural water supply programmes in countries of the Region. A single agency is vested with overall responsibility for programme implementation in Sri Lanka, as in Bangladesh, and this has made

\**Wld. Hlth. Org. tech. Rep. Ser. 1974, No. 541*

tangible progress possible; Nepal has restructured its framework for more positive action; Burma may have to expand its institutional structure for a more extensive programme; Thailand has a multiplicity of agencies participating in rural water supply and sanitation activities - a situation which reportedly results in lack of co-ordination.

### 3.6 National targets versus targets in the Second Development Decade

*Bangladesh* has plans to provide 30% of the rural population with safe water supplies by 1978, which would well exceed the Decade targets. It had an impressive 25% coverage even in 1970. The proposed target of 30% by 1978 would include most of the increase in population of about 26 million expected between 1970 and 1980. It is likely that the goal will be exceeded by about 8% by 1980. This achievement would indeed be a creditable one.

*Burma* is yet to decide on national targets. Rural water supply has a low priority in the current four-year plan (1971-72 to 1974-75); the funds allocated are but 0.04% of the budget for social welfare. Present plans can cover a population of only about 90 000 annually, whereas a five-fold increase is necessary just to keep pace with the expected annual increase in population. A policy decision to improve national targets up to 1980 seems called for. It would appear from Table 2 that, with the present trend of activity, there might be no appreciable increase in coverage between 1970 and 1980.

*India*, in its current five-year plan, has attached due importance to rural water supply. The fourth plan (1969-74) allocated Rs.1 250 million (US\$160 million) and the fifth plan (1974-1979) proposed an investment of Rs.5 740 million (US\$720 million). A comprehensive country-wide survey by special investigation divisions has pointed to the problem and identified areas needing priority attention. Out of 576 000 villages in the country, about 152 500 are in problem areas, which it is proposed to cover by the end of the fifth plan. The criteria for including a village in a problem area are the following: lack of an assured source of drinking water within a reasonable distance or depth (15 m); presence of endemic cholera and guinea-worm disease because of unsafe local water sources, and unsatisfactory quality of water sources, e.g., excess salinity, iron, fluorides and other salts. It is expected that under the minimum needs programme for rural water supply, the provision made in the fifth plan will cover most of the problem areas, with a total coverage of about 18%, which is expected to increase to 22% by 1980. The impact of the current fuel crisis on the proposed plan may make it necessary to change the targets.

It would appear that *Indonesia* will need to begin almost from scratch to solve its rural water supply problem. Current plans up to 1974 should cover 1.6% of the population, whereas plans up to 1979 would cover only 6% of the population, and the figure will probably rise to 7% by 1980, leaving a gap of 18% between the country's expected figure and the Development Decade targets.



The *Maldives* has made a beginning by initiating a UNDP-assisted project to explore the water potential for Male; proposals to initiate safe water supplies in the major islands with UNICEF aid are reportedly under consideration.

*Mongolia*, with a population of less than a million to be covered, has plans for providing 6 000 wells and piped supplies (for 1971-1975).

*Nepal* is yet to finalize its proposals and targets for the period up to 1980. Country proposals are reported still in the draft stage. It would appear that the aim is to cover 10% of the rural population by 1980. Even this would call for a vigorous programme.

The proposed national plan of *Sri Lanka* envisages the provision of safe water supplies (sanitary wells, deep wells, piped supplies and unspecified types) to about 18.8% of the population by 1980. If this plan is implemented, it will mean only a 4% improvement over the present coverage in rural water supply, falling short of the global targets by 6%.

In *Thailand*, about 10% of the rural population had access to safe water by 1970; this percentage will increase to 15% by 1976. The recommended target of 25% coverage by 1980 has been accepted in principle but has not yet been established as the national target. A 10% extra coverage between 1976 and 1980 is feasible but would call for a well-organized and sustained programme.

The appendix to this paper summarizes the study of rural water supplies during 1970-1980 from the whole region, according to the above national targets.

### 3.7 Types of schemes and *per capita* costs

Because of the vast diversity of hydrogeological and climatic conditions in the Region there must be many different types of rural water supply applicable to different areas. Spring supplies from surface; artesian and sub-artesian sources; rain water impoundments; rivers, canals and lakes; sub-surface supplies from sandy and alluvial deposits; ground water from shallow and deep strata in different geological formations, developed by shallow tubewells and drilled wells; manual "sludger" operations (as in Bangladesh) or mechanical rotary and percussion drills - all of these provide a range of sources to be explored in mountainous areas, on alluvial plains and deltas, in rocky tablelands, and in semi-desert and desert areas. Where ground waters in problem areas carry harmful salts, suitable treatment measures to render them potable must be taken or alternative sources explored. All these various schemes have been implemented in the Region depending on their applicability to local areas. The *per capita* cost of each scheme will vary from country to country, and from region to region in the same country, depending on local factors. Table 2 shows the approximate *per capita* costs and financial commitments involved in the country programmes as well as proposed national targets.

### 3.8 Operational and maintenance deficiencies

Planning is often meticulous in the financial, design and construction aspects of a project but is ineffective, if not negligent, in its operational and maintenance aspects. Such a deficiency in planning often leads to defective operation and even to failures in the complex facilities. A successful programme must provide for prompt servicing of breakdowns, by a specially organized task force, irrespective of which local agency is in charge of the operation. Experimental projects are under way in India and Bangladesh and elsewhere to discover reliable types of handpumps for domestic and public use. Much needs to be done in this regard.

### 3.9 Manpower resources

*Bangladesh* reports adequate manpower and training facilities for its projected programme. It would appear that *Burma* has a shortage of trained sanitary engineers, and training facilities for water works personnel are yet to be established. *India* has a surplus of manpower in all skills for its current and proposed massive programmes. *Indonesia* would seem to have a shortage of manpower skills even for the current low rate of rural water supply activities, and a massive build-up has yet to be organized. In *Nepal* there is deficiency in manpower as well as in organizational structures and training facilities at the professional level. *Sri Lanka* has trained engineers and training facilities in all the skills needed to cope with its projected needs. *Thailand* has apparently adequate manpower skills and training facilities for its needs, but the optimum utilization of these resources has to be planned. A common deficiency in all the countries is managerial expertise.

### 3.10 Material resources

In *Bangladesh* shortage of hardware may pose difficulties in meeting the expanding needs of the programme; local manufacture of PVC pipes and handpumps has to be stepped up.

*Burma* has to depend on imports except for locally made concrete pipes; self-sufficiency is reportedly not possible in the near future; adjustments in cost figures, foreign exchange needs and selective procurement of materials need to be planned.

*India* has a special problem in trying to step up its self-sufficiency in materials to the level required by its projected massive programme in rural water supply; the sheer magnitude of all its activities under the fifth plan and the allocation of the materials required will call for special efforts to achieve the objectives.

*Indonesia* has to import sizable rural water works hardware for an expanded programme, which will call for forward planning.

*Nepal* has currently to import most of its construction materials; its rural water supply programme has so far not made good progress, but a major breakthrough in planning and implementation will be achieved with local production of certain items to meet rural water supply needs.

*Sri Lanka* also currently imports the bulk of its water works needs in hardware piping, valves, meters and fittings, pump sets and accessories for the UNICEF-assisted projects; it is likely that some of these items will be locally produced. Country targets have to be set keeping in mind the planned procurement of materials, locally and from abroad.

*Thailand* would seem to be self-sufficient in materials and equipment for its current and future programmes in rural water supply, except for pumpsets and accessories, which may not pose any difficulties.

### 3.11 Local technology - transfer of knowledge

Under the stress of a poor economy in the countries of the Region, local ingenuity has designed low-cost techniques and construction methods for simple rural water supplies. Experience gained in providing domestic and public tubewell supplies by manual methods, as in India and Bangladesh; in the use of plastic pipes (PVC and HDPE); in the patterns of construction and modes of service through public standpipes and the popular types of handpumps, and in the community approach to solving problems of rural sanitation needs to be studied and adapted in formulating current programmes. In the sphere of rural water supply and sanitation, there are few areas where the experience with methods used in the developed countries could be useful in developing countries today. The search for solutions must be made within the developing countries themselves and must include guidelines for design criteria, the use of indigenous materials, labour-oriented construction methods, and self-sufficient operating and maintenance techniques. A closer exchange of ideas and experience among countries of the Region will yield potential benefits. A well co-ordinated use of resources and facilities available within the Region for research and development on problems common to all such countries would pay rich dividends.

### 3.12 Consumer involvement and participation

This field of activity is as yet unexplored by most countries of the Region; as mentioned earlier, it has great possibilities for accelerating the programme and improving its financial and economic viability. Programme implementation under a social policy has remained essentially a government activity concerned solely with administrative and engineering operations, to the exclusion of the human and psychological aspects of community involvement. It has made some progress in India, Nepal, Sri Lanka and Thailand, but the nature and extent of local participation have been variable. In general, it is doubtful whether local sharing in the capital cost of rural schemes by way of materials and construction labour has contributed to the extent projected. In Thailand, a 44% local contribution in the cost of piped supplies is reported; this

may presumably be accounted for by the local interest and participation and a higher GNP figure. India has experienced consumer reluctance to sharing cost except where the supply is piped into the home. The extensive tubewell supplies in Bangladesh have been exclusively a social investment by the Government.

### 3.13 Rural sanitation and drainage

Although harmful effects of unhygienic disposal of waste water and excreta are not pronounced in sparsely populated rural areas, drainage does pose serious threats to health in the denser village conglomerations, particularly in the waterlogged deltaic regions of India, Bangladesh and Thailand and in the Terai areas of Nepal. Helminthic infestations and other enteric diseases, filariasis and polio are endemic in large areas as a consequence. In areas where cholera is endemic the lack of sanitary privies creates serious problems during emergencies. Rural sanitation is as indispensable as a safe water supply to remove water-borne and filth-borne health hazards.

Waste water disposal can often be arranged within the home by suitably inexpensive devices. There is great need to provide sanitary privies in each rural home. A pit-type or borehole latrine, aqua-privy or water-seal latrine attached to each home would be an inexpensive, practicable solution. As a single self-contained environmental health measure, it can yield spectacular results.

The successful promotion of a rural latrine programme depends primarily, however, on an above-minimum subsistence level for the rural dweller, on a multi-disciplinary task force to initiate and popularize least-cost measures to suit local needs and on other supporting programmes of rural rehabilitation with which it could be integrated. Rural latrine programmes initiated in India, Bangladesh and Burma in isolation have had a chequered career owing to lack of sustained efforts and failure to capture community interest, acceptance and self-generating involvement. Sri Lanka and Thailand, however, have made impressive progress in the provision of water-seal latrines by using a trained task force of sanitarians to organize a favourable response from the people.

India is making heavy investments in rural water supplies, to the almost total exclusion of rural sanitation. However, unless rural sanitation is developed as a parallel activity with rural water supply programmes, the expected measure of benefits from the water supply programme may be denied to the rural communities.

### 3.14 Regional imbalances

As of the end of 1970, the South-East Asia Region was the WHO region with the highest population and with the highest ratio of rural to total population. Nine per cent of the rural population in the Region had access to safe water, against an average of 14% for 91 other developing countries. The 1970-80 increase in the rural population of our countries is estimated at 26%, against an average of 24% for

the 91 countries. The Region has the largest number and higher densities of rural communities, with a predominantly agricultural population forming the backbone of the national economies. Undoubtedly our region can claim to be the one with the greatest needs in respect of safe water supply and sanitation in particular, and community health in general.

#### 4 Analysis of Constraints

##### 4.1 Limitations imposed by the GNP and national economies

Current figures for gross national product and economic growth rates in countries of the Region are low (see Table 1), except in respect of Mongolia and Thailand. This means that financial allocations to meet the optimum needs in rural water supplies - a long-range social investment - are all the more difficult to obtain. The fact that populous Bangladesh and India are making a massive attack on this important problem despite other heavy preoccupations in their national planning is an indication of its more than ordinary importance. Thailand, too, is making impressive progress in this direction. It is necessary for all countries of the Region to re-examine the limitations of their economies to deal with this problem in its proper perspective. Slow progress in this field could undermine the economy and prove to be a short-sighted policy.

##### 4.2 Planning policy and procedures

In some countries, planning policy and procedures have been developed as a result of successive five-year plans; in others, planning is yet to be organized and regulated, and in still others it has not even begun. Experience and evaluation of earlier plans have led to substantially increased allocations for rural water supplies in successive plans. India's Fifth Plan proposes a fourfold increase in allocations over the Fourth Plan; similar examples from other countries in the Region (as in other regions) can provide useful guidelines to countries in which rural water supplies have so far received minimal attention. Lack of a definite forward policy in some of the countries has made for *ad hoc* planning and implementation of piecemeal activities through diverse agencies.

##### 4.3 Financial resources and allocation

The size of the problem, which in many cases has not even been ascertained, often inhibits a planned approach to its solution. The total investment seems so staggering and unremunerative that in some countries it prevents action, even with humble beginnings. The need for financial and material resources and manpower skills magnifies the difficulties. A policy of "drift" marks the activities at every stage, and piecemeal measures provide a temporary escape.

The substantial financial allocations for rural water supplies in countries such as India have been facilitated by the countries' near self-sufficiency in the material and manpower skills needed for the

programme. The need for imports of materials, entailing foreign exchange, and lack of manpower most often militate against liberal allocations in other countries. Special programmes, implemented with bilateral and international aid, can help to shape and stimulate country plans but cannot be a substitute for them. Financial resources for adequate budget allocations to sustain a long-range plan must be generated and mobilized within the country. External funding, as aid or loans, can serve only as a measure of assistance in sensitive areas of a planned programme. This complementary role of external financing and its limitations are not yet fully appreciated.

#### 4.4 Organizational gaps

Organizational gaps and inadequate finance often form a vicious circle. The absence of a long-range plan with established goals discourages the allocation of adequate funds; shortage of funds prevents proper organization, which, in turn, tends to fragment activities among multiple agencies, ill-equipped for the purpose; poor performance or under-performance is the result. This vicious circle prevents the problem from being seen in its proper perspective.

It has been the experience of many countries of the Region that a well-knit (preferably unitary) organizational set-up is highly important to identify the dimensions of the countries' rural water supply programmes, make engineering and financial appraisals and organize an integrated implementation of all related activities. The recent establishment of a national board for water supply and drainage (urban and rural) by Sri Lanka is a major step in the right direction. Indonesia apparently does not employ sanitary engineers in its programme; Thailand has six principal agencies engaged in the Thai programme; both situations are handicaps to organization.

In many countries of the Region, engineering activities suffer from a lack of trained task forces; completed facilities are neglected, and programme implementation suffers setbacks because of a lack of managerial and administrative skills; the financial investment fails to secure the desired objective; community motivation is dormant in the absence of a guiding local authority; evaluation of the work is thwarted by the many, unco-ordinated agencies dealing piecemeal with the programme. Expediency rather than planned activity guides the current programme in those countries where progress had been but marginal.

Owing to the lack of a proper dialogue between health, public works, planning, finance and other related ministries concerned with building the social infrastructure, programme formulation, goal setting and institutional needs go by default in many countries. The assembling of the necessary disciplines and skills needed for efficient implementation does not receive proper attention. The organizational set-up is allowed to function with deficiencies in quantity and quality at all levels. Co-ordination is lacking among the agencies in charge of

programme formulation, design and construction, operation and maintenance, and public involvement and participation. These several handicaps cumulatively prevent a proper "cause and effect" analysis.

Rural water supply and sanitation are not merely engineering activities but are an integral part of a total environmental health programme. Irrespective of the agencies directly responsible for the activity, health agencies have a positive role to play in programme formulation, selection of priority areas, choice of rural sanitary privies and household waste disposal measures, the organization of health education to suit local conditions, and programme evaluation. Water quality standards and quality surveillance should be the exclusive responsibility of health ministries, for obvious reasons. Programme implementation should aim at optimum involvement and support of the country's health services.

#### 4.5 Manpower and material deficiencies

Still lacking in many countries are organized effort and an integrated approach to defining the size of the rural water supply and sanitation programme required. As a result, the manpower and material needs for immediate and future requirements remain unidentified, and the shortages due to the lack of planning thus act as continuous constraints. In many cases available resources could be mobilized and used to better advantage, with a proper planning procedure and by initiating measures for securing self-sufficiency as far as possible.

#### 4.6 Local participation

Inadequate public interest and lack of local contributions are other major constraints. Some of the reasons given for this lack of involvement are, however, debatable: apathy and resignation on the part of an inarticulate peasantry, remote from the seat of power and authority; the socio-economic level of the peasant, linking his capacity and willingness to pay; lack of health education to create an awareness and interested participation, and failure of the implementing agencies (which frequently do not have sociologists on their staff) to study the sociological and economic needs of the community and reflect them in the programme. A valid view is that rural water supply projects should be part of the social infrastructure and that, as they can become revenue-producing only as they develop, the usual yardsticks of "self-liquidating character", "credit-worthiness", etc., are not relevant. Basically, the consumer's ability to pay is the major factor in gaining local participation; how soon and how best this source can be tapped can be found only after a detailed study, which would help in tailoring the programme to suit local conditions in the respective countries.

#### 4.7 Water quality aspects

Thus far, in rural water supply programmes, shortage of staff with the appropriate skills has relegated consideration of water quality aspects

to the background. Surveillance of the quality of the water is rarely being undertaken. Admittedly, protection of the sources and supplies from contamination is of first importance and is more relevant and practicable for rural water sources and systems than quality control, which requires a monitoring system and laboratories. Yet the latter cannot be neglected and should be incorporated in the supply schemes by the use of qualified and trained staff in the design, construction and maintenance phases. This is being done in countries where water supply programmes are making good headway, but in others it is not yet receiving proper attention. Its importance cannot be over-emphasized.

## 5 Suggested Work Plan

### 5.1 The objective

Current rural water supply activities in most countries of the Region can hardly even keep pace with the increase in populations. A steady backlog is accumulating. With the exception of Bangladesh, all the countries in the Region will fall short of the United Nations Second Development Decade target by 1980, modest though they are. An even more disquieting aspect is the policy of drift and the piecemeal approach which mark current attempts at planning. There is a widening gap between growing needs and actual achievements. A bold strategy is called for to rectify the situation, in the interest of national economy. The size of the problem has to be identified and measures initiated for a long-range plan for a solution, in feasible stages, by a target date.

### 5.2 Strategy plan

An effective strategy should be evolved by each country to reach the objective in view. Essentially, there should be a policy to include rural water supply in the national development plans and to give it high priority. Safe disposal of sewage should be integrated with the rural water supply programme. A long-term plan, based on a country-wide assessment of needs, should define the size of and target date for a total programme; a short-term plan, as an initial and integral part of the long-term plan, should aim at maximizing the use of currently available facilities and resources to secure optimum cost effectiveness and coverage. A broad assessment of the institutional framework, manpower and material requirements for both short-term and long-term plans would make it possible to determine the administrative, legal and financial measures, to be instituted in stages. Policy decisions would also have to be made on the matter and method of obtaining local participation in the programme. To derive full benefits from the investment, the programme implementation should cover project formulation, design, construction, operation, maintenance and management as a combined responsibility.



### 5.3 Plan of action

#### 5.3.1 Assessment studies

A country-wide assessment is the first essential step, to evaluate the work already carried out and the work yet to be done. The location, size and juxtaposition of communities to be served; the quality, quantity and proximity of available water sources; the nature of locally available supplies; rough figures for the cost of total coverage, and epidemiological and socio-economic data, collected and compiled in rough outline, would help in identifying the extent, scope and magnitude of the total programme for the country. Appropriately qualified national staff, with international help as needed, could carry out this broad assessment. The dimensions of a long-term plan for the country could then be defined.

#### 5.3.2 Priorities for short-term plan

Concurrently, the ingredients of a short-term plan can be identified and formulated for immediate implementation, to span the period 1975-1980 and to serve as national targets for the Second Development Decade where such proposals are yet to be finalized. This immediate plan could be drawn up by experts in the country, supplemented by international help as needed, and would include in its purview the following activities in selected priority areas:

- (1) Sanitary improvements to existing open dug wells, by the provision of cover slabs and aprons, pulleys with attached rope and buckets or hand pumps as appropriate, conversion of step wells into draw wells, and effective disinfection by simple chlorination appliances such as pot chlorination or constant drip-feed chlorinators;
- (2) Provision of shallow tube wells with handpumps, ensuring supply at all times;
- (3) Construction of simple infiltration wells or galleries to draw safe supplies from unsafe raw water sources, with provision for constant disinfection;
- (4) Piped supplies where local conditions so dictate, and
- (5) Exploitation of deep ground water.

#### 5.3.3 Feasibility appraisals

With this short-term plan in view, the next step should be for a country to assess its financial, manpower and material requirements in the long term and in the most suitable institutional framework.

International expertise may be called upon for advice and assistance in drawing up engineering proposals, training manpower and organizing units for design and construction, operation and maintenance, and management and administration. During this period of assessment, sectoral or master plan studies can also be started, to pave the way for a planned implementation of a total programme beyond 1980. Aid from WHO, UNDP, the IBRD and UNICEF could be sought for such studies where needed.

#### 5.3.4 Build-up manpower task forces - acquisition of expertise

Some of the countries have sufficient skilled manpower and training facilities to meet the present and prospective needs of the projected programmes. Some have adequate resources for the present programme, which will, however, need to be expanded to suit future requirements. A few are deficient in local facilities and in trained manpower, which may need to be supplemented by external skills. Governments will need to initiate appropriate measures for increasing their manpower and training programmes, to keep pace with the expanding needs. It may be possible to meet such needs through: (i) higher training in selected regional centres, (ii) expansion of existing training facilities for all sub-professionals, and (iii) short-term training programmes for engineering assistants.

#### 5.3.5 Regional training centres

The countries of the Region have very many common problems in the engineering, managerial and administrative spheres of their current and proposed rural water supply programmes. There are in the Region well established institutions for undergraduate and post-graduate studies and for research in public health engineering. If selected institutions are expanded and strengthened, the training of the skilled manpower needed can be provided economically and efficiently. International agencies can help to strengthen teaching staff, add to the equipment and draw up training programmes to suit the needs of the individual country. Training facilities and construction programmes in India and Thailand, for example, could be used to give all-round training in different disciplines, covering all aspects of community water supply and sanitation. Research facilities in India and Thailand could be exploited to find solutions to problems posed by other countries; additional collaborating units could be set up for the transfer and application of such knowledge. With the cost of training thus reduced, the intake of fellowships could be increased; trainee deputation periods could be cut down, and the training imparted designed to suit local requirements.

#### 5.3.6 Water quality standards and surveillance

The WHO International Standards for Drinking Water are followed by most countries of the Region. India has prescribed its own supplementary standards. Laboratory facilities at the state and regional

levels, where available, are used mainly for urban water supplies. The role of health agencies in quality control and surveillance is minimal or absent.

The safety of the rural water supply should be the main objective, and refinements in its physical and chemical quality can be a secondary one. For reasons of economy, values higher than conventional permissible limits for hardness, sulphates and chlorides may be acceptable, particularly in areas where local populations may have become used to water of a quality which surpasses some of these limits. These and related factors will demand attention in deciding on standards for future programmes.

Rural water supplies of the dug, driven and drilled well types with hand pump or powered pumps should carry built-in provision for the safety of the supply, with sanitary precautions in construction and reliable disinfection of the supply at source. Laboratory control and monitoring, except in the case of piped systems, may not be practicable. Diligent surveillance by periodic inspections will then be necessary.

#### 5.3.7 Mobilization of funds - revolving funds

External financial aid can be only marginal, in helping to initiate specific studies, to stimulate manpower training and the local production of water works materials, or to provide critically needed equipment and facilities. The extent to which funds are mobilized from all internal sources will decide the pace of the programme. External funding for capital outlays, in the form of soft loans from bilateral and international agencies, will depend on the country's economic potential for underwriting its own investment in rural water supply as a social policy. It is reassuring to note that the World Bank is evincing interest in the rural water supply sector of the programmes of developing countries without insisting on proof of its financial and economic self-sufficiency. Conceivably, such external loans could also be attracted when governments attach high enough priority to rural water supply in their economic planning.

The most reliable long-term source of funds for the programme must, however, be the consumer who is willing to pay for an essential service. This will follow from a process of civic development, which can be hastened by a general improvement in the economy, aided by health and social education and a policy of selective subsidies. Where some return from the beneficiaries is forthcoming, as is to be expected when supplies are piped into houses, the nucleus of a revolving fund can be generated, thereby paving the way for an eventual financially self-sustaining programme. Cash-flows from successful projects, as part replenishment of the capital invested, can serve as a revolving fund with which to supplement other established sources for funds and to finance additional facilities.

### 5.3.8 Supply methods and rate setting

It is the mode of supply which often decides the extent of consumer participation. As mentioned, a supply piped into the house usually secures willing payment by the consumer and permits rate-setting to cover operation, maintenance and part, if not all, of the capital charges. This has been the experience of India and Thailand. Supplies through public wells are considered to be a social service; however, similarly, where the supply is confined to public standpipes, and even in the case of tubewell-handpump supplies, there is a reluctance among consumers to meet even the operation and maintenance costs. Rate-setting for rural water supplies would seem to be handicapped by past usage and consumer psychology, in contrast to the situation in the African Region, where water supplied at public standpipes is measured and sold.

Piped supplies, even if confined to public standpipes, usually involve a disproportionately high *per capita* cost. A minimal five-gallon supply through public standpipes may become a financial liability, if it is to be a perpetual social service. In designing piped supplies to rural communities, careful studies on consumer reaction are therefore necessary, to permit a progressive expansion from a minimal five to ten-gallon supply initially to an eventually more liberal supply piped into the house, with consumer cost-sharing stepped up in acceptable stages. Local contributions to the cost of tubewell/handpump supplies should also be generated by education and public relations.

### 5.3.9 Legal framework

When a national plan for rural water supplies has been formulated, it is relevant to examine the need for any specific legislation in respect of the responsible authority; the organizational set-up; the government's financial obligations; the local authorities and the beneficiaries; allocation of water resources; the mobilization of funds and rate-setting; rural sanitation measures; water quality standards and surveillance, and water pollution prevention and control.

### 5.3.10 New techniques

It would be advantageous to use the facilities in the proposed regional training centres to conduct research projects on the evolution of simple and effective designs suited to local needs and potential. These could consist of pilot studies on prototype models covering a whole range of system needs, source development, treatment measures, transmission methods, modes of service, rate setting and consumer reactions, organizational patterns and management methods, economies in construction methods and materials, labour-oriented innovations, and comparative studies of methods used in the different countries of the Region. Pot-chlorination devices, chlorine cartridge, PVC pipes for small tubewells, simple types of latrine slabs, pans and traps and similar innovations can be developed and popularized for large-scale adoption, with economy in costs.

### 5.3.11 Stimulation of local industries for rural water supplies

Market research could identify the local industries that can be encouraged to meet the needs of the programme. A proper dialogue between producer and consumer is essential to ensure the best use of existing capacity and in planning additional capacity oriented towards consumer needs, to promote local manufacture of simple construction materials needed for rural water supplies, with designs adapted to permit the use of local materials. The production and procurement of hardware items, and the relative advantages of using cement concrete, asbestos cement, PVC, HDPE and/or G.I. piping should be studied for appropriate decisions by the country concerned. The importance of advance planning in this sphere to suit the phased requirements of the programme needs special emphasis.

### 5.3.12 Health education - behavioural studies - public relations

Health education, if it is to be effective, must be attuned to the psychology of the rural dweller. Studies of local behavioural patterns and of the influence of the local economy on the motivation for personal and community hygiene should be carried out to determine the strategy in directing health education towards stimulating local involvement, cost-sharing and interested participation in a sustained rural sanitation programme. Health educators, social scientists and economists could help to decide the scope and content of such studies and to shape public relations for the successful implementation of a programme. Expertise in these skills should be continuously integrated into the organizational structure through programme conception, formulation, implementation and evaluation.

### 5.3.13 Application of knowledge

Experience gained in the field of rural water supply and sanitation in other WHO regions should be of interest and help in adjusting plans to suit local conditions in the countries of the Region. New measures developed in Latin America, for example, have reportedly yielded both significant economies in the cost of community water supply distribution systems, and design criteria which can be applied to other parts of the water supply system. Filtration techniques in the USSR, which would seem to offer significant economies, also depart from conventional methods. The techniques for community involvement and participation reportedly achieved in the People's Republic of China could also be usefully studied with a view to their application under similar conditions elsewhere. WHO international reference centres and collaborating units in the countries can play a very useful role in the transfer and application of knowledge in this field.

## 6 Multi-lateral and Bilateral Assistance

Undoubtedly, there are specific spheres in which international and bilateral agencies can play an important and useful role in the future

programme of activities in this field. It would be expedient, as a first step, to identify possible spheres in the different countries of the Region which may qualify for aid from WHO, UNEP, UNDP, UNICEF, UNIDO and ILO, jointly and severally, and then co-ordinate the international aid that may be forthcoming to the maximum advantage of the recipient country. The interest of the IBRD/ADB can also be attracted by potentially favourable projects where the seeds of self-financing can be sown by a bold initial investment. WHO assistance can be sought to identify and highlight priority areas for such multilateral and bilateral aid.

Table 1. POPULATION DISTRIBUTION IN THE REGION (1970-1980)\*

Member State	1970 population x 1 000			1980 population x 1 000			GNP (1970)	
	Total	Urban	Rural	Total	Urban	Rural	Per capita (US \$)	% Growth rate GNP/capita
1. Bangladesh	74 689	4 567	70 122	104 193	7 823	96 370	100	2.4
2. Burma	28 072	5 239	22 833	35 480	7 732	27 748	80	0.6
3. India	561 880	117 605	444 275	726 535	176 693	549 842	110	1.2
4. Indonesia	123 887	21 420	102 467	164 789	33 336	131 453	80	1.0
5. Maldives	109	13	96	133	18	115	NA	NA
6. Mongolia	1 305	486	819	1 765	784	981	460	0
7. Nepal	11 386	532	10 854	14 299	879	13 420	80	0.5
8. Sri Lanka	12 754	2 563	10 191	16 116	3 770	12 346	110	1.5
9. Thailand	36 752	5 485	31 267	50 566	8 897	41 669	200	4.9
Total (excluding DPRK)	850 834	157 910	692 924	1 113 876	239 932	873 944		

\*World Health Statistics Report, Vol. 26, No.11, 1973.

Table 2. STATUS OF RURAL WATER SUPPLY - GLOBAL VERSUS NATIONAL TARGETS

No.	Particulars	Bangladesh	Burma	India	Indonesia	Nepal	Sri Lanka	Thailand
1.	Rural population (x1000) 1970	70 122	22 833	444 275	102 467	10 854	10 191	31 267
	1980	96 370	27 748	549 842	131 453	13 420	12 346	41 669
2.	Population with access (x1000)	18 000	3 174	45 000	1 315	160	1 327	3 535
	to safe water (1972) (%age)	26% (1974)	13.3	9.7	1.3	1.3 (1973)	15.0	10.6
3.	25% of 1980 population (x1000)	24 093	6 937	137 461	32 863	3 355	3 087	10 417
4.	Population likely to be covered under country proposals (x1000)	25 000	4 000	95 000	7 000	1 300	2 300	5 300
5.	Percentage of population likely to be covered under country proposals	26 (1974)	14.4	18 by	6 by	10 by	19 by	15 by
		30 (1978)	by 1980	Mar 1979	Mar 1979	1980	1980	1976
6.	Likely coverage with the current trend of activity extended upto 1980(%)	33	14.4	22	7	10	19	25
7.	Departure from global target	will be exceeded	-10.6%	-3%	-18%	-15%	-6%	Likely to be met
8.	Outlay needed in excess of current proposals to fulfil global target (US\$ x10 <sup>6</sup> )	-	25.00	800.00	250.00	17.00	12.00	150.00
9.	Per capita cost (Handpumps of schemes, US\$ (Piped supplies	2.5	1.0	12-15(Av)	3.0	1.5	22.5	4.25/8.0
		20.0	7.5		7.0	10.0		
10.	Allocation on rural water supply							
a)	as % of total outlay on CWS&S	44.5	NA	12 (1951) 60 (1974)	15.5	59.0	30.0	40.0
b)	as % of total plan outlay	1.0	NA	1.50	0.30	0.90	0.35	1.0
c)	as per capita on total rural popn. (US\$)	0.20	0.023	0.30	0.30*	0.054	0.034	0.17
11.	Urban water supply							
a)	as % of population covered as in 1972	26	37	70	18	63	64	66
b)	as per capita on total urban popn. (US\$)	2.50	NA	0.62	8.50	0.56	0.145	3.4

\*Does not include contribution from local budget.



Table 3. SOME BASIC VITAL AND HEALTH STATISTICAL INFORMATION IN THE REGION\*

Member State	Expectation of life at birth	Crude birth rate	Crude death rate	Infant mortality rate	Endemic diseases
Bangladesh (1970)	M - 52.59 (1966-67) F - 50.67	47	17	149	Cholera is reported from all countries except Maldives, Mongolia and the DPRK. Other enteric infections and intestinal parasites are endemic in all countries. Fluorosis is reported from Mongolia and some places in India. Guinea worm is reported only in India.
Burma (1970)	M - 55.9 F - 59.1	36.2**	10.8**	62.8**	
DPRK (1965-70)	M - } 70.1*** F - }	29.7***	5.4***	...	
India	M - 53.2 (1966-70) F - 51.9 (projected) (1972)	36.6 (1972)	16.9 (1972)	122 (1971)	
Indonesia (1965-70)	M - 47.5 F - 47.5	48.3	19.4	125	
Maldives (1972)	...	51.0	22.9	179	
Mongolia (1965-70)	M - } 57.7 F - }	41.5	11.2	60.3 (1973)	
Nepal	M - } 45.8 (1973) F - }	42 (1971)	20 (1971)	183 (1973)	
Sri Lanka	M - 64.8 (1967) F - 66.9	29.9 (1971)	7.5 (1971)	50.3 (1970)	
Thailand	M - 55.23 (1964-65) F - 61.82	32.8 (1972)	6.8 (1972)	22.5 (1971)	

\*Compiled from latest information available to the Regional Office from official sources.

\*\*Derived from registered data from towns only.

\*\*\*Figures corrected on the basis of information provided by the Government.

Table 4. INSTITUTIONAL STRUCTURE FOR RURAL WATER SUPPLIES IN THE REGION\*

Country	Responsible ministry	Department or authority in charge
Bangladesh	Ministry of Local Government, Rural Development and Co-operatives	Directorate of Public Health Engineering
Burma	Ministry of Health Ministry of Agriculture Ministry of Local Government	Department of Health Department of Agriculture Mechanization Department of Community Development
India	States: Ministry of Public Works/Local Government/Health  Central: Ministry of Works and Housing	State: Department of Public Health Engineering  Central: Central Public Health and Environmental Engineering Organization
Indonesia	Ministry of Health	Directorate General of Communicable Diseases, Prevention and Eradication
Maldives	Ministry of Health	Water Supply and Sanitation Authority
Mongolia	Ministry of Communal Service  Ministry of Water Resources	Special Bureaux for the Aimak Water Supply
Nepal	Ministry of Water and Power  Ministry of Home and Panchayats	Department of Water Supply and Sewerage (for community over 3 000 population)  Department of Remote Area and Local Development (for community less than 3 000 population)
Sri Lanka	Ministry of Irrigation, Power and Highways	Department of Water Supply and Drainage Territorial Civil Engineering Organization
Thailand	Ministry of Public Health  Ministry of Interior  Ministry of Industries	Department of Public Health Promotion Department of Medical and Health Services  Department of Local Administrations Department of Public Works Office of Accelerated Rural Development  Department of Mineral Resources

\*From country papers prepared for twenty-seventh session of the WHO Regional Committee for South-East Asia.

SUMMARY STATUS OF RURAL WATER SUPPLY IN THE REGION,  
AS PROJECTED FOR 1970-1980

Legend:

(a) Total rural population ( $\times 10^6$ )	693 (in 1970) and 874 (in 1980)
(b) Likely population with access to safe water ( $\times 10^6$ )	73 (in 1972) and 180 (in 1980)
(c) Second Development Decade goal (25% of 1980 population) ( $\times 10^6$ )	218 (in 1980)
(d) Likely gap between goal and expected achievements	In population: 38 million below goal In percentage: 18% below goal

