



REGIONAL COMMITTEE

SEA/RC27/7 Rev.1

Twenty-seventh Session

18 July 1974

Provisional Agenda item 10

RURAL WATER SUPPLIES IN

SOUTH-EAST ASIA

Background Paper For the Technical Discussions

R  
E  
G  
I  
O  
N  
A  
L  
C  
O  
M  
M  
I  
T  
T  
E  
E  
D  
O  
C  
U  
M  
E  
N  
T

TABLE OF CONTENTS

	<u>Page</u>
1. Introduction	1
1.1 A Retrospect	1
1.2 The Contrast	1
1.3 Basic Requisites for National Economy	1
1.4 Low Priorities	1
1.5 Shift in Emphasis	2
1.6 Evaluation of the Problem	2
2. Financial and Economic Aspects of Rural Water Supply	2
2.1 Urban and Rural Sectors	2
2.2 Factors in Financial and Economic Appraisals	3
2.3 Productive Work Force Capacity	3
2.4 Special Aspects	4
2.5 Progressive Financial and Economic Viability	4
2.6 Investment Criteria	4
3. Review of the Region	5
3.1 Population Distribution - Urban and Rural	5
3.2 Rural Population with Access to Safe Water	5
3.3 Unserved Populations and Problem Areas	5
3.4 Public Health Aspects	6
3.4.1 Vital Statistics	6
3.4.2 Cholera	6
3.4.3 Other Diseases	7
3.5 Institutional Structures	7
3.6 National Targets Versus Second Development Decade Targets	8
3.7 Types of Schemes and <i>per capita</i> Costs	9
3.8 Operational and Maintenance Deficiencies	9
3.9 Manpower Resources	10
3.10 Material Resources	10
3.11 Local Technology - Transfer of Knowledge	11
3.12 Consumer Involvement and Participation	11
3.13 Rural Sanitation and Drainage	11
3.14 Regional Imbalances	12
4. Analysis of Constraints	12
4.1 Limitations Imposed by the GNP and National Economies	12
4.2 Planning Policy and Procedures	13
4.3 Financial Resources and Allocation	13
4.4 Organizational Gaps	14
4.5 Manpower and Material Deficiencies	15
4.6 Local Participation	15
4.7 Water Quality Aspects	15
5. Suggested Work Plan	15
5.1 The Objective	15
5.2 Strategy Plan	16
5.3 Plan of Action	16
5.3.1 Assessment Studies	16

	<u>Page</u>	
5.3.2	Priorities for Short-term Plan	16
5.3.3	Feasibility Appraisals	17
5.3.4	Build-up of Manpower Task Forces - Acquisition of Expertise	17
5.3.5	Regional Training Centres	17
5.3.6	Water Quality Standards and Surveillance	18
5.3.7	Mobilization of Funds - Revolving Funds	18
5.3.8	Supply Methods and Rate Setting	19
5.3.9	Legal Framework	19
5.3.10	New Techniques	20
5.3.11	Stimulation of Local Industries for Rural Water Supplies	20
5.3.12	Health Education - Behavioural Studies - Public Relations	20
5.3.13	Application of Knowledge	20
6.	Multi-lateral and Bilateral Assistance	21

#### TABLES

1.	Population Distribution in the Region (1970-1980)	22
2.	Status of Rural Water Supply, Global Versus National Targets	23
3.	Health Status in the Region	24
4.	Institutional Structure for RWS in the Region	25
Annex	Summary Status of RWS in SEAR Projected for 1970-1980	

## 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 sanitation accentuate 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 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 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 and, with the rapid strides taken by the developing countries in recent years in their national development plans and 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 held at 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 UN 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/or 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).

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

#### 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 pipe 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 to 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 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\*, comprising 158 million (18.6%) urban and 693 million (81.4%) rural. 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 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 1970 and 1980 population of the Region; the figures for Mongolia and Maldives are fractional; full particulars are still awaited from the DPRK.

Except for minor differences, a community is defined, throughout the Region, as "rural" by the number and density of the population. Above certain units a community is considered to be urban. The other characteristic used to define a rural community is that most 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% so far of their rural populations 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.

#### 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

---

\*excluding the DPRK



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, some 152 500 villages (with a total population of about 60 million) out of a total of 576 000 villages 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 unfailing means of transmission and a growing reservoir of infection. Current procedures for 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 basic water supply and sanitation facilities against 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 water 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 due 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 shows the government ministries and engineering departments in charge of rural water supply programmes in the countries of the Region. A single agency is vested with overall responsibility for programme implementation in Sri Lanka, as it is in Bangladesh, and this has made 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.

---

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

### 3.6 National Targets versus Second Development Decade Targets

*Bangladesh* has plans to provide 30% of the rural population with safe water supplies by 1978, thereby well exceeding 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, which would indeed be a creditable achievement.

*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); 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 the likely increase in coverage between 1970 and 1980 may not be appreciable under the present trend of activity.

*India* has attached due importance to rural water supply in its current five-year plans. The fourth plan (1969-74) allocated Rs 1 250 million (US\$160 million) and the fifth plan (1974-1979) proposes 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 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 reportedly 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 connote but 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 annex summarises the study of rural water supplies during 1970-80 from the whole region, according to the above national target.

### 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 tube-wells and drilled wells; manual "sludger" operations (as in Bangladesh) or mechanical rotary and percussion drills; all 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 operation 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, 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, however, 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 a possibility 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 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* currently also imports the bulk of its water works needs in hardware piping, valves, meters and fittings, pump sets and accessories for the UNICEF-assisted projects; some of these items are likely to 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 pump-sets 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 in the popular types of handpumps, and in the community approach to solving problems of rural sanitation need 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 of 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 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 dividend.

### 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 has 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, 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 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 highest 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 (see Table 1) are low (except in respect of the

Mongolia and Thailand). This means that the 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 that all countries of the Region 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 of the 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 of allocation 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 on humble beginnings. The need for financial and material resources and manpower skills magnify 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 their near self-sufficiency in the materials 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 its 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 suffer neglect, 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; any evaluation of the work is thwarted by the many, uncoordinated 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 between 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 is not merely an engineering activity but is 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, organizing health education to suit local conditions, and in 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

Organized effort and an integrated approach are still lacking in many of the countries to define 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

Lack of public interest and of local contributions is another major constraint. 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 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 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 at 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 will fall short of the UN Second Development Decade target by 1980, modest as 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, within a target date.

## 5.2 Strategy Plan

An effective strategy has to be evolved by each country to reach the objective in view. Essentially, there should be a policy outline to include rural water supply in the national development plans and give it a high priority. Safe disposal of sewage should be integrated with the rural water supply programme. A long-term plan, to be 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 manner and method of local participation to be secured for the programme. To derive full benefits from the investment, the programme implementation should cover project formulation, design, construction, operation, maintenance and management as an integrated 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 cost figures for 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 could carry out this broad assessment, with international help as needed. 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 1975-80, 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

country expertise 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 providing 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 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 initiated to pave the way for a planned implementation of a total programme beyond 1980. Aid from WHO, UNDP, IBRD and UNICEF could be sought for such studies where needed.

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

Some of the countries are self-sufficient in skilled manpower and in 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 well established institutions in the Region for undergraduate and post-graduate studies, and for research in public health engineering. By expanding and strengthening selected institutions, the training of the skilled manpower needed by the countries can be provided economically and efficiently. International agencies can help to strengthen teaching staff, can add to the equipment and can 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 to 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 objective. 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 exceeds 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 provisions 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 critical 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 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 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 and 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. This would 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 integrated as a continuous element in 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 to 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 multi-lateral 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) 30 (1978)	14.4 by 1980	18 by Mar 1979	6 by Mar 1979	10 by 1980	19 by 1980	15 by 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	2.5	1.0	12-15(Av)	3.0	1.5	22.5	4.25/8.0
	of schemes US\$ (Piped supplies	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 as							
a)	% of popn. covered as in 1972	26	37	70	18	63	64	66
b)	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. HEALTH STATUS IN THE REGION\*

Member States	Expectation of life at birth	Crude death rate per 1 000	Infant mortality rate per 1 000	Endemic diseases**
1. Bangladesh	NA	14 (1970)	149	Cholera, typhoid, dysenteries
2. Burma	46.4 (1966-71)	10.8 (1970)	62.8 (1970)	Enteric fevers
3. DPRK	57.7 (1965-70)	11.2	NA	NA
4. India	52.6 (1966-70)	17.2 (1961-65)	90 (1967)	Cholera, guinea worm, filariasis
5. Indonesia	47.5 (1960)	NA	NA	Cholera, typhoid, helminthic
6. Maldives	NA	22.9 (1965)	NA	Enteric fevers
7. Mongolia	57.7 (1965-70)	9.7 (1965)	69 (1960)	Fluorosis
8. Nepal	40.6 (1965-70)	27 (1969)	150 (1969)	Gastroenteritis, helminthic
9. Sri Lanka	67 (1968)	8.2 (1967)	47.7 (1967)	Cholera, helminthic
10. Thailand	58.5 (1964-65)	8.6 (1970)	26.2 (1969)	Enteric fevers

\*Table 8, Annex 3 - Report on a Regional Seminar on Education and Training in Sanitary Engineering, held in Bangkok, Thailand, WHO Project SEARO 0050.

\*\*From country papers prepared for the 27th Regional Committee meeting, WHO/SEARO

Table 4. INSTITUTIONAL STRUCTURE FOR RWS 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	Dept. of Health Dept. of Agriculture Mechanization Dept. of Community Development
India	States: Ministry of Public Works/Local Government/Health  Central: Ministry of Works and Housing	State: Dept. of Public Health Engg.  Central: Central Public Health and Env. Engg. Organization
Indonesia	Ministry of Health	Directorate General of Communicable Diseases Prevention & 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	Dept. of Water Supply & Sewerage (for community over 3000 popn.)  Dept. of Remote Area & Local Development (for community less than 3000 popn.)
Sri Lanka	Ministry of Irrigation, Power and Highways	Dept. of Water Supply & Drainage Territorial Civil Eng. Organization
Thailand	Ministry of Public Health  Ministry of Interior  Ministry of Industries	Dept. of Public Health Promotion Dept. of Medical and Health Services  Dept. of Local Administrations Dept. of Public Works Office of Accelerated Rural Development  Dept. of Mineral Resources

\*From country papers prepared for 27th meeting of the Regional Committee, WHO/SEARO

SUMMARY STATUS OF RWS IN SEAR PROJECTED FOR 1970-1980

Legend:

(a)	Total rural population (x10 <sup>6</sup> )	693 (in 1970) and 874 (in 1980)
(b)	Likely population with access to safe water (x10 <sup>6</sup> )	73 (in 1972) and 180 (in 1980)
(c)	Second Development Decade goal (25% of 1980 population) (x10 <sup>6</sup> )	218 (in 1980)
(d)	Likely gap between goal and expected achievements	In population: 38 million below goal In %age : 18% below goal

