WORLD HEALTH ORGANIZATION
Regional Office for the Western Pacific

ASIAN DEVELOPMENT BANK

FINAL REPORT

WORKING GROUP ON PRE-INVESTMENT PLANNING FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

Volume II

Manila, Philippines
10-15 October 1977

ICP/PIP/001-E

WORKING GROUP ON PRE-INVESTMENT PLANNING FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

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and

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Volume II

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NOTE

The views expressed in this report are those of the members of the Working Group and the consultants and do not necessarily reflect the policy of the World Health Organization or the Asian Development Bank

This report was prepared by the World Health Organization Regional Office for the Western Pacific and the Asian Development Bank for Governments of Member States and for members of the Working Group on Pre-investment Planning for Water Supply and Sewerage Development, held in Manila, Philippines, from 10 to 15 October 1977.

CONTENTS

WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTÉ

ANNEX 3 A

REGIONAL OFFICE FOR THE WESTERN PACIFIC
BUREAU RÉGIONAL DU PACIFIQUE OCCIDENTAL

ICP/PIP/001
WHO/ADB WORKING GROUP ON PRE-INVESTMENT PLANNING FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT
Manila, 10-15 October 1977

OPENING ADDRESS BY THE REGIONAL DIRECTOR

I am pleased to welcome all of you to this Working Group on Pre-investment Planning for Water Supply and Sewerage Development. We are happy that the Asian Development Bank attaches such importance to the subject of this meeting so as to collaborate with WHO in organizing this Group. We are also pleased that the World Bank is represented by one of its senior staff who will help in guiding the discussions. I should like to thank him and the other consultants for coming to assist us.

Since its inception, WHO had considered the provision of community water supply and sewerage services a most essential element in improving public health and in contributing to socio-economic development. The Organization continues to extend extensive technical cooperation to our Member States in this sector's development and has collaborated with all the major multilateral and bilateral development institutions.

As the promotion and development of policy for investment in water supply and sewerage facilities is influenced by a better understanding

/of the issues, ...

of the issues, regional meetings such as this one has been convened by the Organization from time to time to provide an opportunity for the exchange of views between government officials who have a responsibility in these programmes and experts, and to evolve recommendations for WHO and our Member States.

I am sure you are all aware of the magnitude of resources needed for the sector not only in monetary terms but also in manpower and other institutional requirements. Based on a global statistical survey carried out by WHO in 1975, there are more than 1200 million people in the developing countries (excluding the People's Republic of China) who are without reasonable access to safe water supply while the shortcomings are even much greater with respect to sanitary disposal of wastes. These figures however do not even show the immense need for upgrading existing water supply and sewerage services to a reasonably acceptable standard.

Recognizing the pressing need for action two recent United Nations Conferences, i.e. the 1976 Conference on Human Settlements (HABITAT) and the 1977 United Nations Water Conference, adopted strong resolutions urging that high priority be given to this sector so that if possible by 1990 all people should have access to safe water supply. Furthermore, it was recommended that the decade of eighties be declared the International Drinking Water Supply and Sanitation Decade. The thirtieth World Health Assembly this year strongly supported these proposals and requested the WHO Secretariat to collaborate with Member States to the maximum extent possible.

/Despite these mandates, ...

Despite these mandates, we all recognize the scarcity of resources; therefore water supply and sewerage programmes and projects must compete with other developmental sectors for the limited resources. The partly "public goods" nature of these services and the difficulty of pricing the value of safe water makes it essential that we search for conceptual frameworks for guiding inter-sectoral allocation of resources so that hopefully the sector can be given a higher priority for developmental funds. At the sectoral level, planning should strive for economic efficiency with due consideration to equity and welfare objectives.

I trust your exchange of views will be searching and profitable and that we will all benefit from your discussions. I wish you all a pleasant stay and a successful meeting.

ADB/WHO WORKING GROUP MEETING ON PRE-INVESTMENT PLANNING
FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT
MANILA, 10-15 OCTOBER 1977

INAUGURAL ADDRESS
BY
JAY B. CARTER
DIRECTOR, PROJECTS DEPARTMENT II
ASIAN DEVELOPMENT BANK*

MR. CHAIRMAN, DR. DY, MR. SULEIMAN, DISTINGUISHED DELEGATES, LADIES AND GENTLEMEN,

On behalf of the Asian Development Bank, I would like to extend a warm welcome to you all and would like to express our sincere hope that over the next one week of discussions and exchange of views, you will be in a position to identify the many factors that are considered important in the planning and development of the water supply and sewerage sector at the pre-investment planning stage.

Since it is the thoroughness of the preparatory work done at this stage that would provide the setting in which subsequent work for sector development would be accomplished, the significance in the project cycle of a systematic, comprehensive but practically-oriented, approach could hardly be overstressed. The quality of the pre-feasibility or feasibility studies for specific projects prepared in the sectoral context within the framework of area development, wherever appropriate, determines in a large measure the difficulty or the ease with which the subsequent phases of the project cycle are likely to be carried out. Therefore, project implementation and the many intricate problems of loan administration and project management, including the operation and maintenance of project facilities, are all affected in varying degrees, but without fail, by how well-conceived the project was to begin with, and how well was it prepared.

*Presented by Mr K.L. Luthra, Acting Director, Projects Department II of ADB.

The socio-economic benefits of projects, particularly in the water supply and sewerage sector, which directly affect human well-being on such massive scales are, similarly, circumscribed by the criteria governing project selection, project design and project preparation at the very early stages of the project cycle.

In making decisions for this purpose, the planner would be guided by considerations that reflect both efficiency and equity. And the question would always be: how best could a solution be evolved and implemented which is most cost effective and benefits the maximum number at reasonable levels of service in a manner most appropriate to a given situation? Experience shows that although basic considerations to critical decision-making may overlap widely from case to case, their interpretation varies considerably from situation to situation and that each situation requires its own definition. Critical decision-making, then, becomes more of an art and a decision well made a work of art. For instance, each of the 21 projects in the water supply and sewerage sector that the Bank has financed in 12 of its member countries, has a personality of its own and has provided to our staff a working example of living experience.

A group such as yours, I have no doubt, is in a most privileged position to be able to lay its fingers on the heart and soul of the issues central to pre-investment planning and the development of water supply and sewerage: the question of the relative priority of the sector vis-a-vis others and the interface of the sector with other related sectors, the availability of funds, the administrative and the institutional setting for

sector planning and development, manpower resources and the like, are just a few examples. And although the focus of these discussions will be on the sectoral level, you will undoubtedly formulate positions bearing projects and programs in view that sectoral studies are expected to generate.

I am very happy, indeed, to see that several of our member countries have released the services of their senior government officials to participate in this one week meeting. And your presence here this morning is to us a vivid demonstration of your governments' awareness of the need to ensure better sanitation for the people of their countries. I would like to wish for you a very satisfying week ahead and would like to extend to you, once again, a very cordial welcome. I would also like to take this opportunity of expressing our appreciation to WHO, and in particular to its Western Pacific Regional Office, for having given us this opportunity of working together with them in the interest of a worthy cause such as this.

Thank you.

- o - o - o - o -

ANNEX 4-A

3 October 1977

AFGHANISTAN

Ref. Paper prepared by Mr Nour M. Sarij
Central Authority for Water Supply and Sewerage, Kabul

A. GENERAL

1. Population Total

1969 - UN Report estimate - 16.5 million

1977 projected to 17.5 million

1982 (end) projected to 19.61 million

2. Population Distribution

1977 - Urban - 2.5 million inclusive of 0.60 million in Kabul (Capital City) i.e.

Urban 15% in 10 cities growing at 3% per annum

Rural 85% in small towns and villages growing at 2-3% per annum

3. Public Health and Economic Aspects

High morbidity and mortality rates, 50% of which may be attributed to water-borne diseases. Infant mortality is 50%.

Economy is primarily agriculture.

4. Water Resources

No information provided.

5. General Planning Policy

High priority given to the sector development.

National development plan cycle is 7 years (current 1976-1983) calls for an investment of 4000 million Afs. with 1600 million Afs allocated for the Sector. This, however, is not borne out in Annex I, which shows 531.57 million Afs. of internal resources plus 1707 million Afs. of external resources*

- No information on co-ordination of Sector Planning with National Planning.
- No information on Priority Setting within the Sub-sectors although increased emphasis is being placed on rural water supply.

* Currently one U.S. $ = 44.50 Afs.

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

Central Authority for water supply and sewerage with its provincial offices is responsible for sectoral development.

No information about the degree of autonomy, or involvement.

Not clear who is responsible for the rural sub-sector.

2. Coverage and Quality of Service

Beginning of 1977

i.e. - 32% of urban population)
5% of rural population) have access to "safe drinking water supply"
9% of total population)

End of 1977

- 40% of urban population has access to "safe drinking water
- 9% of rural population is served through public standposts
- Water supply is mostly intermittent.

Future

- 84% of urban by 1983
- 22.8% of rural by 1983
- 32% of total by 1983

3. Level of Service

Present

Urban - mixed house connections and public standposts
No breakdown given

Rural - All supplies are through public standposts.

Future

No information given

4. Per Capita Consumption

Urban - (Kabul) 50 to 350 l.c.d.
- Others 50 to 100 l.c.d.
- Acceptable average 100 - 150 l.c.d.

Rural - 20 to 50 l.c.d.

5. Quality Standards and Surveillance

Presently WHO International Standards followed. A national standard is in the preparation stage to be re-inforced jointly by Ministries of Health and Public Works.

6. Standards for Design/Criteria and Construction

Apparently non existant

7. Metering

Urban - Kabul City only metered

8. Costs per capita

Urban - 800 - 1000 Afs/ capita (mostly ground water).

No breakdown given on house connection and public standposts.

Rural - "Slightly higher"?

9. Water Tariff

Goal is self support. Tariffs to cover capital investment repayment with interest and to cover operation and maintenance.

No returns are anticipated.

Metered supply - 7 to 10 Afs/ cu. meter

Non metered - Flat rate at 60 - 240 Afs/cu. meter for 1/2" connection, and higher rates for larger connections and commercial and industrial users.

Government Subsidy is anticipated in some cases.

10. Development Financing

- From national and external source.

Past level

Urban	- Average 80 million Afs/year past 5 years.
Rural	- Average 20 million Afs/year past 5 years.
Internal Source	- 75% (presumably from central government)
External Source	- 25% (from foreign loans)

Future level

Internal	- Expected to increase - 1600 million Afs mentioned for the entire Water Supply and Sewerage Sector presumably

over a 7-year planning period. This, however, is not demonstrated in Annex I which shows a total internal figure of only 531.57 million Afs.

External - Expected to amount to 1707 million between 1977 - 1982. No basis indicated.

11. Manpower and Training

- There is a shortage of trained manpower, especially at the middle level.
- No programme for manpower development has been organised but national government is considering this matter.
- There is heavy reliance on expatriates and foreign consultants.

12. Data Availability

- Data base is lacking including basic data on population census, maps, land use planning and socio economic data.
- Also other relevant information is lacking for developing design criteria, costings and general performances of services.

13. Legislation

No information is given

14. Principal Constraints

- Lack of adequate number of trained manpower.
- Heavy reliance on importation of materials and long procurement delays (being land locked country).
- Lack of adequate base line data and information system.
- Inadequate financial provisions.
- Communications difficulties.

C. COMMUNITY SEWERAGE

1. Institutional Responsibility

Same as for water supply

2. Coverage and Quality of Service

Present 1977

Urban - Only 25,000 people in Kabul have piped sewerage, i.e. 1% of total urban population. Others have private

septic tanks, pit latrines andmany rely on container disposal and night soil, for bucket latrines.

- No information is given on quality of services.

Rural - No information except that "conditions are unsatisfactory".

Future

No information is provided

3. Level of Service

Present

Urban - 1% through piped sewerage, others through individual household means (i.e. latrines, septic tanks, etc.) In Kabul 20% of houses have septic tanks.

Rural - No piped sewerage and no further information given.

Future

No information given

4. Per Capita Sewerage Production

No information is given

5. Water Pollution Control

- "Problems of Water Pollution not Serious" for rivers and other major water sources because of low level of Industrialization. Individual house wells are heavily polluted because of absence of sewerage.

6. Standards for Design/Criteria and Construction

Apparently non existant

7. Metering

See Water Supply

8. Costs per capita

No reliable data is available

9. Tariff

No information is given

10. Development Financing

- No information is given.
- It is not clear whether the figures shown in Annex include sewerage.

11. Manpower and Training

- More serious than for Water Supply

12. Data Availability

- No data is available.

13. Legislation

- No information is given.

14. Principal Constraints

- Same as for water but situation is more serious owing to lack of sufficient priority.

D. GENERAL REMARKS

An informative document which generally follows in accordance with the WPRO outline. There are, however, certain information missing and additional clarification required as follows:

- Inconsistency in the investment figures between the text and Annext I. Not clear what is the basis of the latter.
- Insufficient information on the rural water supply and urban and rural sewerage or sanitation. An Annex like Annex I should have been provided for sewerage.
- It is not clear what constitutes rural and urban.
- No information on water resources, yields, utilization and control.
- No information on co-ordination of Sector Planning with National Planning and priority setting within the various sub-sectors. It is not known whether plans exist for the Sectors during the present national development plan.
- No information on income as affecting ability to generate an adequate revenue for the Sector.
- No information on the autonomy and activity of the responsible institutional body- their ability to raise tariff, etc, and whether they are responsible also for operation and maintenance throughout the country.
- Insufficient information on quality of service and service levels.
- No information on design criteria and standards for construction.
- No information on legislation.
- Insufficient information on tariff setting including interest rates, and payments for connection.
- No reference to the recent WHO/IBRD Sector Study.

4 October 1977

BANGLADESH

Ref. Paper Prepared by Mr M. A. Hussein
Chief Engineer, Public Health
Engineering, DACCA

A. General

1. Population Total

Mid 1975 census - 81 million growing at 3.1% per annum from 1961-1974. High density averaging 1456 person/square mile.

2. Population Distribution

Mid 1975 census

Urban - 5.04 million, (i.e. 6.22%) in 136 towns which generally comprise communities over 5000 pop. There are 5 communities which are over 100,000 pop.

Rural - 75.96 million, i.e. 93.78% which generally comprise communities under 5000 pop. No significant migration from rural to urban because of absence of adequate employment opportunities.

3. Public Health and Economic Aspects

- High incidence of water-borne diseases expected to go down with improved sanitation, as evidenced from improved conditions in areas relying on tube wells.
- No information on economic aspects as might reflect ability to raise revenues.

4. Water Resources

- The main source is ground water which in few cases is supplemented by surface water.
- No information is provided on yields, quality and utilization and allocations.

5. General Planning Policy

- High priority is given within framework of social and human resource development.
- First national five year plan (1973-1978)
- It is not clear how priorities are established in each sub-sector.
- Allocations during 1968/69 and 1972/73 amounted respectively to 2.2-3.6% of planned outlay for the public sector. In 1973/74, 37% of total allocation were planned to the rural sub-sector. The balance is expected to be shifted in from rural to urban sub-sector. Thus, total allocation in current five year plan is T.K.542.0 million for two major schemes (i.e. Dacca and Chittagong) compared to T.K.439.0 million on rural water supply*. These figures do not seem to corrolate with those shown in the table on page 7.

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

- Planning and Construction. Department of Public Health Engineering** with its district offices look after all urban and rural areas except for Dacca and Chittagong. The latter are looked after by their semi-autonomus water supply and sewerage authorities. These agencies are under the Ministry of Local Government, Land Administration, Rural Development and Co-operatives.

Operation and Maintenance

- By respective municipalities in urban areas and WSSA in Decca and Chittagong
- It is not clear who looks after the operation and maintenance of rural water supply.
- Also it is not clear who is responsible for tariff setting.

---

* Current one U.S. $ = T. K. 10.2

** It is not clear under what Ministry is the DPHE

2. Coverage and Quality of Service

Present

Urban - around 15% partial coverage of water supply is provided in 34 communities. It is not clear what quality of service is provided, e.g. intermittent or otherwise.

Rural - around 55%

The quality of service from tubewells is mostly kept in good order.

Future

Urban - to increase to 20% by 1985 (i.e. to 1.5 million)
Plans are underway for 34 new piped schemes

Rural - to increase to 70% by 1979, and 100% by 1983

3. Level of Service

Present

Urban - piped water supply but it is not known what percentage have house connections.

Rural - No information is provided.

Future

Urban - piped water supply but it is not known what percentage will have house connections.

Rural - no information is provided.

4. Per Capita Consumption

Average - 2-15 g c d

Urban - 10 g c d

Rural - 6 g c d

5. Quality Standards and Surveillance

- The Ministry of Health and Population Control has a "nominal role" by conducting water quality control tests but this is inadequate and irregular.
- Standards based on WHO International Standards have been developed by The Environmental Control Board. DPHE has no means to monitor and enforce quality standards.

6. Standards for Design/Criteria and Construction

- No information is provided

7. Metering

- Presumably there is a mixture of metered and non-metered services. No details were provided.

8. Costs per capita

- No information except national allocation figures in terms of entire population

9. Water Tariff

- In Dacca metered rates at T.K. 3.00 to 18.00 per 1000 gal. The lowest being for domestic use and the highest for commercial use.
- Non-metered are taxed at 7.5% of the annual valuations of holdings in Dacca and 7% in Chittagong.
- No information is provided on policy of tariff setting and portion of costs recovered, however, it is noted that operating revenues do not provide for normal costs - para. 8.7 is not clear in this regard.

10. Development Financing

Internal
- National plan allocations in term of loans to municipalities and (largely?) subsidies to rural water supply as an integral part of rural development. Note possible error para. 8.4.1.

External
- IDA credits, UNICEF and USAID grants.
- Difficulties have been experienced in securing government loan repayments from municipalities. No information on interest rates.

11. Manpower and Training

- Generally there are adequate number of engineers but there is a shortage in managerial and research and training capabilities.

12. Data Availability

- Some data is gathered in scattered manner by DPHE staff but information system is not organized due to lack of co-ordination and appropriate compilation and analysis - "There is a definite need for urgent improvement".

13. Legislation

- Executive order spelling out responsibility of the Public Health Engineering Department.
- Water Supply and Sewerage Ordinance Act on the responsibility of the Dacca and Chittagong WASAs.
- Municipal Administration Ordinance of 1960 governing functions of municipalities and townships.

14. Principal Constraint

- Heavy dependence on national government funding and fund shortage.
- Inability to generate sufficient revenues
- The author mentions divided responsibility in the sector as a constraint but this is not reflected in the text.
- Lack of adequate manpower and inadequate information system.
- Lack of appropriate quality control and surveillance

C. COMMUNITY SEWERAGE

1. Institutional Responsibility

- Same as for water supply.

It is not clear how sanitation in the rural areas is looked after by the Ministry of L.G.L.A.R.D and C.

2. Coverage and Quality of Service

Present

- Piped sewerage available only in a part of Dacca, i.e. 60% of Old City and 20% of New City.

- Other urban areas utilize such means as septic tanks and to a lesser extent conservancy system (i.e. bucket latrines) operated by the municipality or private operators.
- No information on the quality of service for the existing systems.

Future

- No information is provided

3. Level of Service

Present

Urban - No information is provided on number who have access to house connections in urban areas. However, it is noted that some 12000 houses in Dacca are not connected to the sewer system.

Rural - population rely on pit privies many of which are unsanitary.

Future

- No information is provided

4. Per capita Sewage production

- Not provided

5. Water Pollution Control

- This is supposed to be dealt with by an Environmental Control Board established by ordinance in 1977.
- Major pollution caused by annual flooding compounded by the indiscriminate disposal of feces and garbage.

6. Standards for Design/Criteria and Construction

No information is provided

7. Metering

See water supply

8. Costs per capita

No information provided

9. **Tariff**

No information provided

10. **Development Financing**

Internal - As for water supply

External - As for water supply

11. **Manpower and Training**

As for water supply

12. **Data Availability**

As for water supply

13. **Legislation**

As for water supply

14. **Principal Constraints**

As for water supply and seemingly low priority given to the sub-sector.

D. GENERAL REMARKS

An informative document which generally follows in accordance with the WPRO guideline except for lack of Annexes. There also certain information missing and some inconsistency in the investment figures. This is summarized as follows:

- No information on economic aspects as related to ability to raise revenues.
- No information on water resources, yields, exploration, qualities, utilization and allocation.
- No information on Priority Setting within each sub-sector.
- No information on the quality of service (i.e. being intermittent or continuous)
- Insufficient information on the service level
- No information on design criteria and unit costs
- Insufficient information on policies for tariff setting, especially for sewerage.

ANNEX 4-C

5 September 1977

BURMA

Ref. Paper prepared by Mr Percy Lao
Rangoon City Development Committee
Rangoon

A. GENERAL

1. Population Total

1973 census taken.
1977 31.64 million within area of 676,000 sq. km.

2. *Population Distribution (1977)

Urban (3 main cities, plus 288 towns) 7.53 million (i.e. 24% of total) growing at 2.5%.
Rural (65,327 villages) 24.11 million (i.e. 76% of total) growing at 2.1%.

3. Public Health and Economic Aspect

High incidence of waterborne diseases in urban areas.
Marked improvement in rural areas since accelleration of rural water supply programme.
No economic information provided.

4. Water Resources

Surface and groundwater in use, but their development is lagging. No information presented on water use planning and yields.
"Only 60% of the demand can be met from the present source".

5. General Planning Policy

Ministry of Planning and Finance (Department of Planning)

Some advance planning is indicated for accelerating rural water supply. It is not clear whether this is co-ordinated with a National Developmen..

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

Primary Responsibility	-	Ministry of Home and Religous Affairs.
Others	-	Ministries of Health and Agriculture.
Engineering	-	Housing Corporation with external assistance as necessary including consultants.
Construction	-	Construction Corporation.
Operation and Maintenance	-	Local bodies. *

* (Presumably under the General Administration Department (GAD) of the Ministry of Home and Village Affairs).

---

* Basis of classification of rural and urban is not clear.

/...

According to other WHO information. Urban Water Supply is under the responsibility of the Construction Corporation and Housing Department of the Ministry of Construction. Rural Water Supply is the responsibility of the Rural Water Supply Division (RWSD) of the Agricultural Mechanization Department of the Ministry of Agriculture. The Ministry of Health's Environmental Sanitation Division (ESD) also plays a role in the construction operation and maintenace of some rural water supplies.

2. Coverage and Quality of Service

Present (1977)

- 41% of urban population served with "safe" water? See below. Accordingly figure too high - other source of information indicates 25 cities and towns have public water supply.
- 13.8% of rural population served with mixed (i.e. protected and unprotected) water.
- Overall population served = 20.3% mixed (i.e.protected and unprotected).

Projected (1982)

- 50.8% of urban population
- 32.1% of rural population

3. Level of Service

Not discussed, but presumably in the urban area there are direct house connexions and standpipes.

4. Per Capita Consumption

Average urban (excluding Rangoon) = 115 l.c.d.
Average Rangoon = 270 l.c.d. (max. in certain parts of city = 1300 l.c.d)
Average rural - Not given, but figures 5 - 10 l.c.d, mentioned for "dry zones".

5. Quality Standards and Surveillance

WHO International Standards and AWWA Standards are used as quality guides for Rangoon. These are lacking in other areas. Supply intermittency is common even in Rangoon, due to source and production development lag. Ministry of Health is supposed to carry out surveillance).

6. Standards for Design/Criteria and Construction - Not mentioned.

7. Metering - No established policy - some urban areas are mentioned.

8. Costs per capita

Present Rangoon system(surface source)	- US$3.07
Present ground water	- US$5.21
Present other urban areas	- US$2.43
Present rural, UNICEF supported(without distribution)	- US$3.08

Obviously the above figures cannot be correct, especially for the urban areas and Rangoon!

/...

9. Water Tariff

Basis - Fixed rate derived from property taxation which range from 23½ to 8% of "the annual value of land and buildings...". The latter is not clear.

Of that 6½% is for water in Rangoon, with house connexions.
Of that 3 3/4% for water supplied from standpipes.

Some urban communities charge on the basis of number of service points, pipe size, etc.
Also, metered water charged on basis of approximately $0.54/1000 gal(i.e.K.4.00).

10. Development Financing

	- Central Government annual allocation (and subsidies primarily for rural areas)
Internal	- Burmese Economic Bank , loans through the General Department of Ministry of Home and Religious Affairs. - Bank interest 7% per annum within 20 years, including 10 years grace period.
	- Urban communities are allowed to spend from their own earnings, instead of full dependence on Central Government.
	- According to other source of information with WHO "there is no interest charge on loans made by the Government for this sector".
External	- Large projects may apply for loans for international or bilateral sources for foreign currency requirements through the "Foreign Economic Relations Department". Limited aid is also received from UNICEF and some bilateral sources.

11. Manpower and Training

"No manpower development programmes have yet been organized", although "training institutions and facilities are sufficently present in Rangoon...etc".

12. Data availability

Various data is available amongst the various departments, but no central information system for the sector has been organized.

13. Leglislation

Numerous acts since 1898 "authorizing local bodies as the respective agencies empowered with the development and maintenance". It is not clear how the Central Government Ministries come into the acts.

/...

14. Principal Constraints

- Difficulties in obtaining imported equipment and supplies.
- Difficulties in transportation of equipment and supplies.
- Not mentioned is the fragmentation of institutional responsibility and probably also insufficient priorities to the urban sector. Financial constraints must also be a factor.
- Insufficient financial provisions.

C. SEWERAGE

1. Institutional Responsibility

Same as for water supply.

2. Magnitude of Service and Quality of Service

Very limited number of people are served by community sewerage.
In urban areas only 6% are served by sewer system.
In rural areas none are served by sewer system.
No information on the quality of service.

3. Level of service

Mixed. Majority low level service.
Urban - Rangoon 350,000 served by sewers
others 100,000 served by sewers
Total = 6% of total urban population.

Remainder by septic tanks, pit latrines, night soil collection and others.

Rural - (none sewered) All by pit latrines and other means.

4. Per Capita Sewage Production

Not mentioned.

5. Water Pollution Control

"Steps have not been taken in this direction". The problem does not appear to be very acute at the moment.

6. Standards for Design/Criteria and Construction

See water supply.

7. Metering

See water supply.

/...

8. Cost per capita

Not provided.

9. Tariff

Included in property tax as for water supply.
e.g.8½% property tax is charged in Rangoon (not clear if this includes water).
It is not known whether this is adequate and what basis is used to establish tariff.

10. Development financing

The figures shown on the second page of Annex I do not indicate whether sewerage financing is included. Notwithstanding the statement in paragraph 3.1, sewerage appears to have a low priority.

11. Manpower and Training

- See water supply.
- Because of limited service, it is not anticipated that a great deal of manpower is needed at present.

12. Data availability

- See water supply.
- Because of limited service,it is not anticipated that much data is available.

13. Legislation

- Same as water supply.
- No legislation on water pollution control.

14. Principal constraints

- In addition to those mentioned for water supply, it appears that sewerage does not enjoy a sufficient national priority.

D. GENERAL REMARK

An informative document, which follows in accordance with the WPRO outline. However, there are some inconsistencies with information available to WHO from other sources. For example:

Annex 4-C

6 September 1977

BURMA

An informative document which follows in accordance with the WPRO outline. However, there are some inconsistencies that need to be clarified and additional information missing which could be very helpful in casting a clearer picture. Examples of these are the following:

1. The magnitude of urban population provided with "safe water" is reported to be 41% of the urban dwellers, yet the report indicates elsewhere that all urban supplies are intermittent. This casts a great doubt on the safety of the water. Furthermore, other information available with WHO indicates a rather lower magnitude of service.

2. The per capita cost figures for urban and rural water supplies reported under section 2.3.1 are extremely low and obviously it cannot be considered that these reflect the full costs.

3. It is noted that the Burmese Economic Bank charges 7% interest per annum for water supply loans. According to another source of information with WHO, there is no interest charged on loans made by the Government for this sector. There is also uncertainty about the question of subsidy.

4. The mechanism of coordination of sector planning with national policy and planning is not evident, and neither is the role played by the Central Ministries in sector development. General economic information which could be related to sector planning and tariffs is also lacking.

5. Information on water resource surveys and water allocation.

6. The concept of service level and established policy in this regard also needs to be explained. It would help to provide information on adopted policies regarding metering and design standards.

7. Although the magnitude of sewerage service is very low, information is needed on the quality of service, costs per capita, connexion charges and policies regarding enforcement of connexions.

Continued ...

Annex 4-C

8. Annex I

Item 6: indicates that no subsidies are "granted for urban communities". Some form of subsidy was mentioned in certain cases, see page 5 section 1.8, which states that "subsidies are granted by the Government to deserving local bodies that need help in boosting their development".
Item 7: "Financial Planning for on-going projects": investment figures were shown throughout 1987; it is unusual to expect on-going projects to extend over a period of ten years. Incidently, there ought to be some footnotes to explain how these various items under 7a and 7b were determined.

ANNEX 4-D

6 October 1977

F I J I

Reference:
Report by Mr Alexander Reid, Principal Engineer, Water, PWD, Suva.

A. GENERAL

1. Population total

1976 Census - 588,068 living in some 100 of 844 islets, growing at 2% per annum.

2. Population distribution

Urban 191,042 in 14 urban areas (i.e. 32% of total population)

Rural 68%

Capital Suva pop. 130,688
and surrounding communities growing at 7.2% per annum.

3. Public Health and Economic Aspects

In 1975 daily average wages amounted to approx. F$6.00, with a wide disparity* in earnings. Current average quarterly water bill amount to F$5.00 - 10.00. Low incidence of waterborne diseases, which may be largely due to improved water supply and sanitation facilities.

Tourism is a major activity, but its expansion has been restricted because of lag in expansion of water supply and sewerage services.

4. Water Resources

No information provided on surveys. The rights to use water and ownership of water resources "are areas where problems arise". New legislation are in the making in this regard.

5. General Planning and Policy

A Five Year National Development Plan is followed - covering 1976 to 1980. Programmes for this sector are reviewed and costed annually and priorities established before Parliament votes the necessary funds.

A Development Committee comprising Permanent Secretaries of all Government Ministries must review and approve major development schemes before approval by Cabinet.

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

- Public Works Department in the Ministry of Public Works is responsible for planning and design. Responsibility for operation and maintenance is also the responsibility of DPW, through the Divisional Engineers.

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* Based on supplementary information.

2. Coverage and quality of service

1975 Approximately 80% of urban pop. through 37,896 service connexions (steady 24 hour supply)

" 34% of rural pop., through independent piped supply, and 26% of rural by way of connecting to urban systems, many others are intermittent.

Overall population served approximately 75%.

Projected

90% of urban population by 1978 and 85% of rural population by 1987.

The quality of service in the urban areas is apparently satisfactory, but in the rural areas there are many deficiencies, including interuption of service.

3. Level of service

Urban - mainly through house connections owing to a low connection charge of F$4.00.*

Rural - through standpipes*

4. Per capita consumption

Urban mostly over 200 l.c.d (on rather the high side)

Rural guessed consumption 10 l.c.d.

5. Quality standards and surveillance

There is no information on quality surveillance, but it is reported that WHO International Standards are adopted.

6. Standards for Design/Criteria and Construction

Some design standards exist but not always adhered to (see supplementary information)*

7. Metering

75 to 85% of service connexions in urban areas.
No metering in rural areas.

8. Cost per capita

50 to 60 Fiji dollars for regional schemes.

No detailed breakdown was provided for house connexions or standpost services.

9. Water tariff

These are to recover cost of operation and maintenance, including debt charges, but excluding depreciation. Interest rates currently applied are 8% but it is not clear over what period are capital costs to be recovered.
Actual running costs:

Varies from $0.11 to $0.54 per 1,000 litres
Varies from $0.14/1,000 litres in the capital city of Suva
Total $6 to 50 per person/year
Total $14/per person/year in Suva

*Based on supplementary information.

10. Development Financing

Capital costs and operations and maintenance budgets are voted by Parliament. 1976 allocation for urban water = 7.18% of total budget, and for rural water = 1.18% of total national budget. Theoretically, works should be self-supporting through established tariff, but this is deposited with general Government resources.

11. Manpower and training

They seem to be understaffed by professional staff. All engineers are expatiots, "with some notable exceptions". At technicians level and field supervision, the country is virtually "self-sufficient" through local training institutions.

12. Data availability

Operational information collected regularly covering costs, consumption level etc. These are gathered and forwarded to the Head Office of PWD.

13. Legislation

Water supply ordinance and by laws of 1955.
Control of water resources not clear.

14. Principal constraints

- Limited funds aggravated by population dispersion causing higher per capita costs.
- Need to coordinate engineering planning and financial planning.
- Need to streamline administrative procedures for importation of material and equipment.

C. SEWERAGE

1. Institutional Responsibility

In addition to the Public Works Department responsible for planning and design, the Municipal Authorities are involved in the day-to-day operation and management.

2. Coverage and quality of service

1975: Urban approximately 10.35% served with sewers
18.70% served with spetic tanks
plus isolated private institutional facilities (i.e. hotels)
70% no proper service

Rural - pitlatrines used - no figure given.

Projected: 20% of urban population by 1978 and 20% of rural population by 1978.

3. Level of service

Not clear.

4. Per capita sewage production

Not mentioned.

5. Water pollution control

Although river pollution is not a major problem, legislation is planned to control the situation for the future.

6. Standards for Design/Criteria and Construction

Not reported.

7. Metering

See water supply.

8. Cost per capita

Not reported, although a connection charge of $210 per dwelling is mentioned to cover the cost of treatment and outfalls only.

9. Tariff

- Based on water uses $0.06/1,000 liters*. Not clear how septic tank cleaning is charged for and by whom.
- $210 connexion charges per dwelling. Large Government subsidy is implied.

10. Development financing

Same as for water supply, except in 1976 Government budget for urban sewerage amounted to 3.26% of total national budget. As per water, revenues for sewerage are added to the general revenues. **Limited external aid in materials amounting to F.$3.00 million from Australia and New Zealand.****

11. Manpower and training

As for water supply.

12. Data availability

A start has been made in data collection, but this is still of low reliability.

13. Legal status

New legislation under discussion.
Existing legislation requiring connection to existing sanitary sewers within 100 ft. from the property.

14. Principals constraints

As for water aggravated by the apparently low priority given to sewerage.

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* Approximately 1 Fiji dollar = 1 US dollar.

** **Based on supplementary information.**

5 October 1977

MALAYSIA

Ref. Paper by C. B. Taik and A. Sekarajasekaran
Public Works Department and Ministry of Health, KUALA LUMPUR

A. GENERAL

1. Population Total

1970 census - 10.39 million of whom 8.7 million were in Peninsular Malaysia, 0.65 million in Sabah and 0.97 million in Sarawak.

1990 (projected) - 17.98 million

2. Population Distribution

1970 census - Urban (more than 10,000 population) is 27.7% of total, i.e. 2.75 million assuming growth at 3-5% per annum.
Rural is 72.3%, i.e. 7.63 million

1990 projected - Urban 36% (i.e. 6.485 million)
Rural 64% (i.e. 11.4 million)

3. Public Health and Economic Aspects

- The present discharge of sullage water and refuse into open channels is becoming a health hazards especially that cholera and typhoid are endemic.
- No information on Economic aspects as related to ability to sustain sector development and raise revenues.

4. Water Resources

- No information provided

5. General Planning Policy

- High priority is given to water supply sub-sector in current third national development plan (i.e. 1976-1981). Priority to sewerage is considerably lower but this maybe increasing. Water supply and sewerage are treated as sub-sector of Public Utility Sector.
- State authorities submit plans with estimates to the Federal Authorities (EPU - not clear?). It is also not clear how priorities are established within the sub-sectors.

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

- Basic responsibility lie within the State Governments.
- In all but two states, Public Works Departments are in charge of planning, design, implementation, operation and maintenance.
- In the remaining two states (Penang and Malacca) water is under "State Water Authorities".
- The Water Supply Branch of the Federal Public Works Department is responsible for programme co-ordination, as well as back-up consultative support to state authorities. It also serves as a clearing house for data collection, research and development of design standards. It is not clear under what Ministry the PWD is.
- The Ministry of Health through its Environmental Health and Engineering Unit supplement input by PWD in the rural sub-sector.

2. Coverage and Quality of Service

In 1970, 83.2% of the urban population had access to public water supply and in 1980 this is expected to rise to 90%. In Western Malaysia almost all urban areas are covered, however, the rural supply in these areas is not well covered due to pupolation dispersion.

In 1970, rural coverage with piped water supply was 33.8%.

No figures were given for 1975.

Over-all piped water coverage in 1975 was 63%.

No information on quality of service.

Future

- 1980 over-all coverage with piped water is expected to rise to 65% of the total population. No further breakdown was given.

3. Level of Service

1975 - Urban - 81.2% of urban population supplied with own house connections.

9.2% supplied with reasonable access to standpipes.

- Rural - No figures given for 1975, however, for 1970, 21.6% owned house connection while 12.2% relied on stand-pipes. Also in 1970, 43.2% relied on wells both sanitary and unsanitary.

Future

- No breakdown was given

4. Per Capita Consumption

- Urban (20-50) g p d

5. Quality Standards and Surveillance

- Surveillance is the responsibility of the Ministry of Health with International Standards in use.
- Quality control is reasonable through Ministry of Health and PWD.

6. Standards for Design/Criteria and Construction

- No information provided although it appears likely that such standards may exist.

7. Metering

Urban - All connections are metered.

Rural - Not clear

8. Costs per capita

Urban piped supplies - U.S.$32.00/capita

Rural supplies - U.S.$8.00/capita

It is not clear whether the latter is for piped system with or without connections, presumably these figures are averages for ground and surface waters.

9. Water Tariff

Tariff components include area assessments rates, connection fees, and direct consumption charges.

Tariff policy provide for generating self-supporting revenues (i.e. interest, debt service, operation and maintenance, administrative costs, depreciation and surplus for expansion).

- Billing is done every two months from meter reading

- Charges are collected by water departments or by municipalities or local authorities on behalf of water departments.
- In developed states, separate accounting for water supply is maintained.
- It is not clear if the above apply to rural areas.

10. Development Financing

Internal

- From state governments, sometimes through loans or subsidies by Federal Governments especially for rural water supply which is heavily subsidized by the Federal Government. Private developers provide for their own development. Consumer connection charges are also utilized as well as contribution from housing estates and industrial and commercial complexes. It is not clear how.

External

- From International Bank loans

Total - In third development plan (1976-1981) investment on water supply will be M$536 million rising from M$334 in previous plan

11. Manpower and Training

- Adequate manpower for design and construction which make use of local consulting firms in collaboration with foreign firms.
- Adequate senior managerial staff
- Inadequate senior technical staff - not clear why?
- Less serious shortage of sub-professional staff.
- Training institutions are adequate

Some of the above is inconsistent with statement in 3(f) page 15

12. Data Availability

A lot of information is gathered but remains not in a readily usable form. Compilation and up-dating is not regular. Staff employed for this purpose not well trained.

There is a big room for improvement.

13. Legislation

- Existing legislation places matter in the hands of the state authorities.

14. Principal Constraints

- Need for an improved information system.
- Some improvement in manpower development may be needed.

Otherwise, this sub-sector seem to be in pretty good shape.

C. COMMUNITY SEWERAGE

1. Institutional Responsibility

At the local level, there is no organization to deal with sewerage except at K.L., Penang and Kota Kinabalu.

At the Federal Level, the Ministry of Local Government is technically responsible but owing to lack of technical staff, this Ministry relies on engineers in the Environmental Health and Engineering Unit of the Ministry of Health.

Existing statute empowers local authorities for the provision of service while the State assists by providing loans and technical assistance for implementation, operation and maintenance. This contradicts above statement regarding the role of the Ministry of Health.

In the rural sub-sector, the Ministry of Health, through its Environmental Health and Engineering Unit, is involved in sanitations.

Institutional responsibility is not clear.

2. Coverage and Quality of Service

1975 - Urban - 10% were connected to public sewer system with house connections.
- 57% were using individual septic tanks, etc.
- 25% relied on conservancy (i.e. bucket latrines)

Sullage is discharged into open drains.

Rural - No public sewer systems
- 53.0% utilized individual septic tanks, etc.
- 37.0% utilized conservancy

(Item C in Annex III is incorrect. Also there is some inconsistency between this Annex and Text).

Future

1990 project - Urban - 15.0% to be connected to public sewers

Rural - 20.0% to be connected to public sewers - this does not seem to be right.

- No information on quality of service.

3. Level of Service

- See item 2 above

4. Per Capita Sewerage Production

No information

5. Water Pollution Control

There is heavy pollution from lack of sewerage system and discharge of untreated wastes. A newly created Department of the Environment plans to monitor major rivers. There is a need for strong legislation.

6. Standards for Design/Criteria and Construction

None existent

7. Metering

See item 7.B for water supply

8. Costs per Capita

U.S.$48/capita for public sewerage?

U.S.$50/capita for septic tanks

U.S.$0.90/capita for rural sanitation

The first figure appears on the low side. Also it is not clear whether this includes treatment.

9. Tariff

"Local authorities are not authorized to impose tariffs other than general rates, the sewerage improvement rate and the urban drainage rate." The latter are limited to 5% of "the net annual property value".

The Federal Government is bound to make an annual grant through the State Government.

It is not clear how the new system for K.L. will set up charges.

10. Development Financing

Internal - At present, limited contribution from national budget in form of loans or grants to State Governments.

External - International Banks loans (i.e. IBRD financing K.L. Severage). Total in third plan rising to M$134.6 million from M$22.54 mainly to cover M$134.5 million for K.L. Severage.

11. Manpower and Training

Serious shortage at present

12. Data Availability

Must be extremely limited because of limited developments in this sub-sector.

13. Legislation

- The 1976 Local Government Act empowers local authorities to construct and maintain sewers.
- "There is need for review of existing legilation making it mandatory for all new communities to be covered."

14. Principal Constraints

- Insufficient priority
- Inadequacy of manpower and training
- Financial burden upon state authorities
- Need strong legislation to control pollution
- Need to streamline institutional responsibility and to improve co-ordination
- Need to develop data base and information system.

D. GENERAL REMARKS

A very informative paper with substantial information. It generally follows the WPRO outline, however, the financial part of Annex I seem to be missing as well as a few other information. Also, there are some inconsistencies in figures shown in Annex II. The above points are summarized as follows:

- No information on the economic aspects as related to ability to sustain sector development and to raise revenues.
- No information on use of water resources, yield, and allocation.
- It is not clear how priorities are established within the sub-sectors.
- No breakdown was provided on future coverage and service levels for urban and rural sub-sectors.
- No information on availability of design criteria and construction standards for water supply (both urban and rural).
- No information on how revenues are collected from the rural sub-sector.
- The percentages of population served under item C.a of Annex II are inconsistent with those shown in item A.a and B.a. Also, it is unlikely that 20% of the rural population, item B.a, will be connected to public sewers by 1990 while only 15% of the urban population will be connected by that year! May be some typographical errors.
- It would have been very helpful if an indication was made as to progress attained since the WHO/IBRD Sector Study was carried out and which of the recommendations have been implemented.

ANNEX 4-F

3 October 1977

NEPAL

Ref. Paper prepared by Mr P.M.S. Pradhan
Water Supply and Sewerage Development,
Katmandu

A. GENERAL

1. Population Total

1975 - approximately 12.6 million

1980 - projected to 14.3 million

2. Population Distribution

1975 - Urban - Approximately 0.7 million, i.e. 5.56% in 16 urban communities growing at 6% per year.

Rural - Approximately 11.9 million, i.e. 94.44% in 28000 villages and settlements growing at 2.5% per year.

- Elsewhere in the report the urban population is mentioned in 19 towns plus 8 communities all with population over 10,000.

3. Public Health and Economic Aspects

High incidence of water-borne diseases (limited statistical data).

No information on economic aspects and ability to contribute by local inhabitants.

4. Water Resources

No information was provided.

5. General Planning Policy

- A five-year national development plan. (Fifth Plan 1975-1980) spells out population coverage, number of additional communities to be served and those whose schemes to be augmented.
- No information is provided on Priority Setting within the Sub-sectors although increased emphasis is being placed on rural water supply particularly in the hilly and remote areas.
- Target set for fifth plan is to raise supply by piped water to 8% of rural areas. (i.e. doubling existing supplies)

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

- Ministry of Water and Power - Department of Water Supply and Sewerage looks after urban communities, zonal and district headquarters and rural communities over 3000 population. Water Supply and Sewerage Board (WSSB) looks after certain urban areas.
- Ministry of Home and Panchayat through Local Development Department (LDD) looks after rural communities under 3000 population. In addition, provincial administrations also constructs some rural water supplies.
- Operation and maintenance is supposed to be local responsibility but this has not always succeeded. DWSS operates and maintains some 50 schemes with HMG subsidy.

2. Coverage and Quality of Service

Present (1977) - 7.25% of total population

Urban - 530,000 in 16 urban centers, i.e. 76% of urban population. Elsewhere 85% are noted to be served. These are higher than shown in Annex 1.

Rural - Only 2-4% have access to safe water through 200 systems. All urban and rural systems operate intermittently. High amounts of unaccountable water up to 75%.

Projected

- Total to increase to 12.25% by 1980.
- Percentages given in Annex 1 are lower and need to be checked.
- Elsewhere in the report a figure of 40% of total population is mentioned to be served by 1990.

3. Level of Service

Present

Urban - All served, use piped system.

25% with direct house connection and remainder with standpipes.

Rural - (110) piped systems? Apparently all through standpipes. 200 systems are mentioned elsewhere.

Projected

- No information is given

4. Per Capita Consumption

Urban - 90-120 l.c.d.

Rural - 20-90 l.c.d.

45 l.c.d is generally adopted

5. Quality Standards and Surveillance

- Surveillance is inadequate due to inadequacy of laboratory facilities especially for remote areas.
- Water Supply and Sewerage Board (WSSB) in process of setting up a fully equipped laboratory.
- WHO International Standards generally adopted.

6. Standards for Design/Criteria and Construction

- No information is provided

7. Metering

- No information is provided

8. Costs per capita

- No information is provided. The information can not be extracted from Annex 1.

9. Water Tariff

- No information is given

10. Development Financing

DWWS - Projects are completely financed by Central Government Funds with limited bi-lateral grants.

LDD - Projects are jointly financed by Central Government and local contribution. UNICEF assists in materials.

WSSB - These receive international loans and credits (i.e. IBRD/IDA)

11. Manpower and Training

- There is a shortage of manpower especially in the sub-professional categories. There is also lack of adequate number of senior engineers with managerial experience. There is heavy reliance on foreign consultants.
- No local engineering schools.

12. Data Availability

- There is need for improved data collection, analysis and information.

13. Legislation

- A 1966 Water Act governing rate and method of calculation of charges.
- A 1962 Act defining power and responsibility of provincial administrative bodies for water supply.
- Other miscellaneous Acts.

14. Principal Constraints

- Lack of adequate number of trained manpower and training facilities.
- Inaccessibility to many of the rural areas.
- Until recently heavy reliance on imported materials and procurement delays (being land locked country).
- Institutional responsibility requires streamlining
- Heavy dependence on Central Government financing and needs for large investment funds. Apparently revenue generation is inadequate.

C. COMMUNITY SEWERAGE

1. Institutional Responsibility

As for water supply - In addition, Ministry of Health is concerned with urban sanitation.

2. Coverage and Quality of Service

Present

Urban - No piped sewerage exists except for a small combined system serving a limited area of Kathmandu.

Rural - No information provided

Projected

- To serve core areas of Katmandu and Lalitpur by 1980.

3. Level of Service

Present

- See 2 above

Projected

- No information is provided

4. Per Capita Production

- No information is provided

5. Water Pollution Control

- No legislation or any action is implemented in this regard. Pollution is uncontrolled and it is on the increase from all sources.

6. Standards for Design/Criteria and Construction

- No information is provided

7. Metering

- As for water supply

8. Costs per Capita

- No information is provided

9. Tariff

- No information

10. Development Financing

- No information

11. Manpower and Training

- Same problems as for water supply but more serious.

12. Data Availability

- Apparently none available

13. Legislation

- No information given. Apparently non existent.

14. Principal constraints

- Lack of priority in addition to constraints shown for water supply

D. GENERAL REMARKS

An informative paper which generally follows the WPRO outline. However, there seem to be some inconsistencies in some data and absences of other information as illustrated below:

- Some inconsistency in the number of urban communities.
- Some inconsistency in Service Coverage and projected investments shown in Annex 1.
- No information on economic situations and ability to contribute to the Sector Development and to the generation of revenues.
- No information on water resources assessments and control of use.
- No information on Policy for sewerage development.
- Insufficient information on standards for design and construction.
- No information on metering and on tariffs and tariff policies.
- Further clarifications needed for Annex 1 concerning sewerage and units quoted.
- No reference to WHO/IBRD sector study.

PAKISTAN

Ref. Paper prepared by Mr Aijaz Akhtr
Ministry of Finance, Islamabad

A. GENERAL

1. Population total

1973 census 65 million)
1977 estimate 73.43 million) in four major provinces and four territories

2. Population distribution *

Urban - 407 communities including seven major cities (1972)
- 20.13 million, i.e. 27.4% (1977)

Rural - 40,000 villages (1972)
- 53.30 million

It is not clear what is rural and what is urban?

3. Public health and economic aspects

- High degree of water contamination.
- 30% of all reported diseases are waterborne and 40% of mortalities are due to the latter.
- No information provided on economic aspects and income.

4. Water Resources

No information provided on surveys, uses and regulations.

5. General Planning and Policy

- Government assigns a very high priority to this sector.
- Strategies and guidelines to the provinces are spelt out in a "National Medium Term Plan".
- Development Departments Co-ordinate Provincial Plans and determine priorites within the various sectors.

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* Basis of classification of rural and urban communities is not clear.

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

- Primary responsibility: Provincial authorities through Public Health Engineering Departments (PHED), or Peoples' Works Programme (PWP) and Individual Municipalities and Development Authorities in the bigger cities. The role of the PWP is not clear.
- Engineering: Presumably by PHED and others mentioned above.
- Construction: Presumably by PHED and others mentioned above.
- Operation and maintenance: "Arrangements are not satisfactory". PHED hands over works to local authorities 2 year after construction. Most local authorities cannot manage and turn back operation to PHED. Apparently rural water supplies are operated and maintained by PHED.

2. Coverage and quality of service

1977 60.2% of urban population is covered)
16.6% of rural population is covered)
25.5% of total population is covered)
These are somewhat higher than the figures indicated in the 1976 WHO/IBRD Sector Study Report

All water supplies are intermittent and therefore services are not adequate. Concern is voiced over excessive wastage, should supply become non-intermittent.

Projected

84% of urban population by 1983
37% rural population by 1983

Apparently intermittent supplies will continue.

3. Level of service

- Presently 30% of urban and 15% of rural populations served are provided with house connexions. The remainders are served with public standposts, or hand pipes in the rural areas.
- Future situation not indicated.

4. Per capita consumption

- Average urban - 30 g.p.c.d.
- Average rural - 10-15 g.p.c.d.

5. Quality standards and surveillance

There is a serious quality problem as water is supplied intermittently in most cities. No information is provided on surveillance and whether International WHO Standards are applied.

6. Standards for Design/Criteria and Construction

According to para. 34, there is a water supply design criteria developed by "General Advisory Service," but this has to be updated. This is not clear.

7. Metering

No information provided.

8. Cost per capita

According to Annexture III

Piped - urban Rs 150 = $15

- rural Rs 100 = $10

Standposts

- urban Rs 25

- rural Rs 1[illegible]

Higher figures are reported in Annexture V for ongoing and new projects. In metropolitan areas, the cost is reported to be Rs 592 per capita and in other urban areas it is Rs 254 for systems with house connexions. It is not clear whether the figures reported in Annex III are for piped or non-piped systems, but because of the big cost differential shown they are probably not piped. Also why is there such a big difference in cost between metropolitan and other urban areas?

9. Water Tariff

No information on policy, according to paragraph 23, the water rates range from Rs 1/1000 gal. to Rs 3/1000 gal. These revenues are too low to recover much of the costs even for operation and maintenance.

It is not clear how the revenues are collected.

10. Development Financing

Internal (Urban) one third grant from Central Government through annual budgetary allocations.

" one third loan from Provincial Government. (No information on interest rates and payments).

" one third contribution from individual local authority, but local authorities often cannot raise the money let alone servicing the loan.

Rural 100% in grant by Central Government

External - No specific information given but Annex V mentioned that "large projects are picked up by various International and Bilateral Agencies".

11. Manpower Training

There is no organized training available for operating staff.

12. Data Availability

Information system is inadequate. Data on costs of development, operation and maintenance are not reliable.

13. Legislation

Information not provided.

14. Principal Constraints

- Financial constraints (i.e. low allocation in the National budget despite high priority given).
- Capabilities of operation and maintenance of local authorities not adequate.

C. SEWERAGE

1. Institutional Responsibility

As for water.

2. Coverage and quality of service

1977 7.7% of total population covered by waterborne sewerage comprising 23% in urban areas and 2% in rural areas.

Projected 61% of urban population by 1983)
10% of rural population by 1983) water borne sewerage

3. Level of service

Very limited service is provided and no information on public facilities versus house connexions ..... etc.

4. Per capita sewage production

Not mentioned. Information probably not available.

5. Water pollution control

No information.

6. Standards for Design/Criteria and Construction

See water supply.

7. Metering

See water supply.

8. Cost per capita

According to Annex V, waterborne sewerage cost is Rs 400 for metropolitan area and RS 256 for other urban areas.

9. Tariff

No information provided.

10. Development financing

See water supply.

11. Manpower and Training

See water supply.

12. Data Availability

See water supply.

13. Legislation

See water supply.

14. Principal constraints

See water supply. Apparently sewerage is given a much lower priority.

D. GENERAL REMARKS

The report is fairly informative, however it does not follow the suggested WPRO outline. A number of important information has not been presented as illustrated in the following:

1. General economic data and income which could be related to sector allocation, ability to pay and tariffs.
2. Information on water resource surveys and water allocation.
3. Co-ordination of activities of agencies active in the sector (i.e. PHEU, PWP, Municipalities etc.)
4. National policies on service level, quality of service, design criteria, standards of quality, surveillance, metering, water tariffs and sewerage charges.
5. Legislation concerning water collection control.
6. Information on borrowing and bank interest rates.
7. Data presented on cost per capita appear to be unreliable.
8. No reference to the sector study of 1976 carried out by WHO/IBRD. It would have been very helpful if the author tried to up-date that report or to indicate which items of the recommendations have been implemented. Evidently not much has happened since the sector study was completed.

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ANNEX 4-H

20 September 1977

PAPUA NEW GUINEA

Ref. Paper prepared by Mr Colin Brett
National Waterworks Authority, Konedobu

A. GENERAL

1. Population (total)

Present - 3 million
1971 - census taken
1986 - projection given for urban centre only

2. Population distribution

Not given, except that in 9 urban centres ranging from 120,000 in the capital of Port Moresby to 3,500 in Rabaut. The total population for these 9 centres = 296,700 estimated in 1977. This roughly makes up about 10% of the total population and accordingly rural population would make up 90%.

3. Public Health and Economic Aspect

Waterborne diseases are endemic with high incidence of dysentry and gastro-enteritis.

No information on economic aspects and income.

4. Water Resources

No information, except that many rural communities use rain water.

5. General planning policy

None. Work is done on an ad hoc basis.

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

- Financial organization controlled by Finance Department
- Promotion of project by field officers
- Operation responsibility local councils
  (Insufficient information)

2. Coverage and quality of service

- There are no accurate statistics
- The estimated coverage for urban centres is between 100% for the capital to 1% for Kavieng

- The quality of service varies from "very good to fair" owing to poor maintenance and power fluctuation
- There is no information on projected coverage or targets

3. Level of service

- No information provided

4. Per capita consumption

700 - 250 l.c.d. The higher figure is in the capital.

5. Quality standards and surveillance

- Reasonable quality - WHO standards are attempted.

- Water quality is monitored by Health Department - generally on weekly sampling basis.

6. Standards for design/criteria and construction

- No information but apparently non-existant
- Design practices are largely based on Australian practice

7. Metering

It is implied that some metering is practiced but no further information

8. Costs per capita

No accurate figures are available, however following figures mentioned

- Urban from K 235 to K 180 per capita (i.e. US$ 294-225)
- Rural as low as K 10 per capita (i.e. US$ 12.5)

9. Tariff

No information provided, except system for Port Moresby is run on business lines and some local Government Councils act as revenue collectors

No information on rural supplies

10. Development financing

Urban
- funds are mainly provided from Central Government up to 50% in grant
- local Council provides the remainder. It is not known from what source

Rural - no information

11. Manpower and training

Inadequate - most professional and technical staff are on short-term contracts

12. Data availability

Not organized

13. Legislation

Minimal, with only water ordinance for Port Moresby

14. Principal constraints

1. Lack of a planning policy
2. Lack of information on water resources?
3. Lack of appropriate institutional responsibility
4. Lack of fund generating capacity
5. Lack of basic information and planning data
6. Lack of appropriate legislation
7. Difficulties in communication and access to outlying areas

C. SEWERAGE

1. Institutional Responsibility

Same as for water supply.

2. Coverage and quality of service

- There are no accurate statistics
- Piped sewerage is available between 60% of the people to 0% in the urban areas. Piped sewerage is non-existant in rural areas.
- There is no information on quality of service
- All waste water systems are overloaded

3. Level of service

No information provided.

4. Per capita sewage production

Not provided.

5. Water pollution

No information on the magnitude of the problem, except that pollution from sanitary wastes and some mining reach the streams.

6. Standards for design/criteria and construction

As for water supply.

7. Metering

As for water supply.

8. Cost per capita

No accurate figures are available.

Urban sewerage - about K 120/capita (i.e. US$ 150)
Rural sanitation - as low as K 10/capita

9. Tariff

Generally about K2.70 per month. It is not known how much of the costs are recovered.

10. Development financing

Presumably as for water supply.

11. Manpower and training

As for water supply

12. Data availability

Not organized.

13. Legislation

Minimal, except Public Health Ordinance concerning sewerage and septic tank regulations

14. Principal constraints

As for water supply.

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D. GENERAL REMARKS

A fairly informative document which follows the WPRO outline, except for the exclusion of annexes. There are also several important information which have not been presented. These may well be due to their non-availability. Examples are:

1. General economic information which could be related to ability to pay and income generation.
2. Information on water resources, surveys and allocations
3. Information on institutional responsibility
4. Information on general planning policies, priority setting, levels of service, tariff setting.
5. Regulations on borrowings and Bank rates of interest
6. Generally insufficient information on the rural sub-sector

Rev. 14 October 1977

THE PHILIPPINES

Ref. Paper by Dr. Angel Alejandrino and
Mr. Carlos C. Leano, Jr.

National Water Resources Council and
Local Water Utilities Administration
Manila

A. GENERAL

1. Population total

1970 - Census (probably taken there)
1975 - 41.8 million
1990 - 65.0 million ; 2000 - 84 million (projection) growth at 2.6 to 2.0%.

2. Population distribution

1977* Urban 38%* (i.e. 16 million inclusive of Manila in which approximately there is a third of this population.)

*Rural 71%

NOTE: 70% RURAL AND 30% URBAN IS A MORE ACCURATE FIGURE, IN ROUND NUMBER

3. Public Health and Economic Aspects

Waterborne diseases including cholera and typhoid are endemic in the Manila Metropolitan Area. No economic information provided.

4. Water Resources

A National Water Resources Council (NWRC) is in existence since March 1974. It is the co-ordinating body of all water resources development activities with "quasi-power of penalty imposition". It is not known what surveys have been carried out.

5. General Planning and Policy

Not described.

NOTE: EACH AGENCY PERFORMS ITS OWN GENERAL PLANNING AND POLICY OF IMPLEMENTATION BUT TO AVOID OVERLAPPING OF PROGRAMS INTER-AGENCY CONFERENCES ARE HELD.

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

There is no single national agency in charge of overall planning and programming.

NOTE: (THERE IS NOW A STUDY TO ENTRUST IN ONE AGENCY THE OVERALL PLANNING AND POLICY FORMULATION, SPEARHEADED BY NWRC.)

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*According to Sector Study Report 1975 population included 29% urban and 71% rural for a total population of 42.5 million since the two figures shown add up to more than 100% these cannot be considered accurate.

At the Central Government level six agencies are involved:

(i) Metropolitan Water and Sewerage System (MWSS)
(ii) Local Water Utilities Administration (LWUA)
(iii) Bureau of Public Works (BPW)
(iv) Environmental Sanitation of the Department of Health (DOH)
(v) Department of Local Government and Community Development (DLGCD)
(vi) The National Economic Development Authority (NEDA)

Rural Water Supply is handled by the DLGCD.

NOTE: BPW IS ALSO INVOLVED IN RURAL WATER SUPPLY AND SO ARE OTHER AGENCIES, BUT TO A LESSER DEGREE.

2. Coverage and quality of service

Present (1975)

* 43% of the country's population benefit from potable water supply
** 51% of the urban population benefit from potable water supply
33% of the rural population benefit from potable water supply
82% coverage in the metropolitan of Manila with piped water
23% of the country's population has piped water (house connections?)
** 56% of the urban population has piped water
8.6% of the rural population has piped water

With the exception of Manila most urban and rural water supplies are inadequate and unreliable. Two thirds of water produced is not accounted for.

NOTE: *38% SHOULD BE THE MORE CORRECT FIGURE

**THE BASE OF 51% INCLUDES PROVINCIAL URBAN CENTERS OF POPULATION WHILE THE BASE OF 56% IS NATIONAL URBAN POPULATION IN CHARTERED CITIES ONLY, INCLUDING METRO MANILA, A SMALLER BUT MORE DEVELOPED BASE.

Projected (Year 2000)

*** 75% of the country's population (i.e. 63 of 83.4 million)

No information on a break-down of urban and rural coverage

NOTE: 75% OF THE POPULATION IN THE SERVICE AREA IS A TARGET SET. THE TARGET IS NOT DEEMED HIGH AS DEVELOPMENT OF PROVINCIAL URBAN CENTERS OF POPULATION ARE GIVEN PRIORITY.

3. Level of service

Not discussed.

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* Another part of the paper (page 8) mentiones 38% ?
** These figures are obviously not right.
*** The basis of these figures is not known. Large funds will be needed and the WDO/IBRD Sector Report questions whether sufficient funds can be generated based on existing sanitation.

NOTE: SERVICE IS GENERALLY INADEQUATE, QUALITY AND QUANTITY WISE. WATER SERVICE, THROUGH PUMPING VARIES FROM 3 HOURS TO 12 HOURS A DAY IN MANY CASES.

4. Per capita consumption

- Metropolitan Manila 235 l.c.d
- Other urban 115 l.c.d
- Rural 25 l.c.d

5. Quality Standards and Surveillance

Control is exercised only in the Manila Metropolitan Area and a few of the urban centres. It is not known whether the Ministry of Health plays a role. A national quality standards was drafted in 1963.

6. Standards for Design/Criteria and Construction

There is a pressing need for developing national standards.

NOTE: LWUA IS NOW DEVELOPING STANDARDS FOR ALL WATERWORKS SYSTEM AFFILIATED WITH IT. THESE STANDARDS ARE BEING PREPARED IN CONSULTATION AND COORDINATION WITH MWSS.

7. Metering

Not mentioned.

NOTE: ON THE PART OF LWUA, IT PROPOSES 100% METERING OF ALL WATER CONNECTIONS IN ALL WATER DISTRICT AND PROVIDES FINANCIAL ASSISTANCE TO ACCOMPLISH THIS. WATER DISTRICTS ARE RESPONSIBLE FOR AND OWN THE METERS.

8. Cost per capita

P 300 to P1,000 (i.e. $40 to $135) for urban areas
Up to P 200 (i.e. $27) for rural areas

9. Water Tariff

For urban areas tariff should cover "full cost recovery". It is not known whether this is implementable and no information provided on the tariff range, method of collection, ability to pay, etc.

Subsidize by Government. Partial recovery of cost-thru socialized pricing.

10. Development Financing

- Central Government contribution through LWUA, MWSS (basis and priority setting not mentioned)
- Self-generation - not explained
- Local borrowing - basis not mentioned
- External financing, which amounts to 50% of total.

For urban areas "the current policy is no government subsidy". It is not clear how and who establishes such policies.

NOTE: UNDER THE WATER DISTRICT CONCEPT (LWUA-SPONSORED), PROVINCIAL WATERWORKS WOULD BE DEVELOPED ON A SELF-SUPPORTING BASIS. LWUA PROVIDES TECHNICAL AND FINANCIAL ASSISTANCE (LOANS). LOANS WILL BE PAID BACK FROM WATER REVENUE. THIS POLICY IS ESTABLISHED BY LAW - PD 198, AMENDED BY PD 768.

Sector allocation inclusive of sewerage amount to about 4% of the national development funds.

11. Manpower and Training

There is a definite shortage of trained manpower in all respects. This has been virtually neglected in the past.

LWUA is promoting manpower development.

12. Data Availability

This is lacking and recently the National Water Resources Council has been engaged in developing an appropriate data system.

13. Legislation

Presidential Decrees established various agencies mentioned under B.1.

14. Principal Constraints

1. Lack of sufficient number of trained manpower in all areas of the sector.
2. Lack of sufficient financial resources.
3. Lack of adequate information system, including consumption and other design factors, costing, etc.
4. Need to streamline institutional responsibility.
5. Need for co-ordination on the higher planning level, in order to determine priorities.
6. Lack of quality controls and surveillance.
7. Lack of standards for design and construction.

C. SEWERAGE

1. Institutional Responsibility

- As for water supply; there is no single national agency.

- It is not known who handles rural sanitation.

2. Coverage and quality of service

Present (1977)

10% of the country's population through piped systems. Only minimal progress since 1909. This is primarily for the Manila Metropolitan Areas and Zamboanga City.*

10% of country's population have flush/water sealed toilets. Does this mean they are served with piped water?
48% of the urban population has modern flush/water sealed toilets.
7.9% of rural population had modern sanitation? Not defined.
This is certainly not a piped system.
Existing system totally inadequate.

Projected (2000)

** 50% of the total country's population is to be provided with public sewerage, and
70% of the Manila Metropolitan population to be provided with public sewerage.

*The WHO/IBRD Sector Report mentions six major cities and a 1% figure.
**The basis of these figures is not known.

No information on a break-down of urban and rural coverage, except that "assistance is being envisaged for the rural communities up to the year 2000".

3. Level of service

Not discussed.

NOTE: AT PRESENT ONLY METRO MANILA AND PARTLY IN ONE OR TWO CITIES ARE ENJOING SEWERAGE SERVICE.

4. Per capita sewage production

No figures were reported.

5. Water pollution control

Water pollution is on the increase as apparently no control has been initiated.

6. Standards for Design/Criteria and Construction

As for water supply.

7. Metering

As for water supply.

8. Cost per capita

"Slightly higher" than for water supply?

9. Tariff

No information provided.

10. Development Financing

Presumably as for water supply?

11. Manpower and Training

As for water supply.

12. Data Availability

As for water supply.

13. Legislation

As for water supply.

14. Principal constraints

As for water supply.

D. GENERAL REMARKS

An information document which follows the suggested outline, except for the Annexes which have not been included.

A number of important information has not been presented as illustrated in the following:

1. General economic information which could be related to ability to pay and tariffs.

2. Information on water resources surveys and allocation.

3. Information on the general planning policies, priority setting, levels of service requirements, metering, tariff setting, and sewerage charges.

4. Information on borrowing and bank rates of interest.

5. Discrepancies in data presented on population coverage and the basis for projected future coverage is not given.

6. Generally insufficient information on sewerage and rural sanitation, including institutional arrangements.

7. No reference to the 1977 WHO/IBRD Sector Study. Some of the figures do not agree, particularly on service coverage and sewerage.

4 October 1977

REPUBLIC OF KOREA

Ref. Paper by Mr Hae-Kyu Roh
Ministry of Construction
Seoul

A. GENERAL

1. **Population Total**

1975 - 35.281 million growing at 1.7% per annum

2. **Population Distribution**

1975 - Urban - 20.004 million, i.e. 56.7%

Rural - 15.277 million, i.e. 43.3%

3. **Public Health and Economic Aspects**

- High incidence of water-borne diseases
- No information on economic situation as might reflect ability to raise revenues.

4. **Water Resources**

- No information is provided

5. **General Planning Policy**

- No information is provided especially on how to relate national development to sectoral planning.

B. COMMUNITY WATER SUPPLY

1. **Institutional Responsibility**

- Not clearly spelt out, although it is noted that the "laws prescribe that water supply and sewerage shall be constructed by the local governments with approval of central government (Ministry of Construction)." It is also noted that "the central government will construct the integrated water supply system, and supply drinking water to cities and towns." Thus, the division of responsibility is not clear. Also it is not clear who plans the systems and who operates and maintains them.

2. Coverage and Quality of Service

Present

Urban - 172 cities have water supply system, with intermittent service in some of these communities. These comprise 75% of urban population; several communities have no piped water.

Rural - 10,317 villages have "simple piped" water supply comprising 30% of total rural population. No information on quality of services.

Future

- The goal for combined urban and rural piped water supply is to achieve 60% coverage by 1981.
- All rural areas with 20 households or more are to be supplied with "simple piped" water by 1981.

It is not clear how these goals are set.

3. Level of Service

Present

Urban - It is not clear what percentage is served with direct house connections.

Rural - No information provided

Future

- No information

4. Per capita Consumption

Total Average - 188 l.c.d.

Urban - 220 l.c.d.

Rural - 84 l.c.d.

5. Quality Standards and Surveillance

Bacteriological, chemical and physical quality standards for raw and drinking water are listed.

Quality examination is carried out by local government.

It is not clear how and what facilities are used.

Ministry of Health and Social Affairs establishes methods and testing items. It is not clear if they are empowerd in anyway.

6. Standards for Design/Criteria and Construction

- No information provided

7. Metering

- No information provided

8. Costs per capita

- No information on true costs except $6.00 per capita is allowed apparently for planning purposes. This is too low for urban supplies if related only to the served population.

9. Water Tariff

"All costs except system expansion are considered in setting water charges."

Different charges set for different uses.

No other specific information were provided.

It is not clear how revenues are collected but apparently these are still mixed with general requirements.

10. Development Financing

For urban - (1977-81) = $433.228

$364.868 million (i.e. 84.22%) from national resources

$ 68.360 million (i.e. 15.78%) is external resources

The total expenditure represent a 3.87 fold increase over 1971-75 period. It is not clear how funds are allocated and what percentage of the national expenditure do they make.

The mechanism of allocation is not clear, and government loans amount to 60% of total construction cost; if so what interest rates?

For rural

Information were provided for 1972-76 amounting to $20.548 of which $16.798 from national resources. No mention of WFP funds amounting to over $24 million. Government subsidizes 90% of total construction costs. This contradicts finding in WHO/IBRD Sector Study Report.

11. Manpower and Training

"Manpower is not sufficient". Central government is planning training.

12. Data Availability

Data on water supply systems and operation status from the cities are collected by the Ministry of Construction and integrated every year. It is not clear how effectively the system works and what sorts of data is available.

13. Legislation

A 1961 promulgated water supply law gives responsibility for construction to local governments with the approval of central government, i.e. (Ministry of Construction). It is not clear whether the law specify responsibility of Health Ministry and whether it spells out government subsidies, etc.

14. Principal Constraints

-Financial constraints owing to heavy dependence on national resources
-Need to streamline institutional responsibility
-Inadequate information system
-Inadequate manpower development
-Inadequate surveillance

In addition the WHO/IBRD Sector Study Report of 1975 mentions the following:

-Lateral communications at central government level is inadequate and unwieldy
-Planning and execution of water supplies is carried out in isolation of local authorities
-Ministry of Health input is inadequate especially in assisting and supervising and operating piped village water supplies.

C. COMMUNITY SEWERAGE

1. Institutional Responsibility

- See water supply

2. Coverage and Quality of Service

Present

Urban - No conventional sewerage system exists. Only 7% are equipped with water flush toilets. 93% are served by conservancy vaults and night soil. "combined sewers" convey flushed water, sullage and septic tank overflow affecting 68% of urban population. Apparently this is discharged without treatment. However, night soil is provided with some kind of treatment.

Rural - Utilize latrines, or privies of various designs.

Future

- No information provided except that a newly planned City of Banweol is to be provided with a separate sewerage system. A master plan for wastewater treatment will be developed in 1978. It is not clear whether this will be on a national basis.

3. Level of Service

Present

- Absence of piped sewerage system with proper house connections (Insufficient information on nature of "combined system").

Future

- No information

4. Per capita sewerage production

- No information

5. Water Pollution Control

- No information except that sewage is presently discharged without treatment. It is therefore concluded that water pollution is a big problem.
- See item 2 above.

6. Standards for Design/Criteria and Construction

- No information is available

7. Metering

- See water supply

8. Costs per capita

- No information on true costs except $1.08 per capita is allowed apparently for planning purposes. This is an extremely low figure if related only to the served population.

9. Tariff

- No information provided

10. Development Financing

For urban (1974-75)

- A total expenditure of $21.393 million is mentioned of which $19.102 million is from national sources.
- See comments on water supply, item B-10. Government subsidizes 50% of total construction costs.

For rural

- No information provided

11. Manpower and Training

- As for water supply

12. Data Availability

- No information is provided

13. Legislation

- A 1966 Promulgated Sewerage Law - no details provided

14. Principal Constraints

- In addition to the water supply constraints, there is not sufficient priority given to this sub-sector.
- Legislation on pollution control not fully enforced.

D. GENERAL REMARKS

1. A fairly informative report which however could have been more informative if it was related to the WHO/IBRD sector study. The report generally follows the suggested outline, but the information is somewhat too brief. In this connection not enough information was provided on economic aspects, water resources, planning policy and goal setting, service levels, design criteria and other standards, actual unit costs, tariff collection and legislation and sector responsibility.

2. In some cases data is unverifiable as far as can be obtained from the WHO Sector Study. For example:

(i) Section 2 C mentions that 68% of the urban population is served with "combined sewer". The combined sewer according to the Sector Study Report are open ditches carrying storm drainage and sullage water and in some cases septic tank overflows and hence may not meet standards for safe collection of waste.

(ii) The per capita costs in Section 2 E "Investment" are highly questionable as these are very much on the low side. The Sector Study Report gives a figure of $7/capita for rural water supply only.

(iii) The "Government Subsidy" mentioned in Section 3 C is not in line with the findings of the Sector Study Report. The latter mentions that subsidies were stopped after 1965. It is also understood from the Sector Study Report that a considerable amount of contribution is made directly by the people themselves.

3. It would have been far more useful if the author could have reported on which items of the recommendations of the Sector Report have been implemented over the past year.

THAILAND

Reference Paper by Mr P. Phisphumvidhi
Bangkok Metropolitan Waterworks Authority, Bangkok

A. GENERAL

1. Total Population

According to the National targets, the population target is stated to be reduced from 3 % per annum in 1976 to 2.1 % by the year 1981. This corresponds to an increase from the population of 44 millions in the year 1976 to 44.85 millions in the year 1977. The projected populations are provided in Annex 1.

2. Population Distribution

Urban - 25 % of total population living in urban areas. Close to 40 % of the urban dwellers are concentrated in Metropolitan Bangkok area. The remaining 60 % are distributed among 118 municipalities and 291 Sanitary Districts.

Rural - 75 % of total population scattered in 45,120 villages, 49 % of which with population less than 500 and 97 % less than 2,000 persons.

3. Pubic Health and Economic Aspects

Water-borne diseases are of high prevalence. These are considered of first priority. 75 % of population is engaged in agriculture contributing approximately 28 % of the GNP. Per capita GNP rising and in 1974 amounted to $ 300 . Income disparities between

rural and urban areas are substantial especially in the North Eastern region.

4. Water Resources

River sources are normally used for large water supplies while ground water are used for providing water in small communities. Substantial information are available on these resources but not enough on ground water exploration. Concerning with the legistration, some actions have been initiated through the Water Resource Planning Sub-committee of the National Economic and Social Development Board. It should be noted that Ground Water Act has been promulgated since July 28, 1977.

5. General Planning Policy

Water supply and sewerage are treated as sub-sector of public utility sector, During the Fourth - 5 year national development plan, it is estimated that 33 billion Baht or 8 % of the central budget be provided for the sector of which 7 billion Baht is allocated for water supply. In the urban sub-sector, goals are apparently set on basis of population to be served. Priorities in the rural sub-sector on basis of request from villages, willingness to contribute or to share costs, water resource availability which is cost related.

B. COMMUNITY WATER SUPPLY

1. Institutional Responsibility

Basic responsibility lie within the government.

Urban - The Metropolitan Water Works Authority (MWWA) for Bangkok.

- The Provincial Water Supply Division (PWSD) of the Public Works Department in the Ministry of Interior with its 6 regional office.

Apparently the MWWA is responsible for planning, design construction, operation and maintenance. PWSD has similar responsibilities but may also grant concessions to Municipalities and Sanitary Districts.

Rural - Rural Water Supply Division of Ministry of Public Health responsible for piped schemes serving 19 % of rural population (i.e. pop. 1000 - 5000).

- Five other government agencies are involved in the non-piped rural water supply.

2. Coverage and Quality of Service

(1976) - Urban - Metropolitan Bangkok, 63 % are supplied with piped water, and a large expansion project is underway. Other urban areas, 25 % are supplied with piped water in 226 communities. Total urban population served is 41 % of urban.

The quality of services is generally adequate, i.e. pressure is adequate and water is mostly available over 24 hours.

Rural - Piped supplies cover 22 % of the rural population in 1194 villages with population 2000 - 5000. The quality of services is not always satisfactory due to varying

quality, i.e. intermittency and inadequate maintenance.

The non-piped rural supplies cover 16 to 19 % of the rural population. Quality of service is also not adequate.

Many hand pumps are out of order.

Future

Urban by 1981 - The target is to provide water to 50 % of the total urban population (i.e. an increase of approx. 11 % of current total coverage). For the urban areas the increase will be from 25 % to 31 %.

Rural by 1981 - The target for the piped supply is to increase total rural coverage to 25 %

The target for the non-piped schemes is to out pace the population increase of this group by a ratio of 2.4 to 1.

Therefore more than the present 19 % will be served.

3. Level of Service

Population in 1976 approx.	44 million
- Urban population 25 %	= 11.1 million
Pop. in Metropolitan area	= 3.9 million
Outside Metropolitan area	= 7.2 million
- Rural population 75 %	= 32.9 million

House connections in metropolitan area serve about 63 % of total population which cover 2.45 million, the remainings use water from stand pipe and natural water. Piped water outside metropolitan

area can serve only 25 % of population, the remainders use water from non piped water supply and other sources.

6.3 million or 19 % of rural population are supplied with piped water.

4. Per Capita Consumption

Urban	Metropolitan area	450 - 500	litres/cap./day
	Outside metropolitan area		
	population 5,000 and under	120	"
	population 5,000 - 25,000	160	"
	population 25,000-50,000	200	"
	population over 50,000	300	"
Rural			
	Sanitary District	80	"
	Other Communities	50	"

5. Quality Standards and Surveillance

Metropolitan Water Works Authority produces water from treatment plant according to WHO water drinking standard; ground water in some area have problem with high mineral contents. Surveillance is adequate for distribution system investegation. The other agencies provide water supply according to their own standards which differ from each other. Now, National water drinking standards are under preparation by Thai Industrial Standard Organization.

6. Standards for Design Criteria and Construction

Urban

	Metropolitan Area	Outside Metropolitan
1. Design Period	30 years	10 years
2. Consumption	450-500 litres/cap./day	120-300 litres/cap./day
3. Sedimentation	1.5 hours	4 hours
4. Filter Loading		
present plant	120 m^3/day/m^2	120 m^3/day/ m^2
new plant	300 m^3/day/m^2	
5. Clear water reservoir	-	25-30 % plant capacity
6. Distribution System:		
residual pressure	10 m. min.	15 m. min.
7. Distribution System capacity:		
average to maximum daily flow	1:1.2	1:1.5

Rural

1. Design Period	Plant 10 years
	Distribution 15 years
2. Consupmtion	80 litres/cap./day for Sanitary Districs
	50 litres/cap./day for other communities
3. Maximum pumping day	15 hours
4. Average pumping day	10 hours
5. Maximum daily demand	15 average day demand
6. Total storage	70 % average day demand
7. Elevated storage	20 % average day demand
8. Minimum pressure	15 m.

7. Metering

Urban - House connection are generally metered but many are out of order.

Rural - A few villages have meters installed.

8. Costs per Capita

Average for Urban	
- Metropolitan area	$ 57/capita
- Outside metro.	$ 14.8/capita
Average for rural	$ 10/capita

9. Water Tariff

Urban - Policy to develop self reliancy.

In Metropolitan area, the progressive rates are used as follows.

Consumptions per month	rate/m^3(฿)
0 - 6 m^3	free
6 - 12 m^3	0.50
12 - 25 m^3	1.00
25 - 50 m^3	1.50
50 - 200 m^3	2.00
over 200 m^3	2.50

Meter maintenance fee of ฿ 3.50/month for domestic consumption will be added on top of water cost.

Flat rate of ฿ 2.00 per m^3 is used outside metropolitan area.

Connection charges vary between ฿ 1000 - 2000 per household.

Rural They are supposed to cover operation and maintenance. They are determined by each village. Flat rate are generally applied at ฿ 5 - 10 per month per household.

Households using public taps pay no charge.

10. Development Financing

Urban

Metropolitan area - financial for on - going projects during 1977 - 1980 consume ฿ 2,265 million from National resources and ฿ 1,365 million from external resources. In 1977 - 1981 the new projects need ฿ 2,238 million from National resources and ฿ 1,065 million from external resources. The external resources for on - going projects are loan from World Bank and Asian Development Bank at interest rate of $7\frac{1}{4}$ % and $7\frac{1}{2}$ % respectively.

Fourth plan projects (1977 - 1981) for other water supply agencies are provided about ฿ 3,900 million. No information available for external resources portion.

11. Manpower and Training

For urban supplies - manpower is generally adequate with exception of those needed for specialized work, i.e. leak detection, surveillance and meter repairs.

For rural areas the problem is to improve management of manpower utilization. Some local training is needed for technical level personnel.

12. Data Availability

Metropolitan Water Works Authority seem to have adequate data for future planning and design. They have fairly good system of data record and collecting. They also have survey team for water used studying.

The other agencies have data available only for piped water, it is seriously lacking in the rural area served by the non piped water supply.

13. Legislation

The legislations which are already promulgated are

1. Raw Water Canal Act. (MWWA)
2. Ground Water Act.

14. Principal Constraints

Urban - Planning has over developed production capacities at the expense of distribution particularly outside metropolitan Bangkok.

Need to improve surveillance

Need to give further consideration to ground water utilization

Need institutional streamlining and to improve management in operation and maintenance

Need to review and optimize design criteria

Need to develop reliable information system

Rural - Need to improve planning and consider low cost solution.

Need to improve personnel utilization.

Need to streamline institutional arrangements.

Need to improve surveillance.

Need a good information system and a more adequate design criteria.

C. COMMUNITY SEWERAGE

1. Institutional Responsibility

Urban - Bangkok Metropolis Authority

- Other areas, rests with the urban communities

Rural - The Sanitation Division of the Ministry of Health is responsible.

2. Coverage and Quality of Service

Present

Urban - There is no water-borne sewerage in the country. Bangkok is the first community now planning a sewerage system. Combined conveyance of storm drainage and sullage are found in some communities and mostly rely on individual waste disposal facilities (i.e. latrines, cesspits, septic tanks, etc.)

Rural - Mostly sanitary lartrine programme being persued by 1975, 30 % were served by water sealed latrines and 85 % of these are in use.

Future

Urban - As a first stage, 25,000 in Bangkok will be getting a water-borne sewerage system in the next five years.

Rural - By 1981, 69 % of the population is to be provided with water sealed latrines.

3. Level of Service

Present - See item 2 C above.

No information as to whether sanitary latrines to serve individual homes or a group of houses in the rural areas.

Future - No information.

4. Per Capita Sewage Production

- No information

5. Water Pollution Control

- It is a major problem in view of the lack of severage especially in metropolitan Bangkok.

6. Standards for Design/Criteria and Construction

- No information

7. Metering

- See Water Supply

8. Costs Per Capita

- No information on piped sewers. Pit latrines, cost about ฿ 200/unit.

9. Tariff

- None existent

10. Development Financing

- National Government allocates 0.2 % of total national development budget.

  Villagers contribute labour and furnish superstructure for latrines.

11. Manpower and Training

- General lack of experience in urban sewerage.

12. Data Availability

- Not available

13. Legislation

- No information provided

14. Principal Constraints

- Very low priority given and lack of funds.
- Need strong legislation and legislation enforcement.
- Lack of strong institutional linkage with water supply.
- Need manpower development and data base.

ANNEX 5-A

Document No.1 (Rev. 1)

WORKING GROUP ON PRE-INVESTMENT PLANNING
FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

Sponsored by the Asian Development Bank and the World Health Organization (WPRO)
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ORGANIZATION AND MANAGEMENT IN PRE-INVESTMENT PLANNING FOR WATER AND SEWERAGE

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THE ORGANIZATION AND MANAGEMENT OF PRE-INVESTMENT PLANNING FOR WATER AND SEWERAGE

Harold R. Shipman

INTRODUCTION

The information presented in the reports submitted for the ADB/WHO Working Group Meeting on Pre-investment planning by the countries in attendance are useful first steps in the process of supplying water and waste disposal services to the peoples of those countries. However, the plans which will finally emerge from the approaches discussed in this paper will be of use only to the extent that they finally result in facilities which provide safe water to people, and collect and dispose of their waste in a sanitary manner. Five or ten year plans showing goals and objectives, costs and implications are very important to help national planners reach decisions on budgetary requirements and to be able to assess impact on national development. In most cases such plans in themselves will not provide a sufficient justification for the release of funds. The targets set and the funds allocated for each year's program have to be translated into engineering plans for selected cities, towns and villages, and the means by which the systems will be constructed and operated spelled out before final decisions can be taken. Only then are funds likely to be released. This is the process known as pre-investment planning.

This paper is in two parts. Part I together with annexes will discuss the national water/sewerage development plan with emphasis on some of the important elements which enter into the preparation and analysis of such plans. Part II discusses the execution of the plan, putting particular emphasis on project identification and project development.

PART I

The Preparation of Five to Ten Year Plans for Water Supply and Waste Disposal

I. Pre-Investment Planning Defined.

1.1 Pre-investment planning may be defined as all work which has to be carried out prior to the decision to commit funds for a project and which provides the information required to reach a decision on whether the investment should be made. It is apparent that if a donor agency is interested only in providing funds simply because the purpose for which the funds will be expended is thought to be good, there is little compulsion for pre-investment planning. Thorough project preparation with full understanding of objectives, developmental contributions, and feasibility will always be required by governmental agencies and international investment institutions interested in knowing where it is that a country is moving in each of its sectors and what contribution the concerned investment will make to national development.

1.2 Using the foregoing definition, pre-investment planning can be interpreted to mean all the events which transpire from the time a government decides it wishes to put together a development plan for water and/or for waste disposal, until the last pipe is in place on the penultimate project included in that plan. The inclusion of the work of putting the last pipe in place as part of pre-investment planning is best understood when it is seen first, that investment is not fully committed until installation of the last pipe has begun, and second, that planning is a continuing process which takes account of everything done in the past, of where things are in the present, and what effects these have on the future. These help the country to predict obstacles and permits it to adjust its goals

and approaches to accommodate these experiences in the plans to follow.

II. The Organization and Management of Plan Preparation

2.1 The preparation of National plans and programs for the provision of water and sewer facilities to meet specified goals for the medium and long term must involve a number of separate governmental agencies and departments each of which is essential both to the framework of the plan and to its successful execution. In the water and waste sector, preparation is more complicated than in most other sectors because there are actually at least four sub-sectors which must be considered. These are urban water, urban sewerage, rural water and rural sewage (excreta disposal). In this report when using the terms water and sanitation, it will be meant water, sewage and excreta disposal.

2.2 Countries engaged in preparation of a plan for five or ten years to cover each of the sub-sectors will commonly have to call on not one but sometimes five, six, or more separate governmental departments or agencies in order to reflect the resources which the country is presently using to administer its activities.

2.3 A national water and sewerage sector plan covering a period of five or ten years requires action on at least two levels, the sub-sector level and the composite sector level. The agency or agencies responsible for a sub-sector will have to prepare their plans, hopefully according to prescribed uniform criteria and guidelines, and the national planning body will then have to consolidate their individual plans into a master plan.

2.4 At the outset, government must designate one agency, committee or Task Force to be responsible for producing the plan.

It must also be given the authority and the resources to exercise this responsibility. If it occurs in any country that either for political or legal reasons it is not feasible to consolidate all the sub-sector plans and all agency proposals into one master plan, this should not be allowed to stand in the way of proceeding separately as long as the central planning or coordinating agency is convinced that the plans are compatible and do not result in unwarranted costs in money and manpower. The coordinating agency should also insure that uniform policies are followed where separate agencies perform similar functions. For example, if seven agencies working in rural water have seven sets of policies with regard to community contributions for water systems, it becomes difficult to insure efficiency and good management. At least some communities are likely to be discriminated against.

3. What period should the plan cover? It can be said that with water and sewerage, five years into the future is the present. Those who work with the planning, design and construction of such facilities well know that it is unusual to be able to deliver water or to connect to a sewage system much earlier than five years after planning was first started. More commonly, it is seven or eight years. These is much to support 10 year plans for water and sewerage. Some of the reasons for this will be discussed later but one of the most obvious is that of manpower development. Any action to build manpower will just be getting well established by the end of five years from the time initiated.

III. The Planning Agency

3.1 At least three situations appear to exist with respect to national planning responsibilities within the 14 countries represented at this WHO/Bank meeting. The first is reflected in countries such as Indonesia, Burma and Afghanistan where an established national planning agency exists and where it appears that a means is provided for consolidating and coordinating each of the sector agencies in the preparation of the plan. The second situation is that where there is no central planning agency, or at least no agency which actively stimulates national planning, and where each sub-sector agency has customarily done its own planning to the extent that budgetary justification is provided. An example of the latter is Fiji and Nepal. Other countries such as Thailand, the Philippines and Pakistan have National Development Banks, Economic Development Authorities or central units which appear to have sector planning interests but where it is difficult to know from the information provided to what extent they can or desire to officially act in the formulation of medium and longer range water and sewerage plans.

3.2 Lack of information on the remaining countries coupled with some uncertainty on the framework for planning which they employ prevents a further classification breakdown, but it is believed they would broadly fall into one of the three categories mentioned above. In the following paragraph some proposals are offered in connection with each of these three situations for the stimulation of thought and possible activity of the working group.

IV. Sector and Planning Agency Responsibilities

4.1 The objective of all water and sanitation planning agencies during the next year should be to establish a unified plan for the sector which has the endorsement of government and which, if implemented, will lead to the greatest number of people to be benefited by the end of the plan period. This objective should be the same irrespective of whether the country has a national planning agency or whether the planning is done by local or national sub-sector agencies and consolidated by means of a committee or task force.

4.2 For countries having Planning Agencies, immediate action should be taken following this meeting for preparation of a five and ten-year consolidated plan for the sector. For countries without a central planning agency, the representative attending the Manila meeting should carry responsibility for arranging an informal meeting upon return home. For countries where the framework is uncertain, the representative to the Manila meeting should calrify local views upon return and should help in reaching a decision on who is to carry responsibility for the next actions. In all these cases, resources are available if requested, from WHO, the international banks and others for assistance in overcoming the initial problems of launching the planning effort.

4.3 The following actions reflect one approach which may be suited to certain of the countries and which can be modified to the extent necessary to reflect differences in authority to take certain actions which vary between countries.

V. Specific Actions to be Taken

5.1 A high level committee (Planning Committee) needs to be created on which the head of each of the sub-sector agencies

involved in water and sanitation is represented. If there is a planning agency, it should act as the chairman and secretariat of the Committee, and if there is no planning agency, a chairma should be selected and a secretariat created. In either event, professional personnel knowledgeable in the water and sanitation sector need to be permanently assigned to the secretariat and the committee given the authority and resources necessary to carry out the work.

VI. The Elements of a Water and Sanitation Plan.

The Planning Committee should immediately begin work. There are several ways that it can proceed, but in each of the place where the first action occurs is in data collection and consolidation of information. This is followed by analysis of future needs, evaluation of alternative goals, and a determination of the implication associated with each, including the institutional and policy issues. This process is commonly referred to as a Sector Study. Certain of the considerations involved in the work on each of these items is discussed in Annex I.

6.1 The Sector Study - Prelude to the Plan. The Planning Committee should immediately arrange for the completion of a sector study, or for the updating of previous studies if they are more than two years old. This can be done in several ways, but only two seem suited to the 14 countries represented in this region. One is through the creation of several task forces and from the sub-sector agencies concerned in the country, and the other is through use of specialized teams brought in to work with each of the sub-sector agencies. The end result

should be the same. Each of these two approaches is briefly discussed as follows:

A. The Task Force Approach

The Planning Committee under this approach does the Sector Study itself by creation of a number of Task Forces, each with a specific term of reference and a firm timetable to be met. Among the areas to be covered, at least the following will require action:

1) A data collection and tabulation task force with authority to work with the demographic agency, with governors, mayors, water department heads and others capable of providing information and data on past and present status of water and sewerage services throughout the country. It should project the numbers of people to be served each year of the plan and should establish a series of alternate targets to be achieved by the end of the plan period. It should work with the other task forces in translating these alternate targets into financial and manpower requirements.

2) A task force whose function it is to set forth criteria for the costing of the program reflected in the plans. Among the items to be covered by their criteria will be: levels of service to be provided (house connections, public hydrants, distances); per capita costs or other basis for establishing cost estimates for facilities to be built; standards and design criteria.

3) A task force to evaluate institutional implications of the plan and to establish recommendations on changes needed, if any, in the organizational structure to permit design and construction schedules to be met and to permit proper operation, maintenance and management of the facilities. This task force should also establish the manpower requirements of each of the alternates and evaluate the recruitment, development and training requirements of each. It should establish a cost estimate for the manpower and training requirements demanded by each of the alternate targets.

4) A task force to study financial policies and to recommend the approach best suited to the financing of the plan, year by year. This task force will also take account of national financing constraints, consider possibilities for local and external funding, and funds likely to be generated by operations of the water utilities. It will present in its recommendations a schedule of funds required per year and sources from which it is proposed to supply them. The policies believed necessary to insure repayment of all borrowed funds and to cover the costs of operation and maintenance should be presented.

5) The high level Committee should establish a timetable for completion of the work of each task force and for the sequence of actions required to implement the plan carrying it through to completion.

B. The Sector Study Team Appraoch

Experience gained from two countries that employed the Task Force approach explained above, has shown that the timetables were not met and that problems were encountered because of shortage of experienced personnel to carry out the work required in addition to other duties from which they could not be spared. Consequently, with all of the shortcomings associated with bringing in an outside team to help do the Sector Study, this seems to be the method of choice. Such teams can be arranged in several ways, one being through a request to WHO. The country should make a substantial input to the study by attaching as many staff from its sub-sector agencies as possible. The external team should be given as much guidance as possible in what targets the government feels it wishes evaluated. The Planning Committee should be actively involved at all stages of the study and should take the data and preliminary conclusions of the team for use without waiting for a final report. It is believed that the raw information provided may in many cases be adequate to permit the Planning Committee to reach broad judgment and to proceed on to the next action. Experience shows that to prepare and present a final report by the best of Sector Study teams is time-consuming and can extend to well beyond six months after completion of the field work.

VII. Plan Adoption

7.1 Upon completion of the work of all task forces on the Sector Study team, alternate targets should be presented to the Planning Committee and a decision then taken on the one believed

achievable and within the resources which can be made available. The recommended goals together with the requirements for achievement should then be presented by the Committee to the national policy making body for official approval and adoption.

7.2 It may be that further modification will be required to the plan based on the policy body's comment. It should be stressed that the final plan needs to be officially adopted and in a form where any who are interested in providing support, either internally or externally, can do so with full understanding of the targets set and the means for achievement.

VIII. Mobilization

8.1 Following adoption of the Plan, mobilization should begin and the process of project identification and development are discussed in Part II of this report, initiated.

IX. The Timetable

9.1 A Critical Path diagram has been prepared and is attached as an Annex. This shows a number of the key events in the process of planning and implementation of a five-year program in water and sanitation. It is necessarily over-simplified, but it does underline a few of the key decisions and actions which every county will confront if it decides to do something to improve water and sewer services for its people in the next decade through a unified and greatly expanded effort (see Annex II).

PART II

EXECUTION OF THE PLAN

This part of the paper covers those pre-investment activities which occur after a country has prepared and adopted a 5 or 10 year development plan. It will discuss the processes by which the figures shown in the development plan are converted into projects.

X. Project Identification and Project Development

10.1 The plan framework defines the approximate magniture of work to be done each year of the plan. By whatever means the goals are definied, these have to be translated into numbers of systems to be constructed, expanded, and extended. The cities, communities, and areas have to be selected in which the facilities will be built; a preliminary judgment has to be made about the type and extent of the facilities needed for each, including a very rough cost estimate and a ranking by order of priority established. This is the process commonly referred to as "project identification". In this senge a project refers to one particular city or community. It is possible later to combined individual projects into one large one for financing and construction.

10.2 The carrying out of the engineering and feasibility studies, of establishing the costs, of designing a financing plan, of determining how the construction will be carried out, of who will manage the project after construction, of what policies will be followed, and how the funds borrowed will be repaid, all of these make up the process known as "project development".

XI. Project Identification

11.1 Project identification is the first step of the project cycle. It leads into preparation of the project and to its subsequent appraisal and construction. Most design is flexible and costs are variable at this early stage of the project cycle, and the investment planner has thus maximun influence.

11.2 Project identification involves determining which investments are sufficiently high priority to be taken up first. Four actions are to be

taken. The first is to see whether the subsector into which the project falls, and the project itself, are of high priority for development and are so recognized in the development plans. The second is to ascertain that the project is technically feasible and whether it appears that it can be undertaken at a reasonable cost commensurate with the expected benefits. The third is to determine whether the city or community is interested in having a project and what steps it is willing to take to help itself. The fourth task is financial and aims at exploring whether a viable financing plan is possible for the investments considered.

11.3 Subsector Priorities

There seems little doubt that differences exist in almost every country between the priorities assigned to various subsectors. This is evident in the country reports which without exception accord higher priority to urban water than to rural; to urban water than urban sewerage; to urban sewerage than to rural excreta disposal. This conclusion is drawn on the basis, first of the number of people with and without service, and second of the amount of money proposed in the plan for future works. Whether this pattern will be accepted by many who are proposing patterns for development believed best for the countries is outside the scope of this paper to debate. Nevertheless, the pattern of priorities seems to have developed unknowingly within the countries and probably reasonably reflects the importance with which both people and their officials have viewed the needs. In preparing the plan, and in its later execution, decision will be needed on the respective resources to be committed to each subsector.

11.4 Technical Feasibility

At the time of project identification it is common to find that no engineering has been done on which to base judgments on feasibility and cost. Experienced staff will be able, nevertheless, to decide after a brief on-site visit, whether there may be unusually costly, and particularly complex engineering problems to be overcome. They can also gauge the risk involved where uncertainties exist. Finally, they will have to make judgments that affect the selection and if it is found after the detailed studies are advanced, that the judgments were wrong, it may be necessary to delete the project or at least postpone it in the planned sequence.

11.5 Community Interest

The selection of communities, villages, and cities and the establishment of priorities has frequently been attempted as a highly scientific process. While the effort needs to be applauded, it is likely that the most effective means of deciding which systems should be built first will be public demand as measured by a town's or city's willingness to help itself. Of the various criteria employed by the Inter-American Development Bank for priority determination of villages in rural schemes of Latin America, the one which has proved most successful has been the one of community interest demonstrated by the communities' willingness to contribute funds and labor for construction, and its agreement to pay all costs of operation and maintenance. There is merit in selecting projects at the beginning of a large program which will be simple and will likely encounter the fewest problems. This is desirable because it gives experience to contractors and staff, it builds confidence, and it keeps the workload at a lower level during the period when operations are just beginning. Success realized on early projects is important to gain official and public support. It makes later projects easier.

11.6 It has been argued that priorities established by expressions of interest as demonstrated by a city's or village's willingness to help cover capital and operating costs may cause communities to be passed over who are in great need but too poor to help themselves. While this weakness has to be continually kept in mind, there do not appear to be too many examples of where this has occurred. On the other hand, the number of systems built which soon failed because of lack of community interest and community attention are scattered everywhere.

XII. Economic Aspects of Priority Setting

Certain economic criteria may be used in the project selection exercise. As with some of the other criteria, the usefulness of such information is dependent on its accuracy. One of the more common screening tests for comparison of projects is the use of per capita costs, defined as the overall investment cost per additional person served by the system. Whenever such per capita investment costs are calculated, they should if possible distinguish between the quantity and quality improvements and service levels to existing consumers. This will prove difficult in many instances and if not possible can be disregarded. However, the per capita investment costs criteria may be quite useful for identifying some projects where overinvestment is clearly evident.

12.2 Another means for comparing the priority of different subprojects is to calculate the investment cost required to supply an additional unit of capacity. Under such a method one simply divides the present value investments, or in cases with similar construction profiles the overall investment costs, by the additional system capacity provided under each scheme. Such comparisons are often made when comparing different bulk schemes to produce more water.

12.3 Still another method used to rank different production schemes is to calculate a unit cost per volume of water produced.

12.4 Of the different numerical methods discussed above the one where the economic choice of the different alternatives is based on the cost per unit of additional production capacity is the least satisfactory and should generally not be used. This is because it does not take into account the rate at which the additional production capacity will be used up. A blind application of this method would often favor the scheme that adds the largest production capacity as there exists substantial economies of scale for water investments.

12.5 The other two measures, namely per capita investment costs, and average incremental costs both have their strong and weak points. Both focuss on the ultimate user and increased coverage but neither accounts for the rate at which deman may catche up with the investments proposed. This deficiency can be overcome to a fair extent by separating clearly the investment costs per capita for say production, treatment, and distribution. It is further corrected by using conservative projections for people to be served and by judicius staging to avoid too much excess capacity at any time.

12.6 The third measure, the unit cost per volume of water produced has the same shortcomings that cost per additional units of capacity has. It is not possible to know what water volume will be produced at the time project selection is made. Also number of people who will use the water will not be known with more accuracy than for the per capita method.

12.7 In practice as data are usually scarce at the time of project identification the measure most widely used will be the per capital investment cost. It may be useful in certain circumstances to calculate the additional investment cost per new connection to be made in situations where the supply will be based on individual service connections.

XIII. Practical Considerations for Project Identification

13.1 At times the administrative inertia of arranging financing and administrative approval for projects may be such that it is preferable to advance works that optimally should not be constructed until after some years so as to be able to include them with the priority works. This aspect may be particularly relevant when international financing is involved. By the same token it may not be feasible with a continuous investment program for construction reasons especially if investments are to take place in geographically

isolated regions. There may also be savings associated with lower startup cost for contractors which may justify including lower priority works together with high priority projects.

XIV. Financial Aspects of Project Identification

14.1 The rudimentary financial analysis necessary at the time of project identification focuses on two aspects. One is to what degree the investments proposed can be recovered through user charges from the beneficiaries, another is to explore a viable plan to finance the investments during the construction period.

14.2 The issue of cost recovery is closely tied to the consumers' income levels and patterns of expenditure. In general it may help to undertake a socio-economic study to see what the payments capacity of the beneficiaries is. Unfortunately evidence to show the success of studies as accurate means of predicting behavior when the water system is built, is not easily discovered. The problem is that people do not readily tell strange interviewers, how much money or other remuneration they receive. The average payments capacity has been assumed by some to be around 3 or 4% of gross income for water supply.

XV. . General Comments on Project Identification

15.1 In connection with all of the screening mechanisms discussed above, it will likely happen in every selection process that insufficient information will be available to permit a ranking by priority of all projects required to be built in the period of the plan to meet the goals set. Decision on all the uncertain projects should be delayed until studies are completed or sufficiently advanced to supply the information needed. In effect, this will mean that all projects which cannot be classified for lack of enough information will be given a low priority and only moved up when the data obtained justifies it.

15.2 Projects having been identified for at least the first two or three years of the plan, need to be placed immediately into the preparation phase. The last chapter of this paper refers to this process.

XVI. Project Preparation

16.1 Project preparation is the final activity in the pre-investment process which leads to the point where someone commits funds and the decision is taken to proceed with construction.

16.2 Much has been written on project preparation and the various elements which must be covered to ensure that the project is sound, is justified, is least cost, and will meet the many tests which financing agencies usually apply. While it is true at the moment, that projects for which external funds are to be requested, require more pre-investment work than those completely financed locally, it is to be hoped and expected that as country sector organizations become better staffed and are able to develop projects at local level for appraisal and funding by central agencies, the same type of data will be required and essentially the same methods employed.

XVII. Criteria for Appraisal

17.1 Criteria and type of information commonly employed for appraisal of

water and sewerage projects by many international and some bilateral agencies can be grouped as follows:

The Technical	The Organizational
The Financial	The Managerial
The Economic	The Commercial

17.2 All pre-investment work should take account of each of these areas. Some additional comments are offered on two of the areas above because they are commonly overlooked. One concerns the commercial and the other manpower development and training which is usually implied when evaluating management.

17.3 The Commercial - The pre-investment work should look particularly into the strategy and the means for developing local consulting engineering resources to reduce reliance on external services for simple works.

17.4 Manpower Development and Training - Because of its importance to each of the 14 countries at the pre-investment meeting in Manila, and because it is critical to every water and sewerage organization in every country, a training plan should be a part of every project presentation. It should be covered in all pre-investment planning. The project should show what actions will be taken, when they will be taken, how they will be financed and administered, who will be trained, and how this training program will be made a continuing operation.

17.5 Hopefully in the not distant future all international investment institutions will make the manpower and training criteria a fundamental part of project appraisal. Countries should include plans and solicit funds to implement them on every project initiated hereafter.

Annex 1

SOME ELEMENTS IN THE ANALYSIS OF WATER AND SANITATION PLANS

Planning Agencies, Planning Committees and Task Forces having responsibility for preparation or evaluation of all or part of a five or ten-year plan in water and sanitation may find the comments presented in the following paragraphs of some help in carrying out this task. The items discussed are by no means comprehensive.

I. Targets and Goals

One of the important actions to take at the outset of work on the plan is to define the objective and to do so in a manner which permits measurement and evaluation of performance at any time. At first glance this seems simple - the objective being to serve people with water, or to see that they have sewer service. The problem stems from the terms "serve with water" and "to have sewer service." A definition suited to an urban area will almost never be the same for the rural. Some of the questions requiring answers when the objectives are established, include the following:

a. Water - For urban and rural areas. What does water service mean? Is it house connections, connection to courtyards, or public hydrants? How far must a house be from a standpost before it is considered not served - 50, 100, 200, 500, 1,000, or more meters? Will distance used for urban definitions be the same for rural? Does a hand pump qualify as

water service?

b. Sewerage - Urban. What constitutes sewer service? Is it connection to a public system or does a water-flushed private system also qualify? In a city if part of the houses use vault latrines or water seal units, how are these classed? Will they be made a part of the facilities included in the figure for setting and measuring goals? Does the fact that most are privately financed make any difference? If the answer is no, does the same reasoning apply for water?

c. Rural Excreta Disposal - Since few countries will install public sewer systems in rural areas, facilities will consist either of houses with water flush systems employing their own disposal arrangements or houses with bore hole on vault latrines or modifications of them. Each country will have to decide whether all units will be lumped for statistical purposes and the basis established on which costs will be estimated and assembled for the plan. Many latrines are not constructed in a manner which meet reasonable health requirements. Should these be included in the figures showing the present situation?

How should goals be defined? The country reports received from Korea, Pakistan, Fiji, Thailand and Burma show that goals have been defined in terms of number of people to be served and then converted to percentages. Each country will need to clarify its

service objectives as noted above. Since the final objective in the water and waste sector is to serve people, the means of defining the goal used by these countries can be fully justified. It has one serious shortcoming, however, which is that when numbers of people are converted into numbers of systems, total costs may be quite different from those reached by multiplying gross numbers of people by per capita costs.

Goals defined by volume of additional water to be supplied, or by capacities of units for treatment ztorage, transmission, and distribution will permit much more accurate cost estimates but the analyst will not know whether the facilities are properly sized and what number of people will benefit. It is also next to impossible at an early planning stage to know what cities, and villages are to be selected, and what types of systems and what sources will be involved.

It is likely that targets defined by number of people to be served, and cost estimates reached by applying per capita costs to these numbers will be the best approach available in situations where precise data are lacking.

For rural systems, where single wells, or standard systems will be provided, the number might show communities and cost per community rather than people. However, it would be desirable to give some indication of numbers of people to be benefited as well.

Each sub-sector agency engaged in preparing development plans should employ the same means for defining and measuring goals.

A set of guidelines should be prepared and given to all on methodology, plan period, and other aspects of the planning process.

One of the results of the work which goes into plan preparation is the development of a series of alternative goals from which one can be selected best suited to the country's economy, its political and social objectives, its ability to implement, its culture, and its manpower. It will likely be true in nearly every country that one set of goals tested and found suitable for one sub-sector will not prove feasible for another. This should be considered normal. See for example the difference between urban and rural percentages of people to serve in 1987 in the Thai and Burma reports. The goal proposed at the World Water Conference in Argentina in 1977, is that by 1990 all people should have access to a safe and convenient supply of water. It will be useful as part of each country's planning process to use this goal as one of the alternatives even though it will be unrealistic for many to achieve. It should give some interesting figures for government officials to consider.

II. The Evaluation of Alternate Goals

The objective of an analysis of several sets of alternative goals is to identify all of the problems and factors which will be encountered and which must be known in advance to permit a well considered decision to be taken. One of the problems frequently confronting the decision maker is demonstrated by a review of the country reports presented at this meeting. The following

comments should not be taken as criticism of the reports since they contain the information asked for. The point which come out, however, is that if certain of the reports are selected by one not familiar with that country and he is asked whether the goals are sensible, the answer has to be that you don't know. To reach a judgment and to then take a decision requires information considerably beyong the financial costs and the number of people that it is proposed to serve. Some of the questions which need to be answered in any plan if decision makers are to have the information required, include the following:

a. Is the plan tailored to the capacity of the water and sewerage agencies to implement, or is it virtually impossible, even if the funds are made available, to carry the work load required. Is the financial commitment implied by the plan so large that it represents many times the levels appropriated up to now. If so, can the planners defend the large increase?. If so, how? Does the plan offer any proposals on how a change in financial policies will reduce the demand on central budgeted funds?

b. Are the facilities even if built on time and of good quality going to be operated, maintained and managed properly and can it be expected that the investments made will continue over the years to benefit the localities affected.

c. Is the scheduling of work per year optimum for recruitment and training of manpower and for proper utilization of the existing staff of the responsible organizations?

d. What are the policies which will be followed vis a vis community participation, tariffs, personnel and management responsibilities, and on project selection?

Does the plan have an adverse effect on other sectors and will it make a sufficient contribution to the country's development to justify the cost?

Additional elements of the various alternate plans which have to be analyzed, and which should be fully explained in the proposal include the technical and design factors to be employed, the organizational and managerial considerations, and the commercial, legal, and political aspects. None of these are sufficiently explained in the country reports, that a decision can be reached on the soundness of the proposals. It would also be useful to indicate the general means for establishing priorities and making selections of towns and cities where construction will take place.

III. The Commercial Factor

The technical, financial and certain economic elements of the five or ten-year plan while touched on here are presented in separate papers for this meeting. The commercial factor needs to be mentioned to the extent that it should take account of availability, or potential availability, of locally produced supplies

and equipment for water and sewer systems. Another concern needing attending is that of engineering services. Can they be developed locally to minimize use of foreign consultants on the small and medium sized cities and on the straightforward engineering of large cities, or must developing countries rely on imported service for the life of the plan?

IV. The Political Factor

The political factors will not be discussed in this paper since this is the province of national officials and those with a knowledge of government, public reaction, and public relations. It is of great importance to understand the political implications when considering policies which are sensitive and which may create undue public reaction. The best of technical and economic practices is of little use if poticially unacceptable approaches are proposed.

V. The Organizational and Management Factor

However good the plan, if the organization and management of the sub-sector agencies are not good, project identification and development will be delayed, construction will not take place on schedule and within cost estimates, and systems will not be effectively operated and maintained. Looking at the various organizational arrangements prevailing in the 14 countries represented in the Working Group, it is apparent that no two have the same structure.

It is inevitable that organizations will not and cannot be the same where geography and size of countries differ, where

governmental philosophy and structures are not the same, and where the resources of qualified personnel for planning, designing, contracting operating, maintaining and managing sanitary facilities are present in differing amounts. It is also unlikely that an organization to serve a municipality will be the same as one for a national urban program; or that one suited for urban operations will be good for the rural. For urban management there are some characteristics which good organizations seem to have in common and which if not present will probably cause problems in the achievement of goals. Many of these characteristics are dependent on the autonomy and authority vested in the organization. For example, every organization should be able:

a. To maintain separate accounts.

b. To hire, promote, discharge, and compensate personnel according to merit and performance.

c. To adopt regulations andrules covering operational matters concerned with maintaining the systems in a safe and sanitary manner, functioning in a sound manner, and insuring good service to all customers under arrangement which are in the public interest.

d. To permit the manager to make decisions and carry out policies free from interference in all day to day operational matters.

e. To retain earnings for reinvestment in the system.

f. To raise rates according to prescribed criteria whenever changes in salary scales, chemical and power costs change.

g. To own and dispose of property.

h. To enter into contracts for the purchase or sale of property; to engage professional service; and to purchase supplies and equipment.

i. Have the power of eminent domain (the power to expropriate land and obtain right of way when in the public interest).

The evaluation of whether the existing organization or organizations working in the water and sewerage sectors have the authority and the managerial ability to carry out the plan, is one of the important judgments which must be made before making the decision on whether to accept the plan. Changes to the legal statutes and charters may be required to insure that authority is clearly defined.

VI. Manpower

7.1 A good organization will permit good management if the staff are experienced and competent. This is one of the problems which most water and sewer organizations face, particularly if the country is moving into a five or ten-year development program for water and sewerage which will require ever increasing numbers of staff to handle an increasing workload.

7.2 As part of the planning process, a manpower table should be established which presents year by year the number and types of personnel needed. The output from this table should go to those responsible for the financial details of the plan to permit in-

clusion of the costs of such staff in the plan.

7.3 A study should be initiated as part of the pre-investment activities to determine how best to train the needed personnel, and how to provide a continuing mechanism for upgrading existing staff. The means by which this training plan will be financed and how it will be administered should become a permanent part of the plan.

VIII. All of the foregoing information is considered essential for decision makers and ought to be included in any pre-investment study. To the extent that certain details will be lacking or available to only a limited extent, judgment will have to be reached or the voice of experience and common sense. The degree to which facts can be replaced by judgment will have to rest with those who commit funds or who have to stand responsible to the problem.

Document No. 2

WORKING GROUP ON PRE-INVESTMENT PLANNING
FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

Sponsored by the Asian Development Bank and the World Health Organisation (WPRO)
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FINANCIAL AND ECONOMIC APPRAISAL: MANAGEMENT AND ADMINISTRATION

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Introduction

1.01 In introducing this paper I do not think I can do better than quote selectively from paragraphs in a World Bank publication.[1]

"Many lessons have been learned since the first loan in 1961. The most important lesson is that lending in this sector is more difficult than had been expected. Although there is nothing intrinsically difficult about the sector, most borrowers have been poorly organized and elementary principles of public utility management have not been observed. Local and national government officials had first to be persuaded of the need for the fundamentals of good project planning such as thorough study of technical alternatives, design criteria ..... financial planning etc. Then the studies had to be organized and carried out before the project could be appraised. Thus delays have been common, both before and after loans were signed ..... Institutional improvement is much more difficult to achieve than engineering improvement.

"Experience suggests that, with some important exceptions, local officials and water managers are less accustomed to using modern economic, financial and management methods and are more exposed to direct political pressure than in higher levels of governments and in other public utility sectors.

"To correct the negative bias towards the sectors in many countries, which reflects in large degree inadequate appreciation of the importance of water supply and sewerage, the Bank is exploring how best to initiate studies to help illuminate public health benefits, price and income elasticity and other characteristics of demand for water and sewerage services in member countries.

"Research. The most pressing problem is to develop criteria for allocating scarce funds among competing projects in this sector. Progress toward this goal depends on developing better measures of economic benefits, which largely depend in turn on developing better data ..... Other research objectives are to improve water demand analysis and forecasting and to identify pricing policy options for water and for sewerage."

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1 World Bank Operations: Sectoral Programmes & Policies. 1972 pp 247-8.

1.02 These paragraphs were written in about 1972. Much progress has been made in the sector since then, stimulated by loans from the World Bank, I.D.B., the Asian Development Bank and other agencies. Despite this progress the diagnosis remains substantially true today and, indeed, is likely to remain so for some years to come.

1.03 It is understood that there is a considerable back log of applications for assistance affecting the water supply and sewerage sector and funds available to satisfy a significant part of them, year by year. The problems of pre-investment planning remain despite the development of improved techniques, particularly as affecting the financial and institutional aspects.

1.04 In this paper I shall refer to the more important stages and the more important techniques in pre-investment planning and appraisal and shall proffer some suggestions for debate by the Working Group.

The Initiation of Proposals

2.01 It appears that specific proposals for schemes in the sector reach prospective lending agencies in two ways. In some cases the lending agency may be involved in a non-committed way at an early stage. Where this happens it can follow the progress of the investigations and use its influence to ensure that a project will be prepared in a way likely to assist when later a financing decision has to be taken.
In other cases the investigation of a project will have been undertaken with little or no contact with a prospective lending agency, on the instructions of the Government concerned or under the sponsorship of other organizations. In due course the lending agency will find itself confronted with an application for financing a particular scheme.

2.02 In either event the lending body must apply its own criteria to the project presented to it. It must satisfy itself as to the engineering feasibilities and cannot afford to neglect possible alternatives. It must assess the scheme in the light of the finance available, not only for lending but also as to the availability of national funds. It must have regard to many aspects perhaps not fully examined by its sponsors of the project or by the consultants they have employed.

2.03 Experience does establish that, all too often, the proposals of consultants are not acceptable to a lending agency. This might stem from their terms of reference or it may be due to the propensity of consultants to propose the "best" scheme from an engineering point of view but to the disregard of financial constraints about which they might not have been adequately briefed.

2.04 In these circumstances the lending agency finds itself obliged to question basic elements in the proposals and explore the possibilities of cutting out parts and of examining alternatives. Frequently the demand estimates are questioned. Inherently demand estimates are very difficult to formulate and therefore they are vulnerable to criticism; one suspects that they are often overstated.

2.05 The financial exposition in consultants' reports is often elaborately presented but has had little regard to the essential criterion of the financial resources likely to be available. This may not be the fault of the consultants but may be due to inadequate briefing or inadequate consultation. If a scheme has to be curtailed the financial appraisal has to be undertaken again of course. But frequently there are other reasons for a lending agency to revise the entire financial analysis.

2.06 Reports on the institutional and management aspects are not always well thought out. This again may be due to lack of guidance or because there has been inadequate liaison with the authorities in the country concerned. The elaborate management reports by separate consultants that sometimes accompany the proposals are of limited use at the pre-investment stage. Usually they could be deferred until a lending decision has been taken and as a condition of it.

2.07 The foregoing remarks may appear to be critical but the sole purpose in making them is to enter a plea for a closer liaison with a prospective lending agency in the early stages, a liaison which can never imply the promise of a commitment but which at least should ensure that the preparation of reports will, as far as possible, be on lines that will facilitate the lending agency's appraisal of a project. It is believed that this would make a worth while contribution to more expeditious progress and avoid some misunderstandings and disappointments.

The Demand for Water & Sewerage Services

3.01 The estimates for future demand for piped water supplies (which in turn determine the sewage flows) is the key factor in any engineering scheme and a vital factor in both economic and financial appraisals of it. Unfortunately it is one of the most difficult elements to formulate except where the project is for an extension of a well established and comprehensive system of public water supply, for which reliable data should be available. In other cases it is the lack of reliable information that presents the major problem.

3.02 At the root of it lies the difficulty in forecasting population growth. This is common to developed and developing countries but particularly difficult for the latter because of their high rates of population increase and rapidly improving mortality rates. The population projections will be the key to the demand assessments but are a factor, too, in the forecast of earnings and thereby in the assessment of ability to pay.

3.03 The simple mathematical projection of past trends in population growth can be wholly unreliable and must always be suspect. Indeed, they should be rejected.
A great deal of work is being undertaken in most developing countries on the subject of population projections and also by international organizations. Inherently speculative, this work provides the best possible source of data on which to rely.

3.04 It is sometimes suggested that demand estimates may not be vital because if an estimated demand does not materialise in year "x" it will assuredly develop by a later year "y". In justification of a particular scheme of works this is plausible. But the effect on economic and financial appraisals can be dramatic.

3.05 This is no solution to this problem but in relation to sector schemes it is vital that the fullest use should be made, by consultants and others, of the best data available from government and other sources. One suspects that in the past this has not always been the case.

Economic Appraisal of Water & Sewerage Schemes

4.01 I distinguish between economic appraisal and financial appraisal, attributing to the former a consideration of those factors that affect the economy of a country in its broadest sense. On the one hand it imports "cost" as involving a use of limited resources though not necessarily in conventional financial terms (e.g. where commodity prices are affected by the inclusion of taxes, duties or subsidies or where the value of labour is affected by chronic unemployment). On the other hand, it imports economic benefits. These may be direct benefits when the availability of services directly contributes to production (e.g. water for industrial processes) or indirect where their availability may be expected to improve health standards and thereby productivity. In essence an economic appraisal is a cost benefit exercise but if the benefits are largely of a kind that manifest themselves in human satisfaction, health and happiness one enters into a misty area in which there are few guidelines. A "social cost-benefit exercise" that purports to incorporate these considerations can never be a scientific approach but is not entirely worthless on that account.

4.02 Sector schemes are entirely in this last category and any economic appraisal of them must be treated with all the implied reservations. Nevertheless, to a point where judgement must take over from analysis, they are useful and particularly so on the "cost" side of the equation. The primary element on the cost side is always the cost of a scheme expressed in its demand on resources that would otherwise be employed in alternative ways. But other cost elements come into the balance, too. People cannot live without water and must find various ways of obtaining it, and sewage has to be disposed of, by one means or another. If a public piped water supply is not available then water will be obtained, in limited quantities, by other means - by private bore-holes, wells and springs, by roof tanks and by transportation and purchase from vendors. These elements are capable of being costed within acceptable limits of accuracy, as are the costs of sewage disposal by cess pit, night soil collection and disposal and the like.

4.03 Some of the benefits can be evaluated but only the direct benefits - (a) the value of water to industry, agriculture and domestic husbandry, (b) its value in fire prevention and fire fighting and, rather more speculatively, (c) the reduction in hospital and medical costs involved in the treatment of water borne and sewage borne diseases. It might

even be possible in some cases to make a fair guess of the impact of improved health on productivity of labour, based on empirical experience elsewhere - but this is hazardous. At this point the analytical exercise should stop, but it can be useful up to this point.

4.04 It can be claimed with reasonable justification that there is substitute or proxy for any attempt at measuring the benefits of human satisfaction and that this is expressed in a peoples' willingness to pay for the benefits they will enjoy. Willingness to pay and ability to pay may not be synonymous but in the absence of compulsion they should be a fair reflection each of the other, when applied to a whole community though not, of course, to individuals.

Ability to Pay

5.01 It is not to be supposed that it is an easy matter to assess ability to pay. This is usually approached by measuring the cost to consumers as a percentage of their earnings in income categories, because of their wide range and because water tariffs cannot be adjusted to incomes, in individual cases. A judgment view is taken of what may seem to be a reasonable percentage though assistance is provided, in this respect, by the experience in other similar communities wherein the services have been provided for some time.

5.02 The most common impediment to completing satisfactory exercises of this kind is the all too frequent lack of reliable up-to-date information. Few countries will not have undertaken surveys of household budgets on a sample basis at some time, in selected communities. Indices of average earnings are likely to be available, usually spanning a range of occupations. One finds, however, that the household budget surveys are often out of date and their up-dating, in inflationary times, can involve statistical errors. Indices of occupational earnings can be helpful to a point. The true earnings of the urban poor are difficult to assess though easier for the very poor who live at subsistence level. As the contribution of the poor and the very poor towards the cost of public water supplies must necessarily be very limited, in any event, this is not a fatal defect in the statistical data available.

5.03 The assessment of the ability to pay for water supply and sewerage schemes is, I submit, a vital link in the appraisal exercises and one which seems to have been treated too superficially in many studies. Despite the shortcomings in basic data there is no good reason why the best use should not be made of what is available. The same basic data can be of great assistance as a guideline in formulating tariffs.

5.04 The ratio of payments to earnings (for water supplies) of the order of 3% - 4% is usually regarded as a satisfactory indication of ability to pay and higher percentages as tolerable in some cases. Necessarily the ratio can vary very markedly with the levels of income and crude average figures must be treated with the utmost care. For those in the upper limits of earnings the ratio may appear low yet it is precisely to this group that the advantages of the services appear to be the most attractive. The critical group are the middle income earners to whom the benefits necessarily have to be off set by other sacrifices in the deployment of their limited spending resources. A project that fails to sell itself to this group is likely to be a financial failure and certainly it will be a social failure. Likewise for the poor and the very poor: for these groups it has to be accepted that their financial contribution to the costs of a scheme has to be severely limited as indeed their enjoyment of its benefits will be determined as it is by their housing conditions. An assured supply of safe water, if only provided by standpipes, can be a great boon to them but their ability to pay for it may be minimal. A strictly "economic" approach to this aspect would be inappropriate.
These considerations emphasise the importance of well based tariff studies.

Tariffs

6.01 I use the term "tariffs" to cover charges for services in its widest extent, embracing water and sewerage rates based on the values of property supplied (if and where a system of national, provincial or local taxation is based on property values) and, likewise, charges based on measured quantities. The importance of this subject cannot be overstressed for herein may lie the financial performance of many projects. The issue of metering for domestic supplies is dealt with later.

6.02 Tariff studies need to be undertaken in depth at some stage before a project is embarked upon. A truly comprehensive study should be undertaken by the executing authority and as a condition of loan approval. Pre-investment studies cannot be expected to cover this ground in all respects but they certainly should embrace realistic exercises in this regard. Too frequently they do not, and in many reports of consultants the matter is dealt with superficially.

6.03 The main objective of a tariff study should be to ensure that the maximum benefit of a project materialises. Purely economic approaches, in a limited sense, should give way to economic and financial considerations in the widest sense and to social considerations as well. They, too, affect the overall assessment.

6.04 The availability of a water supply or a sewerage service does not have an intrinsic value, simply related to its cost, measured quantitatively. Its value to those that enjoy its benefits is conditioned by their ability to pay and must differ from household to household. Tariff formulation must acknowledge this fact, though obviously regard cannot be had to the circumstances of individual households:they can only be dealt with as groups.
This consideration prompts these issues, amongst others.

(a) Where universal metering of domestic supplies does not apply, the case for selective metering of potentially large consumers ought certainly to be examined.

(b) A related issue is that of incremental prices for quantities supplied in excess of an assessed quantity. There is rarely, if ever, a financial justification for decremental prices for additional quantities beyond an assessed limit.

(c) Where supplies are metered minimum charges should be based on a low assessment of probable usage to avoid the encouragement to extravagant consumption.

(d) Where supplies are not metered minimum charges should usually be sufficient to cover the costs of making a supply available but should be tempered where their imposition seems likely to inhibit connexions.

(e) Connexion charges, if levied at all, should be modest and never at a level that inhibits many people from applying for connexions to the public supply. Experience shows that the imposition of high connexion charges is a major inhibition to the successful fulfilment of a project, simply because many potential consumers cannot meet these initial costs. Minimum annual charges are a preferable method for recovering basic costs.

6.05 Within the domestic sector cross-subsidisation is often inevitable especially for sewerage and not undesirable. The issue usually arises as to whether supplies for non-domestic purposes - that is to say, for industrial and commercial purposes - should pay at higher rates. This is essentially a pragmatic or maybe a political issue. There may be no financial or economic justification for this form of discrimination but other considerations cannot be disregarded.

6.06 The most troublesome issue in tariff formulation is unquestionably that of metering, and it is likely to be a hotly debated issue for many years into the future.

Metering

7.01 The writer has mixed views on this subject and would certainly not wish to be emphatic. Metering of industrial and commercial supplies is essential and for all special or potentially large consumers in any category. But the metering of ordinary domestic supplies is another subject. Historical developments cannot be disregarded in exercises in pre-investment planning. In many ex-colonial countries of the former British Empire universal metering does not apply, the British practices having been adopted. In others, metering is of long standing, with various degrees of effectiveness.

7.02 The case for metering on purely economic grounds will be generally accepted. The weakness of the case, on the other hand, arises from the imperfections in its practice and of the costs involved. Domestic supply meters are costly to instal and costly to maintain. They frequently go wrong and they are easily damaged or put out of action. Meter reading and billing is expensive. Surveys show that in some large urban areas of the total domestic supply as little as 25% is effectively covered by accurate metering. The objective of metering is to control and contain waste but whether it makes a worthwhile contribution, in comparison with the cost involved, is an open issue and must depend on the circumstances of each case.

7.03 The relevance of this issue at the pre-investment stage is because it affects other vital aspects in particular, costs, tariff formulation, the billing and collection procedures and the wider issue of ability to pay. For these reasons it cannot be disregarded at the pre-investment stage though there is much to be said for leaving the options open and for the early financial appraisals to be undertaken covering the alternatives of metering and non-metering.

7.04 Most people would agree that if efficient metering can be maintained it provides the fairest method of charging for water and is also a powerful instrument in the control of waste thereby contributing to financial economies in both the short and long term. Inefficient metering is an encumbrance.

7.05 Clearly it is a most important issue that needs to be considered in depth for a new undertaking or when a new large project is imposed on a small existing undertaking. Where this is a long established history of non-metering it can be difficult to change and more frequently than not, this is not attempted. When it is to be introduced the services of experienced experts not necessarily consultants, can be of great help. The costing needs to be carefully done and the choice of meter made after the fullest enquiries and tests. A multiplicity of different types and manufactures is to be avoided. The routines and procedures need to be very thoroughly worked out, including those for routine maintenance which involves the setting up of workshops. Meters should be the property of the undertaking not of the consumer and where the metering is to be extensive the levy of separate meter rent charges, except perhaps for meters above a certain size, is best avoided. Closely related is the subject of billing and collecting.

Billing & Collection

8.01 This, too, is a subject which must be thoroughly explored in the pre-investment stages though necessarily it will evolve and give way to changes from the experience of actual practice.
It presents problems in developing countries that hardly exist at all in developed countries. In England, for instance, the half-yearly collection of water rates, in advance (metering is confined to non-domestic supplies), presents no difficulty, except as to the volume of transactions but this is adequately catered for by computer billing: collection is simple and effected largely by cheque or bank transfer:

bad debts are virtually non-existent, though recovery proceedings have to be invoked to an increasing extent. The threat of cut-off for non-payment is an effective sanction but rarely has to be used.

8.02 The conditions in a large urban community in a developing country are so very different. Monthly or two-monthly billing and collection is likely to be essential if collection performance is to be anything like satisfactory. This involves almost the perfection of procedures and routines and it is necessarily costly - but not so costly as the loss of revenue can be through default and bad debts. The keynote of good procedures is soundness, not sophistication. Simple aids for calculation etc. should be employed but never entrust the work to a computer until a manually operated system has been firmly established and operated. And even then do not just scrap the manual system. Given the right amount of instruction, clear procedures and duties the ordinary clerk can be quite an efficient operator.

8.03 It is no part of this paper to discuss various billing systems though there is scope for debate on this subject. There is always much to be learned from the experience of other undertakings and where these can help in the training of operatives, advantage should be taken of it.

8.04 Billing and collection performance, in practice, needs to be carefully monitored and frequently. A realistic approach to bad debts should be adopted. An increase in debtors soon becomes an increase in "irrecoverables". Herein lies the key to a satisfactory cash flow and thereby to the financial success of a project. The most perfect tariffs are useless if the money does not come in.

Charging for sewerage services

9.01 The emphasis in the foregoing paragraphs is on water supplies. When sewerage services are also provided and to be made the subject of a charge on users, other problems arise but their solution is not unduly difficult. There will, of course, be properties with public water supplies but not using the sewerage service but that poses no great difficulty if the basic records are accurately maintained and frequent inspection undertaken. Illegal connexions are all too common. Where water supplies are metered charges for sewerage services, based on the incoming quantities of water, will usually be appropriate with provision for minimum charges. Where metering does not apply the charges for the

sewerage service, as for water supply, will usually be based on property valuations used for local taxation. Where property valuations are not used for local taxation other methods have to be resorted to, e.g. size of property, and these may, of course, be arbitrary but, none the less, acceptable.

Charging for standpipe supplies (water)

10.01 Standpipe supplies may be of two kinds. Some such supplies may be available for a group of properties within a defined area and not generally available to the public at large. These can afford a minimum supply for the requirements of the occupants of those properties and can, justifiably, be charged for but only on the basis of a modest flat charge. Whether this is worth doing must be a pragmatic or a political decision.

10.02 Public standpipe supplies available to the public at large must necessarily be regarded as a social service and cannot be effectively charged to their users. A financial contribution from the local authority may be appropriate where this can be arranged. Otherwise, the cost of these supplies can only be absorbed in the general costs, to be met by tariff consumers.

The financial appraisal of projects

11.01 The financial appraisal of projects, in the pre-investment stage, will usually involve the preparation of a series of financial projections - in particular,

(i) of outlays in respect of the project and of capital expenditure in respect of extensions of the existing system.

(ii) estimates of income for a selected number of years on the bases of the tariffs favoured, operating and administrative expenditure, the service of foreign and local loans (interest and repayment) and the provision of surpluses for further investment.

(iii) pro forma "balance sheets", the purpose of which is to test the viability of a project over a period of years by bringing into comparison the liabilities incurred, on the one hand, and the assets acquired, on the other.

(iv) cash flow projections, as to outgoings and incomings which probably provide the most useful test of all for they should demonstrate the anticipations as to further investment.

11.02 These exercises are complementary and may indeed be regarded as separate parts of a single whole. Usually the projections should span the whole period of initial construction and seven to ten years thereafter but if the works are to be phased over a longer period the projections may need to be extended.

11.03 Needless to say, they involve several difficulties and decisions have to be taken as to basic assumptions to be used and which should always be clearly set out. Sensitivity exercises allowing for modifications in the assumption should always be undertaken. The more common problems are these:

(i) the effect of price inflation affecting capital costs (during the period of construction), operating costs and income. (See below)

(ii) the allowance for water produced at source but not delivered to consumers (Wastage in the system).

(iii) the allowance for unrecovered water etc. charges.

(iv) the valuation base for existing assets.

11.04 Ideally the exercises should identify the project itself, isolating it from the existing system. This is not always possible and would often be unrealistic to attempt: separate exercises can assess the effect of the project in relation to the existing system and its impact thereon.

11.05 The problems posed by price and wage inflation (escalation) have engaged the attention of many practitioners. Certain kinds of economic exercises can be presented in stable prices but financial exercises of the kind described cannot. Price inflation must be taken into account for assessing a lending agency's commitment and for measuring the impact on consumers. On the other hand assumptions as to the continuance of inflation at particular rates or at variable

rates can reduce the exercise to nonsense. For most projects the best precept is to allow as realistically as possible for inflation up to the end of the period of construction of the initial works and probably a year beyond. From that point "stable" prices are employed reflecting the price level estimated to obtain in that year. As to the revenue earnings a more cautious approach may be needed for it is not to be supposed that ability to pay will enhance commensurately with price levels.

11.06 None of the financial exercises - or of economic exercises in which benefits are substituted for revenues and into which other "cost" items will also be introduced - can be conclusive in themselves. (There is no magic in a particular rate of return.) They provide no single key to the test of viability: but they are very useful tools in the selection of priorities and, generally, in a comparative sense. In the final review judgment based on experience must always be applied.

ANNEX 5-C

Document No. 3

WORKING GROUP ON PRE-INVESTMENT PLANNING
FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

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NOTES ON INTEGRATION OF SECTOR PLANNING AND AREA DEVELOPMENT

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October 1977

NOTES ON

WATER SUPPLY AND SEWERAGE SECTOR PLANNING

IN THE

CONTEXT OF AREA DEVELOPMENT PROGRAMS

(October 1977)

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Views expressed in the Paper do not necessarily reflect the position of the Board or the Management of the Bank.

NOTES ON WATER SUPPLY AND SEWERAGE SECTOR PLANNING IN THE CONTEXT OF AREA DEVELOPMENT PROGRAMS

1. The urgency of providing adequate potable water at appropriate standards in developing countries has been recognized by the UN Conference on Human Settlements (May 1976) and the UN Conference in Argentina (March 1977). According to the World Health Statistics Report (1976) rural water supply sanitation is considered to be particularly poor. The importance of adopting joint programs of water resources development and community water supply has been clearly recognized in the related UN Expert Working Group Meeting held in Geneva (December 1976) preparatory to the Argentina Conference.

2. Also, at the Expert Group Meeting on Integrated Rural Development convened by ESCAP in Tokyo (February 1977), the operational guidelines endorsed by the Expert Group recognize the importance of, among others, maximum participation of the people at local level, decentralization of the decision-making process, promotion of self-

reliance and self-supporting institutions and environmental considerations. These areas are also those where the coordination of sector development and integrated rural development would be beneficial.

3. In recent years, increasing attention has also been given to the application of "appropriate" technology in devising construction methods which balance the utilization of man and machine. This approach is also one of the fundamental requirements to reduce the investment costs for water and sanitation development on a nationwide scale.

4. Area development (AD) projects may have several socio-economic objectives that vary widely from project to project, e.g.; eradication of rural poverty, increase of agricultural production and improvement of productivity, improvement of living conditions in rural areas, improvement in the quality of rural life and income distribution, rectification of regional imbalance, etc. In more physical terms, AD projects frequently provide for land development, irrigation facilities, agricultural modernization, road construction and provision of social infrastructure and services, although these activities

may have received relatively lesser attention. Land reform has played an important role in some area development projects.

5. With few exceptions, institutional arrangements are established for a specific project enlisting also the existing government agencies for implementing some of the project components. A coordinating authority is set up at the national and local levels to administer specific projects. Quite often, there seems to be no organization, however, specifically created to undertake long-range area development planning at the national level. The multiplicity of institutions involved in project implementation which is often witnessed in this context may be attributed partly to the conveniences of using the existing administrative structure with minimal changes. But, then, the absence of a strong commitment to long-range planning might have itself discouraged the establishment of more permanent arrangements. In the absence of a regional development plan, the functional hierarchical relationships among the population centers and their economic influence areas cannot be fully appreciated and their roles cannot be projected realistically.

6. The financing plan for such projects draws on resources from not only the national government but also the provincial (or state) governments; sometimes, local resources or contributions from beneficiaries are also taken into account. The multiplicity of financing channels tends to mask the scale of the problem and hinder the application of a sound financial discipline in area development. As massive resource transfer needed in area development is far greater than what most countries can mobilize, it would appear that sound financial discipline must be introduced to help generate necessary funds through cost recovery measures and to exert a moderating influence on investment costs, and also to help spread the benefits as widely as possible. From past experience, the promotion of self-reliance and self-supporing institutions has been found to be indispensable for the development of the water supply and sanitation.

7. In the absence of a permanent and broad-based arrangement, the responsibility for implementation, operation and maintenance and monitoring of projects

tends to be fragmented making it difficult to link authority with responsibility and accountability. To cite one example, project components constructed by one agency may be turned over to another for operation and maintenance while a third agency may be held responsible for monitoring; or facilities completed by one agency may not in fact become operational simply because complementary facilities which fall within the responsibility of some other agencies are not completed in time or on the scale required.

9. The lack of qualified staff is another constraint. External assistance in the form of consultant services has played a useful role in the planning and implementation stages but only in the short run. A long-range solution would call for a perspective manpower development program.

10. If more emphasis is to be placed -- as it ought to be -- on village development and on improving the living conditions of the rural poor, adequate provision of community water supply and adequate waste disposal facilities would be indispensable.

In certain cases, land-use and irrigation practices would indeed call for close coordination of the water supply and sewerage sector development and area development programs. For example, land development involving deforestation may affect the traditional sources of village water supply; or irrigation practices as they affect either the levels of groundwater or its contamination may need special attention; or, the spread of water-associated diseases such as schistomiasis generally associated with certain irrigation practices would need to be controlled; or, the disposal of effluents arising from the processing of agricultural produce may require regulation; or conjunctive use for irrigation and community water supply may be feasible. However, such measures prove to be effective only if they are expressly built into the planning process at as early a stage as possible. Similarly, the re-use of sewage effluent to augment the supply of water for crop irrigation may prove feasible; a trade-off exercise between withdrawal of natural runoff for community water supply and the return of sewage effluent for crop irrigation may be worth consideration.

11. Similarly, if regionwise planning is adopted, the pooling of administration and common facilities for operation and maintenance would have distinct advantages, such as those arising from standardization of design and construction methods for both water supply and sewerage (or sanitary) facilities, and would make possible the realization of cost-effective techniques.

12. Opinion is strongly in favor of popular participation in the decision-making processes for the formulation of area or regional development programs. Popular participation is an important element in area development planning as it would enable people to appreciate better the value of services provided and would encourage them to support area development projects by contributing self-help efforts in project implementation and cooperation in the operation, maintenance, and monitoring of projects. It would also promote the use of technology which is most appropriate to the local situation such as the use of local resources and traditional practices, wherever applicable. It would also, facilitate, through an adequate forum, the choice of levels of services acceptable to the local beneficiaries.

13. Also it may be noted that the improvement of public health frequently calls for regionwide cooperation. For example, water pollution control and management would require in fact a strict control and surveillance of wastewater discharge over an entire catchment. Another important aspect is the provision of adequate and safe water as part of the public health delivery system. Thus, an adequate forum created for area development can also provide an excellent sounding board for determining the design criteria, levels of service, financial policies, and for public health education programs to be formulated.

14. It has been generally recognized that decentralization of planning and implementation of area development projects is more effective in providing needed impetus for socio-economic development in the rural area. It is therefore reasonable to believe that decentralized regional development planning and the attendant transfer of power to regional bodies would eventually gain wider acceptance. In formulating a long-term sector development program, it would be well to take this trend

into account while planning for specific projects. By bringing the planning body closer to the people, wider public participation in the decision-making process is to be expected. Wider use of regional development approach would, among others, promote the integration of the water supply and sewerage sector development with area development as regional bodies are likely to be more responsive to the local needs and aspirations.

ANNEX 5-D

Document No. 4

WORKING GROUP ON PRE-INVESTMENT PLANNING
FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

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DESIGN CRITERIA AND SERVICE LEVEL IN PRE-INVESTMENT PLANNING FOR WATER SUPPLY AND WASTEWATER PROJECTS

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WHO Headquarters, Geneva
October 1977

WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTÉ

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C O N T E N T S

I INTRODUCTION

Purpose

This paper is intended to throw some light on a vital element of pre-investment planning for water supply and wastewater disposal, namely "design criteria and service levels". In writing this paper, the author appreciates the very broad nature of the subject and the extensive space it occupies in every textbook written in the field of water supply and wastewater engineer. With this in mind efforts were made to avoid, as much as possible, treading into material well covered in these textbooks and instead to focus on concepts and issues which the planners must deal with in the selection of the appropriate criteria. Through this exercise it is hoped to stimulate discussions which would lead to a better understanding amongst those engaged in the planning and decision making in the sector.

The Service Concept

1. Water is a saleable commodity supplied in most countries through public enterprises. Similarly, the collection, removal and disposal of spent water (i.e., sewage or community liquid wastes) is a saleable service provided also through public enterprises which in many cases perform the dual function of providing water and removing wastewater. The success of these enterprises depends highly on their ability to operate in accordance with sound business practice. This makes it imperative to be cost conscious, quality conscious and reliability conscious, i.e. in making the services continuously available under a growing demand situation.

2. To fulfil these basic requirements for success, engineered works must be based on proper planning and feasibility studies which must rely on sound demand forecasts.

The Planning Concept

3. Planning for Water Supply and Sewerage Services is a process for identifying a "least cost" way of providing the required services with built-in health safeguards while at the same time overcoming social, economic, financial, institutional and environmental constraints. As a result of such planning, "feasible" projects which must fit within the overall plan are implemented in stages. A feasible project must be based

on established needs and priorities, ability to pay for the services, ability to manage and operate such services, and of course on convincing technical studies and convincing financial recovery plans.

4. There are often different solutions with their inherent elements of uncertainties and thus the planning process becomes a process of rationalization and differentiation between the different alternatives, selection of the most suitable alternative and elimination or at best reduction of uncertainties. Such a rationalization requires an examination and analysis of past trends which are likely to influence future prediction. Planning is thus a dynamic process which must be related to a continually changing economic and social behaviour and to a changing technology. Within these constraints the planner must at the earliest stage possible identify and set values or limits to all the relevant factors, characteristics and assumptions which are likely to influence the outcome. The values or limits thus established are what the planners refer to as design criteria or more appropriately planning criteria.[1/] As a basis for service evaluation reference to these "criteria" continues well after the services have been installed.

Definitions

5. The terms "criteria" or "criterion" are often applied to mean a variety of things. According to the Oxford dictionary, it may explain "a means for judging, a test, principle, rule, canon, or standard by which anything is judged or estimated". The Webster dictionary defines "criterion" as "a characterizing mark or trait, a standard on which a decision or judgement may be based, and a basis for discrimination".

6. To the planner who has become accustomed to using the term "design criteria", the above definitions are closely linked but do not fully reflect the complex and broad nature of the many complementary or opposing factors which shape up the final product, be it a long-term plan, or a

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1/ "Planning criteria" is the more correct term to use because of the inherently broad and flexible factors involved in pre-investment planning as viewed in this paper. The term "design criteria" on the other hand implies more rigid rules and standards, as applied in the preparation of final engineering designs. Not withstanding the above, the term "design criteria" has been used throughout this paper as a matter of convenience in view of the accustomed uses of the latter term by most planners.

short-term investment proposal. When a planner speaks of "design criteria" a more communicative definition of the broad intended message is that which represents "a combination of technical, health, social, economic, financial, institutional and environmental factors which shape up the characteristic, magniture and cost of a planned system to serve the needs of the community or communities".

7. With "design criteria", the terms "service level", "standards of service", "service magnitude", "degree of service" and "programme mix" are often associated. There is no uniformity of thought as to what these terms precisely express or imply. For some planners, "service levels" imply quantitative dimensions (i.e., number of people served and quantities delivered). For others, it implies in addition to the above, some qualitative characteristics and levels of technology employed (e.g., piped water supplied through standpipes or house connections, water supplied at the source of production through handpump installations versus mechanized pumping, wastewater collection through water-borne sewerage systems versus local public toilets with septic tanks or leaching pits, etc.). Other planners apply qualitative and quantitative characteristics more liberally to include physical, chemical and bacteriological qualities of water served, as well as continuity of service (i.e., intermittent versus continuous service).

8. Most of these definitions are arbitrary and indeed some are in contradiction with the basic sanitary engineering canon of providing safe public water supply. This is particularly true when one speaks of providing intermittent water supply or non-filtered surface water as an acceptable service level. Accordingly for the purpose of this paper, the author refers to "service level" as "a degree of convenience and accessibility of the water supply and wastewater collection and disposal services provided under minimum safety requirements". Under this definition, service levels would include quantifiable dimensions such as proportions of the population relying on direct house connections versus those relying on public facilities, however irrespective of the level of technology employed as long as the minimum safety requirements are observed. Similarly, qualitative aspects of esthetic and industrial economic values can be a basis for altering service levels as long as these have no public health significance.

Design Criteria Objectives

9. Design criteria are subject to wide variations from region to region, from country to country and often even from one community to another in the same country. The selection of the most suitable design criteria must aim at ensuring the acceptance and implementation of the construction programme conceived under the project. Accordingly, the adopted solution must: (a) satisfy the community needs, while being compatible with the socio-economic and institutional needs and constraints, and (b) be technically sound and least costly amongst the various possible alternatives. To be sure, selection of the most suitable "design criteria" would not necessarily guarantee the accomplishment of the intended objective, i.e. the preparation of a "bankable project", however failure to select proper criteria will surely risk a rejection of the proposals and the loss of essential support.

II APPROACH TO DESIGN CRITERIA SELECTION

Service Level versus Design Criteria

10. As an entry to this subject, it would be helpful to arrive at an understanding as to whether "service level" should be viewed as a factor or element of design criteria or vice versa. Undoubtedly, this can be argued either way. If the service level is chosen at the beginning, then appropriate design criteria must be established for that particular service level, or mixes of service levels. When service levels cannot be chosen in advance, the planner would have to include in his studies several alternative levels of service to be presented to the decision makers. To do so, the planner must adopt specific criteria for each level of service considered. Therefore, irrespective of the approach, design criteria can be considered a function of service level and hence the discussion which follows should be viewed in that context.

Conditions of Service

11. In accordance with the above, the approach to design criteria selection is governed by the "level of service" desired against that being provided at the present. In this connexion, one of the following four conditions might be encountered:

(1) Existing services (i.e. level of service and service coverage) and planning is required to meet anticipated level of service.

(2) Existing service level and quality of service are inadequate (e.g. demand in excess of supply). Therefore, planning is required to eliminate present deficiencies and to provide for anticipated future needs, while maintaining an acceptable level of service.

(3) Existing service level, quality of service and service coverage are inadequate. Therefore, planning is required to expand service, to improve the level of service, to eliminate deficiencies in the areas presently covered and to provide for anticipated future needs.

(4) Community services are non-existant, and planning is required to determine levels of service to be provided, as well as service coverage during a phased development plan.

12. The first two conditions are normally encountered in the developed countries, however in the developing countries it is the latter two conditions which are more frequently the norm. The problem becomes somewhat simpler under the first two conditions, particularly where an information system has been developed and where a record is kept of previous plans and design criteria with historial data on past and current service performance. This helps greatly in reducing elements of uncertainty and in strengthening the rationalization process. Under these circumstances, the planner would begin by describing existing facilities, evaluating existing data and deriving conclusions which reflect past trends, as well as adequacy of past design and planning criteria. The latter is then re-examined for applicability in the next planning stage in the light of predicted future technological, demographic and socio-economic changes.

13. In contrast planners working under the third and fourth conditions face a greater challenge and more uncertainty owing to the inadequacy of the existing information system or its total absence.[1/] In the extreme case (i.e. condition (4) above), planners must rely a great deal on judgement and on planning experience in areas or regions of similar background or closely related cultural, social and climatic conditions.

1/ Examples of uncertainties include those due to natural events such as variations in the hydrologic cycle, reliability and adequacy of planning data, unanticipated changes in economic events, changes in priorities and of course new developments in technology.

Identification of Factors and Constraints

14. Irrespective of the general conditions described above, design criteria and level of service selection must be related to the following factors or constraints:

(1) Economic and financial constraints.
(2) Material resource constraints.
(3) Public health and hygienic standards.
(4) Skill availability within the country.
(5) Local customs and needs (i.e. social and cultural constraints).
(6) Legal and political constraints.
(7) Climatic conditions.
(8) Environmental and esthetic values.
(9) Soil, geological, hydrological and hydrogeological conditions.
(10) Maximization of benefits for the resources consumed.
(11) Technical constraints.

15. For a further rationalization of approach, design criteria can be grouped into five aspects which are subject to the influence of the above-mentioned factors. These aspects and the factors influencing them are as follows:

Design Criteria Aspects	Influencing Factors or Constraints
- Engineering or technical aspects	All factors mentioned above
- Public health aspects	Public health and hygienic standa·
- Environmental aspects	Environmental and esthetic values, climatic conditions, public health standards, financial and material resource constraints
- Economic and financial aspects	Economic, financial and material constraints and maximization of benefits
- Institutional aspects	Economic and financial constraints, skill availability, social and cultural constraints, legal and political constraints

A discussion of the above follows in section III.

Consultation with Authorities concerned and Prospective Financing Agency

16. After having collected and analysed available data on the factors and constraints mentioned above, the planner must discuss his initial findings with authorities concerned, obtain their views, preferences and priorities, before arriving at conclusions which can be used as justifications in support of design criteria and service level selection. In countries where there is a national authority entrusted with the overall responsibility for sector development, there may be some established policies on priority setting regarding service level, and service coverage. These authorities, therefore, should be consulted by the planner at the earliest stage possible and conflicts (if any) between their views and those of the community directly effected must be settled as soon as possible. It is equally important also to initiate an early consultation with the prospective financing agency, be it national or external, to take into consideration their conditions. Failure to conduct the above consultations will undoubtedly risk plan rejection, costly revision and long and costly delays in implementation of badly needed services.

III ENGINEERING OR TECHNICAL ASPECTS

Objectives

17. The objective of these is to design uninterrruped systems which can be constructed and operated at minimum costs while meeting (a) quality and accessibility requirements (i.e. service level), and (b) the minimum standards for safety and reliability during the life expectancy of the constructed works.

Elements of Works and Related Criteria

18. A most convenient way to consider this aspect of design criteria, is to view it in terms of the various elements of works involved, i.e.

	Elements for Water Supply	Elements for Wastewater Disposal
(1)	Source	House or property connexions
(2)	Collection works	Collectors (i.e. lateral and sub-main sewers)
(3)	Transmission	Transporters (main and trunk sewers)
(4)	Treatment works	Treatment works
(5)	Distribution and storage	Disposal work
(6)	Pumping works for elements 2, 3, 4 and 5	Pumping works for elements 2, 3, 4 and 5

19. Water supply design criteria factors include average demand or consumption rates and quality of water for the various uses (i.e. domestic, industrial, commercial, public and fire fighting), fluctuation factors (i.e. peak hourly, daily, monthly and seasonally), allowances for leakage and unaccounted for water, maximum and minimum pressure requirements, minimum storage requirements, hydraulic formulae, type of conduits as relevant to hydraulic and structural performances, working and stand-by capacities of pumping facilities and treatment works, and loadings on the various units of treatment.

20. For wastewater collection and disposal works, the design criteria factors include the water consumption rates and characteristics of wastewater to be collected from the various sources and uses, the fluctuation in discharge rates, type of conduits as relevant to hydraulic and structural performances, minimum and maximum velocities, minimum size of conduits and minimum requirements for appurtenances (such as manholes) which affect performance of the system, working and stand-by capacities of pumping facilities and treatment works, and loadings on the various units of treatment. In addition to hydraulic loading, the latter include such characteristics as BOD and suspended solids.

21. Apart from the quality[1/] factors which are directly governed by the users of the service or utility, the overriding technical consideration in establishing the above criteria for the selection of works needed are:

- capacity versus needs;
- reliability, durability and structural resistance and safety;
- hydraulic performance and energy needs;
- operation and maintenance requirements;
- availability of material in the local market and need for imports.

1/ Water quality requirements for a particular water supply system depend on the planned uses of the system. For example, if the foreseen uses are primarily for domestic purposes, a certain set of values might be adopted to satisfy the turbidity, colour, taste and odour, and hardness requirements without causing heavy financial or economic penalities to the other users (see Section IV, Public Health Aspects, below). On the other hand, if industrial uses are substantial, especially for a likely predominant industry such as steam generating plant, a lower turbidity and hardness might be justified. Such decisions often require cost-benefit evaluations of the need to provide the additional treatment for the industry by comparing the costs and benefits of providing a water softening process for the entire community system with the alternative of leaving the burden of additional treatment to industrial users themselves. For wastewater collection and disposal systems, the variation in the source and characteristics of the wastes to be collected requires an early evaluation of the cost-benefits of using a separate versus a combined system and whether to allow industries to discharge their wastes into the system without a certain degree of pretreatment.

Capacity versus Needs and Time Factor

22. The expertise of highly experienced engineers and planners is required to assess the complex issues affecting all the elements of work. In this connexion, one of the main factors to be considered is the period for which designs are to be made. To do so, the planner must consider the expected life of the structure, the advantage of economy of scale versus the economy of a smaller capacity at a time of higher interest rates, the accessibility to financial resources and financial burdens created, the time required to plan and construct the next stage of expansion and of course the likelihood of significant technological advances during the design period. 1/

23. Another highly critical factor which requires a careful evaluation at the earliest stage in the planning process is the unit water consumption rate for the various components of uses (i.e. domestic, industrial, commercial, institutional, etc). This may differ substantially from one community to another and hence, apart from the needed information on past and current service records, a knowledge of the local conditions, as reflected in the factors and constraints mentioned under paragraph 14 above, is essential in arriving at the appropriate values.

1/ Following the system analysis approach, a number of scientific papers have been written on the subject of design period and expansion capacity. This has been done in an effort to derive a scientific solution to this multifaceted problem (see item 19 of bibliography). Such studies are of interest, however they leave the door open to many questions as they contain elements of uncertainty and rely on a number of questionable assumptions, e.g. a uniform demand increase. Indeed this raises the question of whether the degree of reliability obtained justified such an approach in lieu of the time seasoned rules and rational approach adopted from past experience.

In recent years economists involved in project appraisal for financing have introduced a new approach to rationalizing the selection of design periods and expansion capacity. Recognizing the difficulties in approaching the problem through cost-benefit analysis these economists advocate the application of "marginal cost pricing" as a sensitivity method for determining when to add the next increment of expansion. This approach has not gained much in practical application for water supply and sewerage projects because of the inherent problems due to: (a) "lumpiness" or "capital indivisibility" features associated with such utility projects; and (b) the impracticability of having to change tariffs as frequently as required by marginal cost pricing (see items 17 and 18 of the bibiliography).

Realiability, Durability and Structural Resistance

24. These are related to the risks involved and probability of occurence of structural or other failures in the various elements of works. In many of these cases, international standards are applied. These are based on laboratory testing and field performance of machinery and resistance of built-up structures under different conditions and uses. In arriving at the proper criteria values, experience elsewhere must be related to the conditions and needs in the area concerned.

Hydraulic Peformance and Energy Needs

25. These are considerations affecting the selection of the proper material and shape of the various conduits involved in the water supply and sewerage systems. These conduits often require the major part of the cost of the system where adverse selection of material and layout (i.e. roughness, slope and velocity) may not affect the cost of the conduits, but also the number of pumping stations and energy requirements. In th. developing countries, a balance must be struck in the selection of costlier and more hydraulically superior imported conduits against lower quality locally built conduits (i.e. higher friction losses) which may result in a larger number of pumping stations and higher energy requirements. Hydraulic and energy considerations also affect the selection of combined (i.e. domestic and storm sewers) versus separate sewers.

Operation and Maintenance Requirements

26. These influence material selection for conduits and structures, equipment selection, degree of sophistication of treatment processes and pumping installations. Careful considerations are necessary in light of manpower requirements and skill needed for operation and maintenance.

Availability of Material and Skill in the Local Market

27. The need for imports, especially where this requires large expenditures in scarce currencies will highly influence the selection of conduit material and structural elements, and would also influence the selection of the treatment processes. 1/ Under such circumstances, trade-offs and adjustment of values given to other factors might be warranted.

1/ This consideration might well favour the use of slow sand filters instead of rapid sand filters for water treatment, and oxidation ponds or trickling filters instead of the activated sludge process for wastewater treatment.

IV PUBLIC HEALTH ASPECTS

Objectives

28. The primary objective of public health oriented criteria is to maximize the safety of the users in the community. This is accomplished (a) by means which would ensure the removal of contaminants from drinking water supply and its subsequent protection against entry of organisms and other substances which may be harmful to human health; and (b) by means which ensure the removal and disposal of community liquid wastes without exposure to nuisance, risks of disease or any harmful effects resulting from contamination of drinking water supply or from pollution of water resources. 1/

Standards / Effects

29. For community water supply, planners often are guided by the WHO recommended International Standards, as well as other national standards. Such standards generally aim at serving water which is clear, pleasant to taste, of reasonable temperature, neither corrosive nor scale-forming, and free from chemical substances and organisms which are likely to cause harmful physiological effects. In these standards, upper limits of bacterial indicators (e.g. coliform bacteria) and toxic or harmful substances are set out together with a range of values for other indicators. Further reference to these standards is provided in Section IX below.

30. Adherence to public health standards might require a change in the method of water distribution and treatment, the selection of piping material as well as the method of wastewater collection, treatment and disposal. When such changes cannot be attained within the economic, financial and institutional constraints, the planners are faced with the alternative of modifying the service level. For example, if a planned system cannot from the start maintain a continuous supply of drinking water (i.e. non-intermittent), there will be a risk of contamination with polluted ground-water sucked into the system due to the high probability of encountering vacuums in the distribution pipes. Rather than allowing such risks, it would be justifiable to initially limit the extent of service through a piped water distribution with house connexions to fewer people while serving a larger proportion of the population through public standposts. Notwithstanding the above, it must be recognized that the attainment of the objectives of public health criteria cannot be assured without proper operational controls, monitoring and surveillance systems.

1/ Contaminants include toxic materials, bacteria or other harmful substances which make the water unfit for domestic use.

31. In the planning for wastewater collection and disposal systems, the setting of standards beforehand is more difficult because these would depend to a large extent on the nature and function of the receiving waters as well as on their quality before and after waste disposal. Therefore, the adoption of standards requires a considerable amount of preparatory study and collection of baseline information. Earlier emphasis had been focussed on BOD and bacterial indicators but in addition in recent years more and more attention has been given to the limi of toxic wastes and heavy metals as the health effects of these substances began to emerge in this decade. These factors may significantly affect the selecton of treatment processes and methods of collection and disposal.

V ENVIRONMENTAL ASPECTS

Objectives and Effects

32. The objective of these is to ensure against environmental degradation and disturbance of the living habitats as a result of the construction and operation of the planned system. Environmental factors greatly influence water source selection, sites for waste treatment and disposal, treatment processes, location and design of pumping stations and location and method of sewer laying.

Application

33. In the past, planners were not permitted the "luxury" of devoting sufficient attention to environmental considerations which were mostly treated as esthetic aspects. It should be recognized, however that water supply and wastewater disposal planners were amongst the first to appreciate the problem of water pollution. The decade of the seventies has seen the greatest upsurge of attention to this important aspect as a result of which new legislations in the developed countries were enacted, setting up new limits to pollution and establishing targets for achieving these limits. The 1972 UN Conference on the Human Environment also did a great deal to draw world attention to this aspect of planning. Despite these efforts a large number of communities, particularly in the developing countries, have not been able to devote sufficient attention to this matter.

Indicators

34. Standards for environmental aspects are very difficult to establish as these depend a great deal on judgements in evaluating tolerance and acceptability of new environmental interventions. Final decisions must be guided by values and trade-offs set by the communities themselves.

VI SOCIAL ASPECTS

Objectives and Consequences

35. The objective of these is to ensure that the planned system will be socially acceptable. For example, the planning of public latrines as a part of community waste collection and disposal services may be acceptable by certain communities or a segment thereof, but not by others. Similarly, public standposts as a means of water distribution might be rejected by one segment of the community but accepted by others. Therefore, social factors, such as status, culture and even religious beliefs, become very important in determining methods of distribution, waste collection and water and wastewater treatment in the larger context of the service level selection. Failure to take these factors into consideration has resulted in total failure of the services. This is particularly true in the developing countries who rely on expatriate planners who do not possess sufficient knowledge of the local conditions.

Means of Influence

36. Social acceptance is a matter which can be effected through appropriat involvement and communication with the community concerned from the very beginning. Many of the obstacles and suspicions can be diminished through health education and other means of inculcation.

VII ECONOMIC AND FINANCIAL ASPECTS

Objectives and Consequences

37. The objective of these is to ensure both economic and financial viability of the planned services.[1/] To this end the criteria chosen in selecting different discount rates and in applying shadow pricing where possible should pave the way for the appraiser to appreciate that the proposed system is likely to contribute effectively to the improvement of the economic well-being of those affected (i.e. a surplus of benefits over costs). If the objectives of the economic and financial aspects cannot be met on the basis of acceptable criteria, the planners may be forced to reassess and revise the level of service proposed.

1/ Economic viability and financial viability are usually appraised individually by the financing agencies. It is conceivable that a water supply and sewerage project might be viable economically but not financially because of inability to generate sufficient revenues. For further discussion on the subject see item 5 of the bibliography).

Indicators

38. When dealing with economic benefits and costs, scientific rationalization becomes very complex because one must deal with a large number of intangibles as well as secondary benefits or effects which the economists call "externalities". Therefore, a greater reliance is placed on the qualitative indicators of this aspect.

39. On the financial aspects, the emphasis is on quantitative indicators which must establish that the planned system is self-supporting. The indicators in this case are the ability to pay for the service in monetary terms and the prevailing and projected interest rates. These would influence the total amount of the overall investment, including any subsidies (if economically and socially justified) and hence the capacity of the individual elements of works proposed.

VIII INSTITUTIONAL ASPECTS

Objectives and Consequences

40. The objective of these is to ensure safety, reliability and economy in the operation and maintenance of the planned system. This requires a thorough knowledge of the availability of local manpower and their level of training, the legal and organizational constraints, and managerial capabilities. In most developing countries a large proportion of failures of water supply and sewerage or sanitation services have resulted from inadequate attention paid to this aspect. Constraints often require that the planned system is designed for the simplest possible method of operation and maintenance where only unsophisticated processes and equipment can be utilized. For instance, a decision on whether to use metering for a water distribution system will depend on the magnitude of the problem created as a result of the need for meter repair and maintenance. Institutional changes are often a necessary ingredient in planning for water supply and waste disposal services. The planner must realize however that the criteria adopted are realistic in anticipating the pace of improvements possible under the local situation.

Indicators

41. Institutional indicators are very difficult to establish as much depends on the judgement of the planner who has to relate the above objectives to the local conditions. In terms of number of personnel needed some planners might attempt to establish a relation between these and the number of people served. This can be very misleading because of the

variations of the level of training of personnel, their attitudies and incentives, as well as the variations in the service levels.

IX STANDARDS AND GUIDELINES

Applicability

42. The preceding discussions should lead to the conclusion that it is impracticable and indeed risky to adopt a so-called "standard design criteria" in the manner of applying cookbook recipes. Unfortunately, often this is just what happens when the purposes of published guidelines and standards proposed for conditions in developed countries are misunderstood with the result that sound engineering and planning is exchanged for expediency and false economy.

43. In contrast with the above, much can be said, especially in the developing countries, in favour of design, specification and construction standardization, provided these are based on sound engineering and planning principles as discussed in the preceding sections of this paper. Such standardization could be viable tools in accellerating sector development and in effecting a much needed economy, in order to achieve the Drinking Water Supply Decade goals recently adopted by the UN Water Conference and the World Health Assembly.[1/] The author draws the conclusion from his experience in observing the substantive wastages and failures of systems which could have been avoided, had it not been for the proliferation and indiscriminate usage of a variety of designs, specifications and construction material imported from the developed countries.

1/ The United Nations Conference held at Mar del Plata, Argentina, in March 1977 adopted recommendations by an earlier UN Conference on Human Settlement (i.e. HABITAT) emphasizing importance and priorities that should be accorded to Community Water Supply and Sanitation. It urged that maximum efforts should be mounted so that water supply and sanitation services can be made available to all people by 1990. To mobilize support the Conference resolved that the years 1980-1990 be designated as the International Drinking Water Supply Decade. The World Health Assembly in its thirtieth sessio held in May-1977, adopted a similar resolution and requested its Secretariat to collaborate with Member States to achieve their goals.

Existing Standards and Guidelines

44. Two types of standards and guidelines are in general usage, namely those which deal with health related water and effluent quality standards, and those dealing with the engineering and technical matters. As mentioned under paragraph 29 above, a frequently referred to set of health standards are those developed by the World Health Organization, i.e. "WHO International Standards for Drinking Water", and the US Public Health Standards published in the "Standard Methods for Examination of Water and Wastewater". Although the primary consideration of the above-mentioned standards is the safeguarding of public health, these standards also deal with non-health related physical, chemical and esthetic matters, where a wide range of difference in tolerance may be expected. Examples of these are standards dealing with hardness, corrosion, turbidity, colour, taste, odour, etc. 1/

45. Engineering "design standards", "design guidelines" and "manuals" have been developed by various state and national agencies in a number of the developed countries. The authors of these publications derive their conclusions and recommendations from their review of plans and designs submitted for approval by the responsible local authorities, from evaluation reports on systems in operation, and from personal observations. Amongst the well-known publications of this kind are the manuals prepared by the American Society of Civil Engineers in collaboration with other US professional societies as well as the US Ten States Standards (see Section XI, Bibliography, items 3, 11, 12, 14 and 23).

46. Published data in the World Health Statistics Report, Vol. 26, No 1' of 1973 provide some interesting figures on daily water consumption for urban communities (with house connections and with public stand posts) and for rural communities in 29 African countries, 22 countries in the Americas, 22 countries in the Eastern Mediterranean, 8 countries in South-East Asia and 10 countries in the Western Pacific. These show wide differences not only between the various regions, but also between some countries within the same region. The relevant information contained in Table 16 of the WHO document is attached as Annex I.

1/ See attached Annex IV showing "drinking water standards comparison" compiled by Harold Shipman of the World Bank.

47. USAID, in collaboration with the US Public Health Service, has published a document under the title "Guidelines and Criteria for Community Water Supplies in the Developing Countries". This is based on a 1968 study conducted by consultants who visited 12 countries in the American, South-East Asian and Western Pacific regions. The guidelines indicated are of necessity general in nature while presenting for consideration important issues such as policies, institutions, financing, manpower, training, etc. The technical standards mentioned in this document provide a range of values of "design standards most frequently used by engineers in the developing countries for water supply". Information extracted from this document is attached as Annex II.

48. Some data are being gathered by WHO and efforts are continuing to enhance the establishment of appropirate information gathering and recording systems in the developing member countries of WHO. An example of the useful but unpublished data available to WHO is the different criteria adoptedin planning reports prepared by consulting firms on behalf on the Organization in its capacity as executing agency for pre-investment planning projects. A tabulation of planning criteria derived from some of these studies is attached as Annex III.

49. In the majority of the developing countries, the use of specific engineering design criteria varies widely. Several countries rely on design criteria established in the developed countries with little or no questioning, thus frequently resulting in impractical and non-feasible systems. In referring to the above-mentioned statistical information, guidelines and data, it is strongly advised that extreme care must be exercised in relating the information to local conditions and needs. In the final analysis, the need for a careful survey and investigation for each individual case must not be overlooked.

The Role of International Agencies

50. It would be well worthwhile for developing countries in regions which share many common characteristics to collaborate in the development of guidelines on design and planning which would be more applicable in their regions. International Organizations such as WHO and International Banking Institutions must collaborate in such an undertaking as they have a clear mandate, especially in the recent resolution of the United Nations Habitat and Water Conferences as well as the 30th Assembly of the World Health Organization. In this connexion, WHO and IBRD have already

embarked on a crash effort to collaborate with member countries in carrying out a "Rapid Assessment" of the Water Supply and Sanitation Sector with the aim of facilitating an accellerated sector development, where the maximum possible number of people can be served by 1990. Undoubtedly such an assessment must examine existing policies, standards and guides, and must explore the various levels of service under which the national sector goals can be met. This, of course, will have to be followed up with pre-investment studies for individual projects.

X SUMMARY

51. Design criteria are key elements in the planning process with the objective of identifying a least-cost way of providing the required services with built-in health safeguards. In order to ensure the feasibility, acceptability and success of the planned water supply and sewerage services, the adopted criteria must be responsive to the needs and constraints imposed by the existing and forecasted conditions of the communities concerned. Thus, design criteria comprise technical, health, social, economic, financial, institutional and environmental factors which determine the characteristics, magnitude and cost of the planned system.

52. Design criteria are also a function of the desired service level which has been defined here as "the degree of convenience and accessibility of the water supply and wastewater collection and disposal services provided under minimum safety requirements". Accordingly, the approach to the setting of design criteria is governed by the level of service desired against that in existence. This approach must also be viewed from its engineering and technical aspects, public health aspects, environmental aspects, economic and financial aspects and institutional aspects. When the objectives of the planned works cannot be met due to the inability to overcome the local constraints identified under the various aspects mentioned above, the planner must reassess and revise the level of service initially proposed.

53. In view of the wide differences in the conditions, needs and constraints of the various communities, design criteria, other than those related to the minimum public health requirements, cannot be standardized and applied indiscriminately. Technical criteria which have been developed in the advanced countries should be utilized merely as guides and not as substitutes for rational planning and sound engineering judgement. The developing countries would benefit more from design criteria guidelines if these are derived from conditions and experiences similar to those in their regions. Collaboration of international agencies concerned with this sector (i.e. WHO and the international lending agencies) could be of help in developing such guidelines.

54. Despite the cautious and rational approach for design criteria selection stressed in this paper, the path of the planner cannot be fully cleared from uncertainties due to unpredictable events and insufficient and unreliable data. The longer the duration of the planning horizon is, the greater will be the uncertainty.

XI BIBLIOGRAPHY

Numerous classroom textbooks have been written in the field of water supply and wastewater engineering. These textbooks invariably deal with the technical aspects of design criteria described under Section III above. The following list does not fall within the category of standard textbooks referred to above.

1. ALTERNATIVE SANITARY WASTE REMOVAL SYSTEMS FOR LOW INCOME URBAN AREAS IN DEVELOPING COUNTRIES: Hansen, J.A. and Trykt, H.T., Polytechnisk Forlag/Special Trykkeriet Viborg A.S., Denmark (1977)

2. COMMUNITY WASTEWATER COLLECTION AND DISPOSAL: Okun, D.A. and Ponghis, G., World Health Organization, Geneva, Switzerland (1975)

3. DESIGN AND CONSTRUCTION OF SANITARY AND STORM SEWERS: ASCE Manual No 37, The American Society of Civil Engineers and the Water Pollution Control Federation, New York, U.S.A. (Sept. 1969)

4. DESIGN CRITERION FOR WATERWORKS FACILITIES: Japan Waterworks Association, 1-4-1 Hongo Bunkyo-ku, Tokyo, Japan (1969)

5. DEVELOPMENT OF PRE-INVESTMENT PLANNING FOR WATER SUPPLY AND WASTE MANAGEMENT PROJECTS UNDER UNITED NATIONS DEVELOPMENT SYSTEM - Engineers thesis: Suleiman, M.S., Stanford University, Stanford, California, U.S.A. (Dec. 1973)

6. DISPOSAL OF COMMUNITY WASTEWATER - Report of a WHO Expert Committee: Wld Hlth Org. Tech Rep. Ser. No 541, World Health Organization, Geneva, Switzerland (1974)

7. EXCRETA DISPOSAL FOR RURAL AREAS AND SMALL COMMUNITIES: Wagner, E. and Lanoix, J.N., World Health Organization, Geneva, Switzerland (1958)

8. GUIDELINES AND CRITERIA FOR COMMUNITY WATER SUPPLIES IN THE DEVELOPING COUNTRIES: US Dept. of State (AID PASA TCR 3-67) and US Dept. of Health, Education and Welfare (Public Health Service), Rockville, Maryland, U.S.A. (1969)

9. GUIDE TO SIMPLE SANITARY MEASURES FOR THE CONTROL OF ENTERIC DISEASES: Rajagopalan, S. and Shiffman, M.A., World Health Organization, Geneva, Switzerland (1974)

10. INTERNATIONAL STANDARDS FOR DRINKING WATER SUPPLY - 3rd edition: World Health Organization, Geneva, Switzerland (1971)

11. RECOMMENDED STANDARDS FOR SEWAGE WORKS - i.e. Ten States Standards: Great Lakes Upper Mississippi River Board of State Sanitary Engineers, New York State Health Dept., Albany, New York, U.S.A. (1971)

12. RECOMMENDED STANDARDS FOR WATERWORKS - i.e. Ten States Standards: Great Lakes, Upper Mississipi River Board of State Sanitary Engineers, New York State Health Dept., Albany, New York, U.S.A. (1971)

13. RE-USE OF EFFLUENTS: METHODS OF WASTEWATER TREATMENT AND HEALTH SAFEGUARDS - Report of a WHO Meeting of Experts: Wld Hlth Org. Tech. Rep. Ser. No 517, World Health Organization, Geneva, Switzerland (1973)

14. SEWAGE TREATMENT PLANT DESIGN: ASCE Manual No 36, The American Society of Civil Engineers, New York, U.S.A. (1972)

15. SLOW SAND FILTRATION: Huisman, L. and Wood, W.E., World Health Organization, Geneva, Switzerland (1974)

16. STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER - 13th edition: The American Public Health Association, American Waterworks Association and Water Pollution Control Federation, New York, U.S.A. (1971)

17. THE DEFINITION AND ROLE OF MARGINAL COST IN PUBLIC UTILITY PRICING: PROBLEMS AND APPLICATION IN THE WATER SUPPLY SECTOR: Saunders, R.J., Warford, J.J. and Mann, P.C., International Bank for Reconstruction and Development, Washington, D.C., U.S.A. (30 July 1976)

18. THE ROLE OF ECONOMICS IN MUNICIPAL WATER SUPPLY: THEORY AND PRACTICE: Warford, J.J., Economic Adviser, International Bank for Reconstruction and Development, Washington, D.C., U.S.A. (Dec. 1971)

19. TIME-CAPACITY EXPANSION OF URBAN WATER SYSTEMS: Scareto, R.F., Water Research, Vol. 5, No 5 - Pergamon Press, Fairview Park, Elmsford, New York, U.S.A. (Oct. 1969)

20. WASTE STABILIZATION PONDS: Gloyna, E.F., Wld Hlth Org. Monograph Series No 60, World Health Organization, Geneva, Switzerland (1971)

21. WATER SUPPLY AND WASTEWATER DISPOSAL IN DEVELOPING COUNTRIES - Proceedings of a Water Supply and Sanitation Seminar: edited by Pescod, M.B. and Okun D.A., Asian Institute of Technology, Bangkok, Thailand (Jan. 1971)

22. WATER SUPPLY FOR RURAL AREAS AND SMALL COMMUNITIES: Wagner, E.G. and Lanoix, J.N., World Health Organization, Geneva, Switzerland (1959)

23. WATER TREATMENT PLANT DESIGN: The American Society of Civil Engineers, The American Waterworks Association and Conference of State Sanitary Engineers, American Waterworks Association, New York, U.S.A. (1969)

Annex 1

DATA ON COMMUNITY WATER SUPPLY CONSUMPTION FROM THE WORLD HEALTH STATISTICS REPORT, TABLE 16, VOL. 26, NO. 11, 1973

TABLE 16. COMMUNITY WATER SUPPLY — DAILY WATER CONSUMPTION IN LITRES PER CAPUT

TABLEAU 16. APPROVISIONNEMENT PUBLIC EN EAU — CONSOMMATION D'EAU JOURNALIÈRE EN LITRES PAR HABITANT

Region and country / Région et pays	Present consumption — Consommation actuelle						Future consumption — Consommation future					
	Urban — Urbaine				Rural — Rurale		Urban — Urbaine				Rural — Rura	
	With house connections — Avec raccordement aux immeubles		With public standposts — Par distributeurs publics				With house connections — Avec raccordement aux immeubles		With public standposts — Par distributeurs publics			
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
Africa — Afrique [1]		65	290	20	45	15	35	90	275	30	60	20	50
Americas — Amériques [1]		160	350	25	50	70	190	195	375	30	55	120	195
Eastern Mediterranean [1] Méditerranée orientale [1]	average	95	245	30	60	40	85	160	310	55	95	70	115
Europe [1]		65	210	25	40	20	65	90	250	35	45	35	70
South-East Asia [1] Asie du Sud-Est [1]	moyenne	75	165	25	50	30	70	125	225	45	85	40	85
Western Pacific [1] Pacifique occidental [1]		85	365	30	95	30	95	230	375	50	85	70	145
Average — Moyenne [1]		90	280	25	55	35	90	150	300	40	70	60	110
AFRICA — AFRIQUE													
Botswana		90	1 820	...	...	10	45	90	320	...	45	20	45
Burundi		100	350	10	40	...	...	150	350	40	70	20	40
Cameroon — Cameroun		100	180	18	34	10	20	120	200	30	50	20	30
Central African Rep. Rép. centrafricaine		50	300	...	20	...	...	75	220	15	20	...	...
Chad — Tchad		60	400	8	25	5	15	150	400	25	45	20	40
Congo		75	100	50	75	10	30	75	100	50	75	...	...
Dahomey		10	125	10	30	10	20	80	150	25	50	20	30
Gambia — Gambie		60	220	50	150	22	50	90	310	...	...	...	...
Ghana		36	120	22	36	22	100	115	180	20	55	20	45
Guinea — Guinée		100	150	40	60	...	...	100	150	40	60	...	...
Ivory Coast — Côte-d'Ivoire		20	130	20	40	10	20	40	150	20	40	20	40
Kenya		20	200	5	15	10	20	50	300	20	30	15	75
Lesotho		55	270	...	...	27	54	55	270	35	70	35	70
Liberia — Libéria		95	190	20	40	20	40	115	285	40	80	40	95
Madagascar		40	250	10	24	4	10	80	250	—	25	10	40
Mali		10	25	...	...	...	...	40	160	30	50	...	...
Mauritania — Mauritanie		20	200	20	50	10	50	100	300	50	100	30	100
Niger		100	300	1	2	3	10	...	...	...	...	...	...
Nigeria — Nigéria		45	230	45	70	45	45	90	230	45	90	45	70
Senegal — Sénégal		70	96	18	22	...	...	100	125	20	24	...	...
Togo		60	100	...	...	...	...	...	...	...	...	...	...
Uganda — Ouganda		50	500	5	15	5	10	70	700	20	30	10	15
U.R. of Tanzania — R-U. de Tanzanie		80	110	40	80	25	50	100	150	55	100	20	40
Upper Volta — Haute-Volta		50	250	5	50	5	20	75	300	10	75	10	50
Zaire — Zaire		30	250	10	30	20	40	100	300	20	50	5	10
Zambia — Zambie		200	700	50	90	10	50	130	700	50	90	40	50
AMERICAS — AMÉRIQUES													
Argentina — Argentine		300	600	...	...	100	200	200	350	...	...	100	20
Barbados — Barbade		230	1 730	23	68	23	910	135	570	23	68	135	57
Bolivia — Bolivie		60	150	10	25	60	100	150	250	...	...	60	150
Brazil — Brésil		80	500	10	50	20	75	100	500	30	50	20	75
Chile — Chili		180	400	10	20	100	100	250	550	...	...	100	100
Colombia — Colombie		113	275	...	..	40	200	115	300	...	...	80	150
Costa Rica		175	275	...	..	120	150	200	300	...	...	150	250

Annex 1 (cont'd.)

TABLE 16. COMMUNITY WATER SUPPLY — DAILY WATER CONSUMPTION IN LITRES PER CAPUT

TABLEAU 16. APPROVISIONNEMENT PUBLIC EN EAU — CONSOMMATION D'EAU JOURNALIÈRE EN LITRES PAR HABITANT

Region and country Région et pays	Present consumption — Consommation actuelle						Future consumption — Consommation future					
	Urban — Urbaine				Rural — Rurale		Urban — Urbaine				Rural — Rurale	
	With house connections Avec raccordement aux immeubles		With public standposts Par distributeurs publics				With house connections Avec raccordement aux immeubles		With public standposts Par distributeurs publics			
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
AMERICAS — AMÉRIQUES												
Dominican Rep. — Rép. Dominicaine	320	375	55	95	95	130	130	340	55	95	95	130
Ecuador — Equateur	140	200	...	...	70	140	...	...	...	...	...	...
El Salvador	17	295	40	40	60	100	130	400	40	40	60	100
Guatemala	150	150	...	...	25	25	200	200	...	...	60	60
Guyana — Guyane	270	360	...	...	135	270	450	550	...	...	360	550
Haiti — Haïti	150	200	20	40	...	...	175	225	20	40	20	40
Honduras	20	270	...	...	45	140	160	270	...	...	90	135
Jamaica — Jamaïque	320	390	45	70	20	320	340	570	45	90	45	450
Mexico — Mexique	100	350	20	50	50	250	100	350	20	50	50	250
Nicaragua	130	220	40	60	75	150	240	300	40	60	95	150
Panama	190	300	...	...	40	80	210	340	...	...	60	90
Paraguay	160	350	10	30	100	200	160	350	10	30	100	200
Peru — Pérou	90	400	25	30	80	100	150	300	30	50	000	100
Uruguay	120	250	...	...	100	180	126	262	...	...	105	190
Venezuela	200	300	...	...	150	300	400	600	...	...	150	300
EASTERN MEDITERRANEAN MÉDITERRANÉE ORIENTALE												
Afghanistan	60	70	20	30	15	20	60	100	30	50	30	50
Bahrain — Bahrein	220	420	23	140	110	340	230	360	...	...	140	280
[illegible]prus — Chypre	145	275	...	...	90	145	185	320	...	...	145	180
[illegible]mocratic Yemen Yémen démocratique	50	100	10	23	10	18	140	230	18	36	50	70
Egypt — Egypte	100	260	30	40	30	40	250	350	150	250	40	60
Ethiopia — Ethiopie	20	100	5	10	5	10	40	100	10	20	5	15
Iran	75	150	...	25	40	75	150	190	...	...	110	150
Iraq — Irak	90	200	...	...	65	130	160	360	...	...	90	145
Jordan — Jordanie	60	120	...	...	30	60	80	150	...	...	40	80
Kuwait — Koweït	150	220	70	220	...	...	180	410	150	220	...	...
Lebanon — Liban	150	200	...	...	80	125	200	250	...	...	100	150
Pakistan	70	180	20	60	20	100	150	220	20	70	50	100
Qatar	150	300	80	110	40	80	230	300	80	150	80	150
Saudi Arabia — Arabie Saoudite	50	400	25	50	25	50	150	250	25	50	100	200
Somalia — Somalie	—	250	20	50	...	...	250	...	60	...	...	...
Sudan — Soudan	45	900	23	32	14	42	110	[2] 1 140	...	...	18	45
Syrian Arab Rep. Rép. arabe syrienne	150	200	...	...	50	...	...	250	...	...	...	75
Tunisia — Tunisie	100	150	5	10	...	...	150	...	5	10	...	...
Yemen — Yémen	50	80	30	50	20	40	...	...	...	...	30	60
EUROPE												
Algeria — Algérie	20	200	10	30	10	60	80	200	50	60	50	60
Morocco — Maroc	60	260	10	20	—	70	100	300	20	30	20	80
Turkey — Turquie	120	170	60	70	50	60	...	...	...	...	...	...

2 See notes on page 3 of Annex I

Annex 1 (cont'd.)

TABLE 16. COMMUNITY WATER SUPPLY — DAILY WATER CONSUMPTION IN LITRES PER CAPUT

TABLEAU 16. APPROVISIONNEMENT PUBLIC EN EAU — CONSOMMATION D'EAU JOURNALIÈRE EN LITRES PAR HABITANT

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	Urban — Urbaine				Rural — Rurale		Urban — Urbaine				Rural — Rurale	
	With house connections Avec raccordement aux immeubles		With public standposts Par distributeurs publics				With house connections Avec raccordement aux immeubles		With public standposts Par distributeurs publics			
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
SOUTH-EAST ASIA **ASIE DU SUD-EST**												
Bangladesh	45	70	15	25	10	20	70	135	25	45	25	45
Burma — Birmanie	100	180	45	100	22	60	150	220	70	120	50	100
India — Inde	50	270	...	...	25	100	90	270	...	...	45	130
Indonesia — Indonésie	50	150	5	20	...	...	86	150	...	100	30	60
Mongolia — Mongolie	24	150	5	60	...	...	187	420	...	...	...	...
Nepal — Népal	60	100	40	60	40	60	100	200	60	100	60	100
Sri Lanka	170	220	30	50	20	70	170	220	30	50	20	70
Thailand — Thaïlande	120	180	...	...	50	100	150	200	...	...	50	80
WESTERN PACIFIC **PACIFIQUE OCCIDENTAL**												
Fiji — Fidji	140	260	...	...	...	...	...	270	...	...	9	90
Khmer Rep. — Rép. khmère	40	400	15	140	...	15	...	...	...	...	...	...
Korea, Rép. of — Corée, Rép. de	150	250	...	...	40	80	200	350	...	...	80	120
Laos	50	300	40	80	20	40	100	200	50	150	30	100
Malaysia — Malaisie	18	410	...	...	14	230	250	250	...	...	23	110
Philippines	110	540	...	...	40	110	360	1 100	...	...	180	360
Singapore — Singapour	...	220	...	...	...	...	...	315	...	...	...	...
Viet-Nam, Rep. of — Rép. du	...	150	...	60	...	...	...	300	...	60	...	...
Western Samoa moa-Occidental	...	770	...	...	...	...	...	220	...	50	...	100

NOTES:

[a] Averages rounded to nearest 5 liters.

[b] Estimation includes garden watering.

NOTES:

[a] La moyenne a été arrondie à la demi-dizaine.

[b] Estimation y compris l'arrosage des jardins.

Annex II

WATER SUPPLY DESIGN STANDARDS FREQUENTLY USED IN DEVELOPING COUNTRIES - (EXTRACTED FROM "GUIDELINES AND CRITERIA FOR COMMUNITY WATER SUPPLY IN THE DEVELOPING COUNTRIES : APPENDIX IV" - SEE SECTION XI, BIBLIOGRAPHY, ITEM 8)

The design standards most frequently used by engineers in the developing countries are listed as follows:

Item	Range of Values	Most Frequent Values
Design Period	10-25 years or 100% growth whichever is greater	20 years or 100% growth whichever is greater [1]
Domestic Consumption (liters per capita per day)		
Small systems	50-200	115-150
Larger urban systems	150-300	180-250
Public taps	5-40	10-15
Maximum Daily Use (times average)	1.2-1.5	1.2-1.5
Maximum Hourly Use (times average)	1.5-4.0	1.5-2.5
Distribution Storage (% daily consumption)		
Large systems	30-70	40-50
Small systems	100	100
Fire flow provided for only in large communities having fire departments:		
Hours of Operation	12-24	12-24
Minimum Static Pressure in meters of water height	7-23	10
Maximum Static Pressure in meters of water height	46-50	50
Maximum Dynamic Pressure in meters of water height	100	
Provision for Unaccounted-for Water (% total flow)	20-40	25-35
Rapid Sand Filtration Rate (gallons per minute per square foot)	2-3	2-2½
Slow Sand Filtration Rate (gallons per day per acre)	250,000 with iron removal	
Sedimentation Period	2 hours with iron removal 4 hours for surface water	

1/ In the larger cities the author frequently finds 100% growth coverage to be unobtainable over a twenty-five year planning period

ELEMENTS OF DESIGN CRITERIA FOR SEWERAGE PROJECTS - COMPILED FROM WHO/UNDP PRE-INVESTMENT PROJECT REPORTS

Design criteria factors →

City and date study completed ↓

	Projected population & planning horizon & coverage	Water consumption (lpcd)	Average domestic sewage flows i.e. DWF (lpcd)	Infiltration	Separate or combined system	Sewer design	Sewer loading (% full)	Peaking factors	Velocities and minimum size (diameter)	Manhole spacing	Sewer Materials	Pumping equipment capacity	Sewage loadings 5 day BOD at 20° C	Treatment process and disposal
Istanbul (Turkey) 1970	9.0 million by year 2020	120 - 430	100% of gross domestic demand	0.1 litre/sec/ha at population density of 200 p.ha	Existing system combined New system separate	Manning n 0.014	100% at peak flows	Babbitt $\frac{Peak}{Avg.} = \frac{5}{p0.2}$ Max = 5.0 x avg. flow	Max 5 mps Min 0.65 mps Collection 200 mm	200 - 600 mm dia. Max 100 meters 650 - 1200 mm dia. Max 125 meters 1300 & over dia Max 150 meters	Reinf. concrete Prestressed concrete Asbestos cement Cast iron Mortar lined steel pipe	Wet well: 45 min. storage At least 2 pumps cap. at peak flows Standby: 1 pump same cap. 50%	Not quoted	Comminution with submarine outfall
Kabul (Afghanistan) 1974	1.99 million by year 2004 80% coverage	380 inclusive of industrial and commercial	300 inclusive of industrial and commercial	7 cu.m/ha/d (0.174 l/s/ha)	Separate	Manning n 0.013	100% at peak flows	Babbitt $\frac{Peak}{Avg.} = \frac{5}{p0.2}$ Max = 5.0 x avg. flow Min = 2.0 x avg. flow	Min 0.77 mps (full flow) Max 3.0 mps Collection 200 mm House 100 mm	900 mm dia. or less 100 meters, 900 mm dia. or more 150 meters	Concrete	Wet well: 30 min storage 2 pumps at peak flows Standby: 1 pump 50%	50 grms/c/d	Screening Grit removal Stabilization ponds
Greater Kathmandu & Bhaktapur (Nepal) 1973	482,500 by year 2000 Full coverage	83 - 147	74 - 133 i.e. 90% of water usage	Low areas 10% domestic flow Other areas 5% domestic flow	Existing systems combined New systems separate	Manning n 0.012 - 0.018	Separate: 100% at peak flows Combined: 100% at wet weather (30 mm/hr intensity)	$\frac{Q\ Max.}{Q\ Avg.} = \frac{K}{(P)^{1/6}}$ Where K = 6.0 P = Population in thousands	Min 0.75 mps (½ full) Collection 200 mm House 100 mm	200 - 500 mm dia. 55 meters 501 - 1000 mm dia. 80 meters Over 1000 mm dia. 100 meters	Stoneware Spun concrete	Wet well: 40 min. storage 2 pumps at peak flows Standby: 50% of installed capacity	50 grms/c/d	Stabilization ponds: Mechanically aerated

ELEMENTS OF DESIGN CRITERIA FOR SEWERAGE PROJECTS - COMPILED FROM WHO/UNDP PRE-INVESTMENT PROJECT REPORTS

Design criteria factors ⟶

City and date study completed ⟶

	Projected population & planning horizon & coverage	Water consumption (lpcd)	Average domestic sewage flows i.e. DWF (lpcd)	Infiltration	Separate or combined system	Sewer design	Sewer loading (% full)	Peaking factors	Velocities and minimum size (diameter)	Manhole spacing	Sewer Materials	Pumping equipment capacity	Sewage loadings 5 day BOD at 20° C	Treatment process and disposal
Jakarta (Indonesia) 1977	8.3 million by year 2000 with 40% direct coverage	60 - 260	55 - 220 90% of water usage	5 cu.m/ ha/d	Primarily separate	Manning n 0.013	100% full at peak flow	$F = 4.02Q^{-0.154}$ Q = DWF in 1000 cu.m/d Min. F = 1.35	0.6 mps at full flow for VCP & 0.75 mps at full flow for RCP 200 mm for laterals 150 mm for house connections	80 meters for up to 60 cm. dia. 50 meters for up to 30 cm. dia. Max. 200 meters	PVC or VCP for up to 50 cm. dia. RCP for over 60 cm. dia. & up to 200 cm. dia.	Centrifugal non-clog peak daily flow plus 25% - 50% extra capacity	50 grms/ c/d	Screening Comminution with submarine outfall
Manama, Muharraq and Issa Town (Bahrain) 1975	0.58 million by year 2008 Full coverage	197 - 245	227	45 l/c/d	Separate	Colebrook -White	100% full at peak flow	2.25 D.W.F population over 150,000 & 3.0:1 for lesser population	0.9 mps at full flow 200 mm for laterals 150 mm for house connections	100 meters up to 600 mm dia. & 180 meters up to 1800 mm dia.	VCP up to 450 mm & AC with liner for larger sewers	Small pumps up to 250 litres/ sec. are submersible. Large pumps screw type Max. 10 pump cycles/ hour	30 grms/ c/d	Primary treatment sedimentation Secondary treatment (16 MGAD) Standard rate trickling filters
Teheran (Iran) 1976	8.0 million by year 2000 Planning horizon year 2015 80% coverage by year 2000	Avg. 200 in 1971 Avg. 300 in 2000	130 - 326	2.75 - 5.5 cu.m/ha/d	Separate	Colebrook -White K = 0.6	100% full at peak flow	Laterals over 4.5 D.W.F. Interceptors 3.2 - 6.4 D.W.F. Trunk 2.4 - 4.4 D.W.F.	1.0 mps at full flow 100 mm for house connections 200 mm for laterals	100 meters up to 1000 mm dia. 200 meters above 1000 mm dia.	VCP or AC for 100 - 300 mm dia. RC for over 400 mm dia.	Min. 3 pumps including one standby Non-clog centrifugal or mixed flow. Generator standby	40 grms/ c/d	Capacity at peak flow. Activated sludge with polishing & disinfection to allow reuse

Annex III (cont'd.)

ELEMENTS OF DESIGN CRITERIA FOR SEWERAGE PROJECTS - COMPILED FROM WHO/UNDP PRE-INVESTMENT PROJECT REPORTS

Design criteria factors →

City and date study completed ↓

	Projected population & planning horizon - coverage	Water consumption (lpcd)	Average domestic sewage flows i.e. DWF (lpcd)	Infiltration	Separate or combined system	Sewer design	Sewer loading (% full)	Peaking factors	Velocities and minimum size (diameter)	Manhole spacing	Sewer Materials	Pumping equipment capacity	Sewage loadings 5 day BOD at 20° C	Treatment process and disposal
Manila (Philippines) 1969	10 - 15 million by year 2010 Full coverage	335	268 80% of water use	5.6 cu.m/ ha/d	Separate	Manning n 0.013	100% full at peak flow	1.3:1 for over 700,000 pop. 2.5:1 for under 30,000 pop.	0.6 mps at full flow 200 mm for laterals	90 - 200 meters up to 15" dia. not exceeding 120 meters	Concrete or reinforced concrete VCP preferred if available	Wet well: 30 mins. storage Centrifugal pumps for peak design flow 25% extra capacity	0.45 grms/ c/d for domestic plus 23 grms/ c/d for industrial and others	Inland raw wastes stabilization ponds and coastal marine outfall
Kampala-Jinga (Uganda) 1971	670,000 by 1980 for Kampala Planning horizon to year 2000	250 average	190 - 220 avg. 205 80% of water use	1 x D.W.F.	Separate	Charts produced by Hydraulic Research Station, Wallingford, U.K		4 to 6.5 x D.W.F.	Min. 0.9 mps Max. 2.5 mps Collection 7"	Under 24" 100 meters	Spun concrete Asbestos Cement Spun iron	Wet well: 30 mins. storage capacity 2 pumps each for peak flow operated alternately 1 pump acting as standby 100%	45 grms/ c/d	Stabilization ponds Mechanically aerated
Accra-Tema (Ghana) 1966	1.5 million by year 1980 Planning horizon to year 2000	42.5 - 163	34 - 130 80% of water use	Wet areas 1600 gal/ acre/d Dry areas 100 gal/ acre/d	Separate	Manning n 0.013 - 0.015	80% for 18" dia. & larger 50% for 18" dia. & smaller	From 6 D.W.F. down to 1.5 x D.W.F	Max. 10.0 fps Min. 2.5 fps Collection 9" House 6"	Suitable intervals (Distance not defined)	Spun concrete	30% - 50% standby	0.15 lbs/ c/d	Primary sedimentation Submarine outfall

Annex IV

DRINKING WATER STANDARDS -Comparison

GENERAL, PHYSICAL AND CHEMICAL STANDARDS	WHO Recommended Standards (International, 3rd Edition)	European Standards 1970 Edition	Japan (1968)	India (1975)	India Recommended (1977)	Tanzania (Temporary 1974)	USSR 1973 (Rank ...)	Israel (1974)	Germany (1977) 3/	Poland
Radioactivity, α activity β activity	3 pCi/l 30 pCi/l	3-10 pCi/l 30-100 pCi/l 1/		10.0 10.0	3 pCi/l 30 pCi/l		[illegible]	3 pCi/l		
pH	6.5-9.2		5.8-8.6	6.5-9.2	6.5-9.2	6.5-9.2	6.5-8.5	6.5-9.5		6.5-9.0
Total hardness (meq/l) 1 meq/l = 50 mg/l as CaCO3	2-10	2-10	6	10	10	10	10			7
Chlorides (as Cl)	600 mg/l	600	200	1000	1000	800	300	600		215
Depending on temperature, Fluoride (as F)	0.6-1.7 mg/l	0.7-1.7	0.8	1.0	1.5	8.0 2/	0.7-1.5	1.4-1.9	1.5	1.0
Nitrate (as NO3)	45 mg/l	100	45	50	45	100	45	50	50	
Copper (as Cu)	1.5 mg/l	.05-1 for new pipe	.10	3.0	1.5	3.0	1.0	1.4		1.0
Iron (as Fe)	1 mg/l	0.3	0.3	1.0	1.0	1.0	0.3	1.0		0.3
Manganese (as Mn)	0.5 mg/l	0.05	0.3	0.5	0.5	0.5	0.1			0.1
Zinc (as Zn)	15 mg/l	5.0	1.0	15.0	15.0		5.0	15.0	2.0	5.0
Magnesium (as Mg)	150 mg/l	30 or up to 125 if 250 mg/l SO4		150	150			150		
Sulfate (as SO4)	400 mg/l	250		400	400	600	500	400	250	150
Phenolic compounds (as phenol) (mg/l)		.001	.005	.002	.002	.002		.002		17.0
Color (platinum-cobalt scale)	50 units		5			50	20	50	20	
Turbidity (T.u.)	25 T.u.		2			30 T.u.	1.5 mg/l	25 T.u.	1 mg/l silica scale	
Taste	Should be unobjectionable		not to be abnormal			not objectionable	2 units	not objectionable		
Odor	*		*			*	*	*	5	
Arsenic (as As)	.05 mg/l	0.05	0.05	0.2	0.05	0.05	0.05	0.05	0.04	0.05
Cadmium (as Cd)	.01 mg/l	0.01	<0.01		0.01	0.05		0.01	0.006	
Cyanide (as CN)	.05 mg/l	0.05	0	0.01	0.05	0.20		0.05	0.05	
Lead (as Pb)	0.1 mg/l	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.04	0.1
Mercury (as Hg)	.001 mg/l		0		.005			0.01	.004	
Selenium (as Se)	.01 mg/l	0.01		0.05	0.01	0.05	.001	0.01	.008	
Polycyclic aromatic hydrocarbons	.0002 mg/l	.0002			.0002				.00025	
Chromium	0.05 mg/l	0.05	<0.05	0.05	0.05	0.05		0.05	0.05	
Beryllium, Molybdenum, Strontium, Barium (mg/l)							.0002 .5 2.0			
BACTERIOLOGICAL STANDARDS										
Total plate count			100				100/ml	[illegible]/ml		25/ml
Coliforms	1. Water entering distribution system: Chlorinated or otherwise disinfected supplies - 0/100 ml; non-disinfected supplies E. coli 0/100 ml; coliform 3/100 ml occasionally. 2. Water in distribution system: 95% of samples in a year - 0/100 ml coliform; E. coli - 0/100 in all samples; no sample greater than 10 coliform/100 ml; coliform not detectable in 100 ml of any two consecutive samples. 3. Individual or small community supplies: less than 10/100 ml coliform; 0/100 ml E. coli in repeated samples.	E. coli - 0/100 ml. Coliform - 95% of samples - 0/100 ml. No sample to exceed 10/100 ml. No consecutive samples to be positive	Coliform - not to be detected	Coliform - 0-1.0/100 ml permissive; 10-100/100 ml excessive but tolerated in absence of alternative, better source; 0-10/100 ml acceptable only if not in successive samples; 10% of monthly samples can exceed 1/100 ml	E. coli - 0/100 ml. Coliform - 10/100 ml in any sample, but not detectable in 100 ml of any two consecutive samples or more than 50% of samples collected for the year.	Non-chlorinated piped supplies: 0/100 ml coliform - classified as excellent; 1-3/100 ml coliform - classified as satisfactory; 4-10/100 ml coliform - classified as suspicious; 10/100 ml coliform - classified as unsatisfactory; one or more E. coli/100 ml classified as unsatisfactory. Other supplies: WHO Standards to be aimed at.	Coliform not more than 3/litre on membrane filters. Coli titre with enriched media not less than 300	Faecal coli - 0/100 ml. Coliform - not more than 2/100 ml		For systems serving at least 50,000 people - coli titre not lower than 100 (coli index 10/l). For systems serving less than 50,000 people - coli titre not lower than 50 (coli index 20/l)

GENERAL, PHYSICAL AND CHEMICAL STANDARDS	Sweden (1968)	Bulgaria (quoted in ... country)	USA 1975 Interim (1) ... (2)	Thailand	Canada	Korea 4/	Australia - Criteria	[illegible]	Philippines (1963)	France
Radioactivity, α activity β activity			3 pCi/l 10 pCi/l				3 pCi/l 30 pCi/l			
pH	6.0-8.0	6.5-8.5		6.5-8.5	6.5-8.5		6.5-8.5		6.5-9.2	
Total hardness (meq/l) 1 meq/l = 50 mg/l as CaCO3		9		6	10	6	10			6
Chlorides (as Cl)	25/250	250	250(2)	250	250	150	600	250	600	250
Depending on temperature, Fluoride (as F)	1.5	0.7-1.0	1.4-2.4(1)	1-1.5	1.0-1.4	1.0	1.5	1.6	1-1.5	1.0
Nitrate (as NO3)	30	30	45(1)	45	45	45	45		50	44
Copper (as Cu)	1.0	0.5	1.0(1)	1.0	1.0	1.0	0.1	0.3	1.5	3.0
Iron (as Fe)	0.2	0.3	0.3(2)	0.3	0.3	0.3	0.3	0.3	1.0	0.2
Manganese (as Mn)	0.05	0.1	0.05(2)	0.3	0.05	0.3	0.1	0.3	0.5	0.1
Zinc (as Zn)	5.0	5.0	5.0(2)	15.0	5.0	1.0	5.0	15.0	15.0	
Magnesium (as Mg)		30		125	150		150	125	150	125
Sulfate (as SO4)	25/250	250	Being studied	250	500	200	250	250	400	250
Phenolic compounds (as phenol) (mg/l)		.001		.001	.002	.005	.001	.001	.001	0
Color (platinum-cobalt scale)	10	15		20	15	2	15	20		
Turbidity (T.u.)		30 T.u.	1-5 T.u.(1)	5	5	2	5	5		
Taste				not objectionable	not objectionable	none	not objectionable			
Odor		2		*	4 T.O.N.	none	-			
Arsenic (as As)	.05/.05	0.05	0.05(1)	0.05	0.05	0.05	0.05		0.2	0.05
Cadmium (as Cd)	0.01	0.01	0.01(1)		0.01		0.05		0.01	
Cyanide (as CN)	.01/.2	0.01	0.01(2)	0.2	0.2		0.2		0.01	
Lead (as Pb)	.02/.05	0.10	0.05(1)	0.05	0.05	0.1	0.05	0.1	0.1	0.1
Mercury (as Hg)	.001/.005		.005(1)				.002			
Selenium (as Se)	.01/.05	0.05	0.01(1)	0.02	0.01		0.01		0.05	0.05
Polycyclic aromatic hydrocarbons										
Chromium	0.02	0.05	0.05(1)	0.05	0.05	0.05	0.05	0.05	0.05	
Beryllium, Molybdenum, Strontium, Barium (mg/l)										
BACTERIOLOGICAL STANDARDS										
Total plate count				500/ml						
Coliforms			Coliform shall not be present in (a) more than 60% of the portions in any month; (b) five portions in more than one sample when less than five are examined/month; or (c) five portions in more than 20% of the samples when five or more samples examined/month.	Coliform - 2.2/100 ml. E. coli - 0/100 ml	Coliforms - Acceptable - at least 95% of the samples in any 30-day period to be negative. None of samples positive should have MPN greater than 4/100 ml. Maximum permissible - at least 90% of samples in any 30-day period to be negative. None of the positive samples should have MPN greater than 10/100 ml.		Coliforms - 0/100 ml in at least 95% of samples for the year. No sample to contain more than 10/100 ml. Coliforms not to be detected in any two consecutive 100 ml samples. Faecal coliforms - 0/100 ml	Coliforms 0/100 ml if present in two successive 100 ml samples, gives grounds for rejection of supply.	Coliforms - Not more than 10% of 10 ml portions examined shall be positive in any month. Three or more positive 10 ml portions shall not be allowed in two consecutive samples; in more than one sample per month when less than 20 samples examined; or in more than 5% of the samples when 20 are examined per month.	E. coli - 0/100 ml. Strep. faecalis - 0/50 ml

Compiled by Donald E. Skinner, Consultant to the World Bank Water Supply Staff Training Course 1977

NOTES BY M. SULEIMAN

1/ This should be similar to the figures in the previous column

2/ This is tolerated-only in small scale rural water supplies in remote areas

3/ Federal Republic

4/ Republic of Korea

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WORKING GROUP ON PRE-INVESTMENT PLANNING
FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

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DATA REQUIREMENTS AND INFORMATION TRANSFER

A staff paper of the:

World Health Organization
WHO Regional Office for the
Western Pacific
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WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTÉ

REGIONAL OFFICE FOR THE WESTERN PACIFIC
BUREAU RÉGIONAL DU PACIFIQUE OCCIDENTAL

WHO/ADB WORKING GROUP ON PRE-INVESTMENT PLANNING FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

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DATA REQUIREMENTS AND INFORMATION TRANSFER

A WPRO staff paper

DATA REQUIREMENTS AND INFORMATION TRANSFER IN WATER SUPPLY AND SANITATION SECTOR

OUTLINE

I - INTRODUCTION

II - CLASSIFICATION OF INFORMATION CATEGORIES AND RELATED OUTPUT

III - SUGGESTED APPROACH TO INFORMATION SYSTEM DEVELOPMENT

IV - CONCLUSION

ANNEX 1

An outline of information categories and related output

I. INTRODUCTION

1. In every planning endeavour, one must work from an adequate information base upon which decisions can be made and a plan can be built. Understandably, a large number of developing countries are anxious to rapidly prepare and implement development plans and in this process they are making hasty decisions based on limited information which may be of extremely doubtful accuracy and of varying consistency. Even in countries where considerable data of a statistical nature exist, such data is not in a usable form as they are not adaptable to the needs of the decision-makers. The main reason for this situation is the lack of a carefully conceived information system, tailored for the specific sector needs or easily adaptable thereto.

2. WHO experience in assisting countries in pre-investment planning for water supply and sanitation projects over the past 15 years is full of examples of the many difficulties and delays encountered in project planning and execution resulting in frustrating search for suitable and reliable information which can be utilized as a concrete base for arriving at conclusions and decisions. For example, a large number of communities do not yet regularly carry out population census at appropriate intervals and even those which do, the statistical data presented does not provide such basic information as to what constitute "urban" and "rural" population, let alone densities, classifications based on income and other socio-economic indicators. The most frustrating exercise for a conscientious planner is to prepare a Master Plan for a community water supply needs for the next 15 to 20 years without information on physical planning and national or local policies on settlement and land use! Unfortunately, this is quite common in the developing countries and the best one can do is to make an intelligent guess and to record all the assumptions and consultations carried out with local officials

.../

in this respect. Under these circumstances, such assumptions must serve as the "base line information" which obviously may prove to be a very shallow foundation for some costly decisions. The high risks involved may force a financing agency to decline a request for assistance or to seek additional information which could cause serious difficulties, resulting from the delays in project implementation.

3. Realizing the importance of a good data base and information system, Member States of the World Health Organization have called upon the WHO Secretariat through resolutions of its governing bodies, to assist countries in the development of systematic information systems including those for water supply and basic sanitation as an integral part of an overall health and socio-economic development. In this connection, a "Guide on Information Systems for Planning and Evaluation of Community Water Supply and Community Wastewater Disposal Programme" is currently under preparation by WHO. A first draft was prepared by a WHO consultant in 1975 and this has been subjected to field test applications in developing countries before its finalization. Further guides have been evolving as a result of WHO experience with numerous sector studies carried out under the WHO/IBRD cooperative programme.

4. The starting point for an appropriate information system is to begin immediately the process of compiling, classifying and analyzing relevant data which can serve as a basis for sector planning, as well as evaluation of achieved progress, impact and performance. Inherently, this is a continuous undertaking which must involve various planners, operators, and managers working in the sector. It is also a demanding and maybe a costly process but if carefully planned and executed the benefits will far exceed costs. Therefore, it must be carried out in an organized fashion where

.../

initially emphasis must be made on the most important data which would lead towards optimization of design criteria, reliability of systems operations, utilization of water resources and allocation of financial resources.

II. CLASSIFICATION OF INFORMATION CATEGORIES AND OUTPUT IN WATER SUPPLY AND SANITATION SECTOR

5. As proposed in the draft WHO guideline on information system referred to paragraph 3 above, it is suggested that the needed information may be classified according to the following major categories:

A. General Information

a. Demographic and Geographical Information

b. Health, Social, Historical and Cultural Information

B. Economic and Financial Information

C. Technological Information

a. Information on current and future CWS/CWD* Technology as it relates to the country

D. Institutional and Administrative Information

a. Institutional Organization Information

b. Institutional Law and Policy Information

c. Information on the Planning Machinery of the Country

d. CWS/CWD Manpower Information

e. Information on the Current Status of CWS/CWD Development from the Community to the Country level

f. Information on Local, Regional and Country Objectives

6. As illustrated in Annex 1, an attempt has been made to relate the above categories to the kind of information output specifically needed in the water supply and sanitation sector. The listing of output mentioned is by no means exhaustive and it should therefore be adjusted or supplemented according to the local situation.

* CWS is Community Water Supply
CWD is Community Waste Disposal

III. SUGGESTED APPROACH TO INFORMATION SYSTEM DEVELOPMENT

7. The following is intended as a general guidance and for stimulating discussion and therefore must not be construed as a rigid rule.

8. Identify institutional responsibility at the local and national levels, make an inventory of existing data and data sources and carry out a survey of collected data and observe collection, retrieval, and utilization of such data. This is by no means an easy task in view of the fact that in most developing countries many agencies are involved in the sector directly or indirectly. Among these are the municipal bodies, rural councils and provincial bodies, public works and public health and environmental pollution control departments or ministries, water resources or irrigation and agricultural departments, census bureau, social and economic departments, central planning authorities and perhaps a score of others. The persons to whom this task is assigned should be well familiar with the data requirements of the sector. This undertaking therefore may be assigned to an interagency task force under the guidance of an experienced information system planner.

9. Identify shortcomings of the collected information and present proposals for necessary revision in format and procedures with the objective of simplifyin the process and maximizing utility. Frequently, the following shortcomings are encountered:

(a) lack of consistency owing to a lack of a common interpretation of terminology, or lack of sufficient training of personnel involved. Examples of this is the different interpretation of what is considered to be "safe water", what is called "service level", and what is considered to be "urban" or"rural."

(b)an aimless collection of data without a common understanding of purpose. Thus, much of the data may not be in a readily usuable form. An example of this is the availability of bulk water production figures without

being able to distinguish who the users are and what amounts are used by each. The availability of per capita cost data without a knowledge of the level of service, and technology employed is another example.

(c) lack of data accessibility and retrieval difficulties. In many cases, data collected at the operating level may not be kept there but forwarded to a central department where it gets lost amongst the numerous other information.

10. Improvement proposals mentioned above and additional data requirements should be reviewed individually by each agency involved in the sector and collectively under the leadership of a central planning agency if applicable. This should be carried in the light of proposals planned for sector development over the next five to ten years period, the yardstick used for evaluation and the kind of decisions that have to be taken. It should be kept in mind that sufficient flexibility be maintained in the adopted information system, allowing each of the various agencies involved to incorporate essential data required for their operations. The system devised should clearly indicate the flow of information, and identify responsibilities for certain data. In this connection, due regard should be made of the trend of decentralization of governmental functions and decision-making and therefore the data should be readily available at all levels when it is needed.

11. Because of the magnitude of the task involved in setting up a data gathering and processing system, particularly when making a new start, priority for the most essential data should be identified so that such data are collected first while the process of data collection and information system development is being gradually expanded. In this connection, consideration should be given to whether it is practical to immediately implement the proposed system on a broad national scale or to begin the trials in a pilot implementation programme for selected regional areas.

12. Data collection forms must be simple. To generate the basic data, clear responsibility has to be assigned at national, regional and local levels. Standard forms and frequency of reporting will have to be predetermined. Although data processing methods using computers has been resorted to in some advanced countries, it is felt that a simpler system by long-hand compilation is in most instances sufficient to facilitate information system administration. Channels of communication should be clearly established and the responsibility for and the nature of analysis and aggregation to be carried out at different levels should be clearly assigned.

IV. CONCLUSIONS

The data base and information system should not be developed in isolation, but should be developed in tune with the planning decisions to be made and the issues to be analyzed, and should facilitate the process of evaluation of progress achieved, the impact on health on socio-economic development as well as quality of performance and reliability. Only in this way can governments avoid costly and wasteful efforts and develop simple but useful information systems.

ANNEX 1 - AN OUTLINE OF INFORMATION CATEGORIES AND RELATED OUTPUT

INFORMATION CATEGORIES BASED ON (SECTION IV) OF WHO "DRAFT GUIDE ON INFORMATION SYSTEMS FOR PLANNING AND EVALUATION OF COMMUNITY WATER SUPPLY AND COMMUNITY WASTEWATER DISPOSAL PROGRAMMES -WHO/CWS, JUNE 1975	EXAMPLES OF INFORMATION OUTPUT (These are by no means considered to be exhaustive)
A. General Information	
a. Population and location	Total Population Present and Projected growth Population Distribution Present and Projected growth for: - Urban:) Definitions - Rural:) Number of communities - Nomadic (if applicable)) Trends in population movements Densities Classifications as to income level
b. Health, Social and Cultural	Health Water-borne diseases: Water-related diseases:

c. Historical

Frequency

Distribution effects

Social and Cultural

Social customs and ethnic influence

Levels of literacy and education

Current Situation

Population coverage

Level of service for various coverage, e.g.

house connections

yard connections

public connections

piped sewerage

individual waste disposal facilities

etc.

Quality of service

Water Production (monthly) for various uses

Wastewater generation (monthly) from various sources

B. Economic and Financial Information

Government targets and objectives:

- Population coverage
- Service level
- Time horizons
- Urban against rural
- Water against sewerage
- Geographic target groups

Other Information

- Physical planning for development
- Housing conditions
- National economic development plan and its priorities

Economic

- GNP and Income Stratification
- Sources of income including industrial trends

Finance

- Development funds
- Recurrent funds
- Revenue sources and methods of collection

External assistance:

Past

Present

Future

Sources

Material against labour

Foreign exchange

Customs and taxes

Tendering procedures

Comparison with total public expenditure and with other sectors

C. Technological Information

a. Current and future technology

b. Design criteria and units costs

c. Water Resources utilization

d. Other Resources

Urban Water Supply with inf. on Design criteria and Units Costs for:

Gravity surface:

Pumped surface:

Pumped borehole:

With treatment:

Without treatment:

continuous:

intermittent:

house connections

standpipes

Rural Water Supply With inf. on Design Criteria and Unit Costs for:

- Gravity Surface
- Pumped Surface
- Pumped borehole
- Shallow well:
  - Dug well:
  - Drilled well:
    - With handpump
    - Without handpump
- Rock catchments
- Roof catchments
- Dams and Hafirs without distribution
- Springs
- Irrigation channels

Urban sewerage and sanitation with inf. on Design criteria and Unit costs for:

- Water-borne sewerage:
  - Combined system:
  - Separate system:
    - Piped:
    - Open:
      - With treatment
      - Without treatment

D. Institutional and Administrative Information

a. Institutional-Organization Information

b. Institutional-Law and Policy Information

c. Information on Planning Machinery

d. Manpower Information

e. Objectives

Septic tanks

Cesspools

Bucket latrines

Pit latrines

Dry:

Wet:

Communal

Private

Institutions

Laws, codes and decrees regulating water quality sources, allocation and the organization of the water supply and sewerage services

Water resources management

quantity

quality

Water resource investigation

Surface Water

Ground Water

Urban water supply

Urban sewerage and sanitation

Rural water supply

Rural sanitation

Domestic water quality surveillance

Water pollution discharge standards

Manpower

National:

Expatriate:

Professional

Sub-professional

Auxiliary

Consultants

Contractors

Equipment

Transport

Construction

Laboratories

Materials

Local

Imported

Procedures

Planning

Budgeting

Accounting

Selection

Design

Construction

Importation

Operation

Maintenance

Surveillance

Revenue collection

ANNEX 5-F

Document No. 6 (Rev. 1)

WORKING GROUP ON PRE-INVESTMENT PLANNING
FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

Sponsored by the Asian Development Bank and the World Health Organization (WPRO)
Manila, Philippines
10-15 October 1977

HISTORICAL PERSPECTIVE AND EVALUATION OF THE WATER SUPPLY AND SANITATION SECTOR

Presented by:

Dr J. Warford
Economic Adviser
Energy, Water and
Telecommunications Department
World Bank
Washington, D. C.
United States of America
October 1977

WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTÉ

REGIONAL OFFICE FOR THE WESTERN PACIFIC
BUREAU RÉGIONAL DU PACIFIQUE OCCIDENTAL

WHO/ADB WORKING GROUP ON PRE-INVESTMENT PLANNING FOR WATER SUPPLY AND SEWERAGE DEVELOPMENT

Manila, Philippines
10 - 15 October 1977

WPR/PIP/77.1
7 October 1977

ENGLISH ONLY

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HISTORICAL PERSPECTIVE AND EVALUATION

I. Introduction

While expressing reservations about the quality of global data on access to water supply and sanitation facilities, this paper outlines the present service situation and the progress that has been made in the last few years in the fourteen selected countries.1/ It then goes on to present some rough estimates of recent multilateral and bilateral assistance, and of local investments in the sector. Sector planning is heavily dependent upon the general economic and social philosophies prevailing at the time. The recent emphasis on satisfaction of "basic needs" as a development objective is therefore described, in light of the implications for the water supply and sanitation sector. The expected sectoral growth that is likely to result needs to be matched by a considerable improvement in sector planning and organization. The lessons drawn from the WHO/World Bank Cooperative Programme in conducting sector studies are therefore increasingly relevant: some of the more important of them are briefly described.

II. Present Service Levels

Evaluation of water and sewerage services is usually comprised of two elements. First, is the measurement of coverage, and , the ease of access that the population has to the services. Second is some indication of the quality of service offered. There are many types of access, e.g., good service through individual house connections with modern indoor plumbing,

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* Prepared by K. Ringskog and J. Warford, World Bank. The views expressed do not necessarily reflect those of the World Bank Group.

1/ These countries are Afghanistan, Bangladesh, Burma, Fiji, Indonesia, Korea, Laos, Malaysia, Nepal, Pakistan, Philippines, Papua New Guinea, Thailand, Vietnam.

yard or patio taps and public standpipes with varying spacing. Although scant and often unreliable, international statistics on service levels usually distinguish between that part of the population served through house connections and that part served from public standpipes. However, what is less clear is at which point the population is considered having access to public standpipes and when the population is not served by the public water supply. Often a given population uses both public and private water delivery systems. The ensuing lack of uniform criteria between countries to measure service levels results in wide variations in service levels, and makes comparisons less meaningful.

The definitional problems arising when trying to measure the quality of service are even more thorny. Ideally, the quality of service should be measured by a composite index, including per capita consumption, the number of hours of continuous service per day, the residual pressures in the system, and the safety of water, to mention only a few quality aspects. The first factor, per capita consumption, is notoriously difficult to obtain as metering is so often deficient. For this reason, many of the statistics shown as per capita consumption in international water literature are nothing but estimated per capita supply before distribution losses and wastage have been subtracted. It can also be mentioned that production metering is also often unreliable. The second factor, i.e., the number of continuous hours of service is not regularly measured at all and only spotty indications are given in studies. The same situation holds for the third quality aspect, i.e., the residual pressure in the distribution system. The fourth important factor, relating to the safety of the water distributed, is seldom monitored.

The fact that the community has a water treatment plant, or that it chlorinates its ground water supply, does not mean that the supply is necessarily safe at all times. Deficient operation and maintenance often make it impossible to produce consistently safe water. Given the lack of data, it must therefore be concluded that meaningful comparisons can rarely be made between different countries as to the safety, or, therefore, adequacy of public water supplies.

Some of these problems are illustrated by recent efforts to estimate service levels and progress that has been made in the sector. Annex 1 of this paper presents a number of estimates of service coverage that have been made in recent years by the World Health Organization and the World Bank, for water supply and sanitation. It is shown that, according to the Mid-decade WHO Review, the 1975 service levels in the 14 selected countries varied a good deal. For the countries in question the water service coverage in urban areas varied from 22% of the population supplied to 100%, while in rural areas the range was 5% to 61%. Such variations may be explained not only by different investment priorities, varying income levels and so on, but also by the different definitions that may be used for urban and rural communities, and for access to service. This may also be an explanation for the discrepancies (shown in Annex 1) between the service levels estimated by the WHO/World Bank Cooperative Programme sector studies and the data from the WHO Mid-decade Review.

On the sewerage side, data appear to be even less reliable than in water supply. For instance, overall sewerage and sanitation coverage varied from a low 1% to a high 96% in 1975 according to WHO[1/] Such differences are far larger than could be explained by different stages of development and investment priorities and are no doubt largely definitional quirks. For example, Annex 1 shows that in Republic of Korea 40% of the population of urban areas had

1/ WHO Statistics Report Vol. 29 No. 10, 1976 (Table 3 p. 575-579)

water-borne sewerage in 1975, however, it is known that less than 6% had adequate sewerage in 1977.

Keeping in mind the necessary qualifications that need to be made when comparing service level data for different countries and even in the same country if long time periods have elapsed, only broad statements are possible to describe progress in the sector. According to the WHO statistics, the water supply coverage from 1970-75 has progressed somewhat unevenly. For urban water supply, of the 14 countries studied, service coverage rose in 9 countries, and fell in 3 whereas in one country data do not permit an evaluation.1/ For rural water supplies the picture was more encouraging with increases in 10 countries, dropped in 2 and data not permitting any evaluation in 1 country. Overall it must be said that the trend of water supply coverage is a rising one.1/

For sewerage and sanitation, improvement appears to be less rapid. In urban areas 6 countries could register rising trends, 3 reported drops in service coverage, while for 2 countries data permitting an evaluation were unavailable.1/ However, for rural sewerage and sanitation the situation may be slightly better with increases in 5 countries and drops in 1, while 5 countries had no data for evaluation.1/ Given that the majority of the population in these largely agricultural countries reside in rural areas, the overall trend for sewerage and sanitation was of encouraging trend. As noted above, the data scarcity does not permit any evaluation as to whether the services rendered were of a higher quality than before.

III. Financing Sector Investment

External Financial Assistance

External financial assistance for water supply and sewerage works in the sample countries can be divided into two categories by source: multilateral aid from international organizations, and bilateral aid from individual countries.

1/ In remaining country(ies) the trend was stationary.

International organizations included in this survey are the World Bank, its soft-loan window IDA, and the Asian Development Bank. Since 1962 the World Bank loaned the sample countries $192.3 million for water and sewerage projects. IDA gave credits for $70.5 million to produce a total of US$262.8 million from the World Bank Group during this period. Between 1971 and 1976 inclusive, the Asian Development Bank (ADB) loaned the same countries $226.5 millions. Given the different periods surveyed, the ADB annual average lending of US$38 million surpassed the World Bank Group's US$16 million for the 14 countries.

The information we were able to obtain on bilateral assistance has been fragmentary, but it appears that since 1962 loans and grants from five of the larger bilateral aid agencies (those of the U.S., West Germany, Denmark, Japan and UK), were approximately one fifth of the amount loaned by the international organizations, i.e., about $90 million.

Local Investment

As noted in the WHO Report on Community Water Supplies, presented at the UN Water Conference in Mar del Plata, the role of external aid during the period 1971-75 was relatively small, accounting for about 10% of total investment in the water supply and sanitation sector. There is little doubt that, as in the past, the development of the sector will continue to depend primarily upon the degree of local financial commitment.

Per Capita Investment

Based on WHO/World Bank water supply sector studies and internal Bank economic reports, order of magnitude per capita annual investments for the 14 countries were estimated and are shown in Annex 2. The per capita annual

investments are related to the total popultion at the mid-point of each time period studied and hence cannot be used to estimate what it costs to serve any additional population. What is striking are the enormous variations in investments per capita. For the 8 out of the 14 survey countries for which data were available the per capita investments ranged from US$0.06 to US$2.56 annually with the median being around US$0.2, which in light of the numbers of people currently unserved, is certainly not an impressive figure.

IV. New Developments in Sector Planning: The Basic Needs Strategy

Sector planning for water supply and sewerage has not received adequate attention in the past. This is no doubt partly due to the difficulties in relating the sector's investment to a specific improvement in the population's health or added convenience. Thus while it is generally accepted that an improved state of health is usually associated with better water supply and sanitation services, present knowledge does not allow us to predict the magnitude of the health improvement brought about by investments in potable water supply or sanitation facilities. The trade-offs between project costs and benefits - even if the latter could be couched in physical terms - are therefore not clear cut.

A related reason why the water supply and sewerage sector has not received the attention it deserves, is the fact that the sector is not directly productive, but only indirectly so. Faced with demands to construct a steel mill or a water system, the steel mill may be preferred because it is felt to be productive whereas water supply is primarily a consumption good. Water sector planners have thus often been at a disadvantage because of the dominance of economic growth as the primary objective of governments in developing

countries - and indeed of aid agencies. In recent years however new development theories have emerged that give a more prominent role to water supply and sanitation. One of these is the "basic needs strategy".

The basic needs strategy emphasizes the goal of providing food, safe water, clothing, and housing to all. In this respect, it is different from earlier strategies that either concentrated on economic growth per se, or on redistribution with growth.

It should however be noted that the conflict between the provision of improved water supply/sanitation on the one hand and the demands of economic growth on the other is not totally irreconcilable. Thus, water supply may be expected to have a long-term positive health effect and through its stress on preventive rather than curative medicine may well be more cost effective than some health schemes. The improved state of health may reasonably be expected to have a beneficial effect upon productivity.

The basic needs strategy stresses the importance of direct efforts to redress absolute deprivation, and as such has greatest relevance to society where absolute poverty is concentrated. Such direct efforts do not have to depend upon chain reactions or "trickle down" effects before the welfare of the population is increased as a result of its investment. In addition tariffs can be set in such a way that the poor will benefit to the maximum extent. In the water sector it is common to make use of "lifeline" rates, which enable poor consumers to obtain a sufficient amount of water at a nominal charge, while at the same time applying much higher tariffs approaching or exceeding the long run marginal cost for higher income consumers. To the extent that this can be done the fiscal burden of satisfying basic needs tends to be diminished.

It can be hoped that water and sanitation sector planners will become more efficient at "selling" the merits of their sector to those who are responsible for authorizing capital outlays, and that the coherent basic needs strategy will provide the theoretical framework. As the allocation between sectors of available investment funds is much influenced by the prevailing development philosophies, the gradual adoption of the basic needs strategy would certainly result in a considerable expansion of the water supply and sanitation sectors. Indeed, this has recently been reflected in the recommendations of the 1977 UN World Water Conference at Mar del Plata, which implied that urban and rural areas should be fully supplied with water by 1990.

V. Lessons from Sector Work

Achievement of the Mar del Plata goals will require, not only an unprecedented commitment of funds to the sector, but also, in most cases, a considerable improvement in sector planning and organization.

In recent years, the World Health Organization and the World Bank have been developing a more constructive and systematic approach to sector planning than has usually been employed in the past. The sector studies that have been produced by the WHO/World Bank Cooperative Programme examine the effectiveness of sector planning in the various countries studied, analyze existing service levels, and the obstacles to sector development, and make recommendations regarding the way in which improvements may be brought about. For the 14 countries under study 10 sector studies have been completed to date (these are listed in Annex 3). Only Fiji, Laos, Papua New Guinea and

Vietnam lack sector studies carried out by the WHO/World Bank Cooperative Programme.

The ten completed studies are fairly unanimous in defining the main obstacles to more rapid sector development. Invariably the main obstacle is identified as scarcity of trained staff. This is undoubtedly a correct diagnosis and spills over into deficient planning, operation and maintenance. The studies invariably mention lack of financial resources as another common obstacle to more rapid sector development. Such financial insufficiency takes on many forms. At times the studies simply state that budgetary appropriations for sector investments have been insufficient; in some cases the inability of the water supply and sewerage sector to internally generate its funds is said to be the real reason restricting sector expansion; this implies either a failure to levy appropriate tariffs or to establish an efficient mechanism for the collection of revenues. The third most frequently cited deficiency is the fragmented institutional arrangements in several countries, which dissipates the efforts made by the small number of trained staff.

Aside from an increasing perception of the needs of the water and sanitation sector in developing countries, and a growing familiarity with the means of effecting improvements, our experience in sector work has taught us one more lesson, namely that sectoral analysis, if it is to be of maximum value, should also be addressed to the requirements of policy makers outside of the sector. The "basic needs" issue provides a good example of this: in order to judge the desirability of extending water supply to all, social planners need, not only information from the water sector about the implications of currently inadequate water supplies; they also need information on plans to improve

matters; on the associated investment and operating costs; and on the way in which sector planners intend to speed the process, whether by means of variations in service standards ("appropriate technology") or by revision of tariff structures. Similarly, regional planners would find the sector study an indispensable tool if it demonstrated the implications - in terms of project cost - of alternative regional development schemes. Indeed, the potential contribution that water supply and sanitation sector studies can make to the achievement of overall economic and social planning goals is enormous. In planning a sector study, therefore, it should be recognized that the analysis should be designed to assist two broad groups of people, i.e., those who have day to day responsibility for running the sector, and those for whom information about the sector is a useful input in making decisions of an inter-sectoral nature.

As some of the mentioned sector studies are already outdated, it would be desirable over the next few years to selectively update them and review whether the main obstacles to more rapid sector development remain the same and to see what has been the impact of past sector studies in removing these obstacles. Although WHO and the World Bank have taken the lead in conducting the sector studies, it is urged that the countries themselves should carry them out as a matter of routine, perhaps calling in Bank or WHO staff for advice on specific issues.

September 9, 1977

COMMUNITY WATER SUPPLY - COMPARISON OF SERVICES IN SELECTED COUNTRIES

Country	Urban. House Connexion and Public Stand Posts						Rural Population with "reasonable access"					Composite Statistics				
	WHO Report[a]				WHO/IBRD Sector Study[b]	Participants Country Reports[c]	WHO Report[a]			WHO/IBRD Sector Study[b]	Participants Country Reports[c]	WHO Report[a]			WHO/IBRD Sector Study[b]	Participants Country Reports[c]
	1962	1970	1975	Trend			1970	1975	Trend			1970	1975	Trend		
Afghanistan	30%	18%	40%	Rising	N.A.	32%	1%	5%	Rising	N. A.	5%	3%	9%	Rising	N.A.	9%
Bangladesh	N.A.	13	22	Rising	N.A.	15	47	61	Rising	N. A.	55	45	56	Rising	N.A.	52
Burma	25	35	31	Falling	31	41	13	14	Rising	13	13.8	18	17	Falling	17	20.3
Fiji	N.A.	78	89	Rising	N.A.	80	15	56	Rising	N. A.	60	37	69	Rising	N.A.	75
Indonesia	35	10	41	Rising	33	N.A.	1	4	Rising	4	N.A.	3	10	Rising	9	-
Korea, Republic of	50	84	95	Rising	68	75	38	38	Stationary	16	30	58	66	Rising	47	55
Lao People's Democratic Rep.	50	97	100	Rising	N.A.	N.A.	39	32	Falling	N.A.	N.A.	48	41	Falling	N.A.	-
Malaysia	60	100	100	Stationary	100	83.2	1	6	Rising	48	33.8	29	34	Rising	34	46.8
Nepal	60	53	85	Rising	86	76.0	-	5	Rising	2	2-4	2	8	Rising	6	7.25
Pakistan	60	77	75	Falling	70	60.2	4	5	Rising	13	16.6	21	25	Rising	26	25.5
Philippines	45	67	82	Rising	74	51	20	31	Rising	33	33	36	50	Rising	43	38-43
Papua New Guinea	N.A.	44	30	Falling	N.A.	47	72	19	Falling	N.A.	N.A.	70	20	Falling	N.A.	N.A.
Thailand	40	60	69	Rising	30	41	16	16	Rising	20	(22 piped (19 non-piped	17	25	Rising	21	41
Viet Nam, Soc. Rep. of	50	N.A.	N.A.	N.A.	N.A.	-	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		N.A.	N.A.
				9 Rising 1 Stationary 3 Falling 1 N.A.						10 Rising 1 Stationary 2 Falling 1 N.A.					10 Rising 0 Stationary 3 Falling 1 N.A.	

a/ WHO Statistics Report, Vol.29, No.10, 1976, Table 2.

b/ Various dates, See Annex 3.

c/ Report and Percentages for (1977) except Fiji, Philippines (1975), Malaysia (1970), and Thailand (1976).

N.A. Not available or data do not permit evaluation.

EXCRETA DISPOSAL - COMPARISON OF SERVICES IN SELECTED COUNTRIES

Country	Urban connected to Public Sewerage				Rural "with adequate disposal"				Composite - Urban connected to public sewerage plus urban and rural with adequate disposal			
	WHO Report a/			Participants Country Report b/	WHO Report a/			Participants Country Report b/	WHO Report a/ c/			Participants Country Report b/
	1970 %	1975 %	Trend		1970 %	1975 %	Trend		1970 %	1975 %	Trend	
Afghanistan	1	1	Stationary	1	16	15	Falling	NA	21	21	Stationary	NA
Bangladesh	12	5	Falling	NA	-	-	NA	NA	6	5	Falling	-
Burma	6	5	Falling	6	32	32	Stationary	NA	35	33	Falling	-
Fiji	19	23	Rising	10.35	87	93	Rising	NA	91	91	Stationary	-
Indonesia	2	2	Stationary	-	4	5	Rising	-	12	15	Rising	-
Korea, Rep. of	29	40	Rising	0	-	50	Rising	NA	25	64	Rising	-
Lao People's Democratic Republic	NA	NA	NA	NA	NA	2	NA	NA	-	3	NA	-
Malaysia	11	14	Rising	10	43	43	Stationary	NA	59	60	Rising	-
Nepal	10	9	Falling	0	-	-	NA	NA	1	1	Stationary	-
Pakistan	9	14	Rising	7.7	-	-	NA	2.0	3	6	Rising	-
Philippines	4	5	Rising	10 d/	40	44	Rising	7.9	57	56	Falling	-
Papua New Guinea	23	25	Rising	28	5	5	Stationary	NA	14	18	Rising	-
Thailand	NA	NA	NA	0	8	36	Rising	30	17	40	Rising	-
Vietnam, Soc. Rep. of	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
	6 Rising				5 Rising				6 Rising			
	2 Stationary				3 Stationary				3 Stationary			
	3 Falling				1 Falling				3 Falling			
	3 NA				5 NA				2 NA			

a/ WHO Health Statistics Report, Vol. 29, No. 10, 1976, Table 3

b/ Reported percentages for (1977) except Fiji, Malaysia, and Philippines (1975), Thailand (1976)

c/ Some of these figures include urban bucket latrines which makes them inaccurate

d/ 1977 Sector Study for the Philippines reports only 1% of urban population is served with piped wewerage

NA - Not available or data do not permit evaluation

Annex 2

Expenditure Per Annum Per Capita on the Water and Sewerage Sector in Selected Countries

Country	Time Period	Expenditure Per Annum Per Capita
Afghanistan		N.A.
Bangladesh	1969-1973	US$0.11
Burma		N. A.
Fiji	1971-1975	US$2.56
Indonesia	1970-1974	US$0.06
Korea	1972-1976	US$0.95
Laos		N. A.
Malaysia		N. A.
Nepal	1971-1975	US$0.08
Pakistan	1971-1974	US$0.11
Philippines	1967-1975	US$0.24
Papua New Guinea		N. A.
Thailand	1970-1975	US$0.50

Annex 3

Selected Water Supply and Sewerage Sector Studies
Produced Under the WHO/IBRD Cooperative Programme

Country	Year
Afghanistan	July 1977
Bangladesh	December 1973
Burma	May 1977
Indonesia	February 1977
Korea	October 1975
Malaysia, Sewerage	April 1977
Nepal	March 1977
Pakistan	May 1976
Philippines	July 1977
Thailand	August 1976

COMMUNITY WATER SUPPLY AND SANITATION

RAPID ASSESSMENT OF CURRENT AND PROJECTED SECTOR DEVELOPMENT

Regional Advisers Meeting

Geneva, 1-5 August 1977

Contents

Remark: The assessment should be based on information available from various sources and therefore might not be complete in all its aspects. Information gaps should be identified and action proposed to fill them.

MANDATE

Resolution WHA 30.33 (Excerpts. The full text is given in Annex).

The Thirtieth World Health Assembly

URGES Members States:

"to appraise as a matter of urgency the status of their community water supply, sanitation facilities and their control;"

REQUESTS the (WHO) Director General:

"to collaborate with Member States ..... with immediate efforts to be made for a rapid assessment of ongoing programmes and the extent to which they could usefully be expanded to meet the objectives recommended ....."

OBJECTIVES

To evaluate the extent to which ongoing programmes could be usefully expanded, and more specifically:

a. the country's preparedness to proceed with accelerated sector development;

b. the constraints which are likely to hamper such development;

c. the actions required for preparing, during the period 1978 to 1980, national plans (including investment plans) for the 1981-1990 Decade Programme, and which would be reviewed in 1980 through arrangements made by ECOSOC;

d. the need for international cooperation in preparing development plans for the Decade.

USE OF GUIDES

Numerical information on population coverage and cost of facilities may be recorded and compared with mid-decade review figures, as indicated in Part I. It is emphasized that this part is not intended as a "questionnaire" but only as a guide to the type of data which may be obtained from recent reports and consultation with national officials.

A check-list of other information useful for assessing the sector during review of background documentation and discussions with national officials is provided in Part II.

The Rapid Assessment report should be in the form indicated at the beginning of Part III, which utilizes material obtained using the guides in Parts I and II.

I. GUIDE FOR UPDATING SECTOR INFORMATION

(Based on definitions and forms used for the Mid-decade Review of Community Water Supply and Sanitation)

(Ref: World Health Statistics Report, Water and Sanitation Volume 29 No 10, 1976)

	Urban population served - Population urbaine desservie						Rural population with reasonable access - Population rurale desservie à distance raisonnable		Total	
	by house connections - par raccordements aux immeubles		by public standposts - par distributeurs publics		Total urban - Total urbaine					
1. COMMUNITY WATER SUPPLY	1970	1975	1970	1975	1970	1975	1970	1975	1970	1975
	N'000 %	N'000 %	N'000 %	N'000 %	N'000 %	N'000 %	N'000 %	N'000 %	N'000 %	N'000 %
Mid-decade review entry										
Revised estimate for 1975, based on professional judgment										
Estimate for 1977 (thousands)										
Recent trend: Not keeping up with population growth					☐		☐		☐	
Barely keeping up with population growth					☐		☐		☐	
Exceeding population growth					☐		☐		☐	

	Urban population served - Population urbaine desservie								Rural with adequate disposal - Rurale avec installations adéquates		Total	
	connected to public sewerage systems - raccordée à des égouts publics		Household systems - installations privées				Total urban - Total urbaine					
			pit privy, septic tank - fosses septiques, puisards, latrines à fosse		buckets - seaux							
2. EXCRETA DISPOSAL	1970	1975	1970	1975	1970	1975	1970	1975	1970	1975	1970	1975
	N'000 %	N'000 %	N'000	N'000	N'000	N'000	N'000 %	N'000 %	N'000 %	N'000 %	N'000 %	N'000 %
Mid-decade review entry												
Revised estimate for 1975, based on professional judgment												
Estimate for 1977 (thousands)												
Recent trend: Not keeping up with population growth							☐		☐		☐	
Barely keeping up with population growth							☐		☐		☐	
Exceeding population growth							☐		☐		☐	

	National - Interieur			External - Extérieur			Total		
3. TOTAL INVESTMENT IN COMMUNITY WATER SUPPLY (million US$ current prices)	Urban Urbain	Rural	Total	Urban Urbain	Rural	Total	Urban Urbain	Rural	Total
a) During period 1971-1975									
Mid-decade review entry									
Revised estimate									
b) In 1976									
c) In 1977 or nearest calendar/fiscal year (if available)									
4. TOTAL INVESTMENT IN EXCRETA DISPOSAL (million US$ current prices)									
a) During period 1971-1975									
Mid-decade review entry									
Revised estimate									
b) In 1976									
c) In 1977 or nearest calendar/fiscal year (if available)									

5. ESTIMATED PER CAPITA COST (US$)	Urban Water Supply	Rural Water Supply	Urban Sewerage	Excreta Disposal	
				Urban	Rural
Regional average (from Mid-decade review)					
Estimate for country (in 1977 prices)					
for new construction					
for improvement work					

II. GUIDE FOR ASSESSING SECTOR SITUATION AND IDENTIFYING INFORMATION GAPS

1. General Information

Area in Km^2

Total, urban and rural population from last census and as estimated for 1977, 1980 and 1990.

Corresponding population growth rates and trends (%).

Definition of "urban".

Breakdown of number of communities by size, in accordance with local practice or by typical groupings such as:

above 100 000; from 20 000 to 100 000; from 5 000 to 20 000; from 500 to 5 000; below 500.

Gross National Product (GNP) per person in US dollar equivalent.

Meaningful information on income distribution.

Importance of water related diseases.

Pollution aspects as related to sources of drinking water from domestic, industrial or other causes.

2. Present levels and quality of service

Brief description of the situation in typical community groupings, incorporating such aspects as:

for water: principal sources (surface, groundwater) and their reliability during the dry season; population served by standposts private connections, deep wells, shallow wells, etc. Total population without public service. Typical per capita consumptions; continuity of service; unaccounted for water; water quality and surveillance procedures. Water quality standards.

The extent to which public systems serve horticultural, agricultural or industrial users.

For excreta disposal: Population connected to sewerage systems, septic tanks, served by pit privies or other facilities. Hygienic conditions and surveillance procedures. Industrial wastes.

An appraisal of the urban "fringe" population problem, as related to the provision of water supply and sanitation services.

3. Institutions involved in the sector

Listing and brief description of jurisdiction, tasks and resources of agencies concerned with planning; inter-agency coordination; design; construction; water uses (industry, agriculture, etc.).
Identification of gaps and overlaps.

4. Policy and Planning Aspects

A. Basic data

Sequential number of and period covered by current national socio-economic development plan.

Existence or state of preparation of a long or medium-term plan in the water supply and sanitation sector or in any of its subsectors.

Ratio of investment in the sector to total investment (percent).

Ratio of foreign to total sector investment (percent).

Basic legislation affecting the sector.

Sharing of planning, financial and operational responsibilities between the central, regional and local administrative levels on one side and the benefiting communities on the other.

B. Views of Central Planning Agency, complemented by those of the main sector Agencies, the Health Agency, WHO country staff, etc. on:

Adequacy of the sector's share in the total investment.

Links between sector development and other development in the field of health, industry, housing and town planning, integrated rural schemes.

Level of priority given to the needs of special groups such as urban poor, rural populations, dispersed populations, nomadic groups etc.

Type of service planned for these various groups, in terms of public standposts and private connections, average per capita consumption, water-carried and non-water carried excreta disposal, quality and surveillance procedures.

Percentage of needs, based on the concept of "minimum acceptable level of safe water supply and sanitary disposal of excreta" which are expected to be met by 1980 and 1990 for urban water supply, rural water supply, urban sewerage and excreta disposal, and rural excreta disposal.

5. General Evaluation of on-going and planned Programmes and Projects

The sub-sectors of urban water supply, rural water supply, urban sewerage and rural excreta disposal should be evaluated separately. The three main categories of new construction work, rehabilitation and upgrading work and studies should be treated separately.

The evaluation should consist of a listing and/or tabulation of the planned and actual inputs and outputs of programmes and projects over a recent three-year period (preferably 1974-1976) and on the planned or estimated inputs and outputs over the three year period covering 1978-1980.

Properly identified fiscal years may be substituted to calendar years. Costs should be expressed in 1000 US$ equivalent, in current prices, and populations in 1000s.

The sample tabulation in the following page may be used as a guide:

URBAN WATER SUPPLY SUB-SECTOR

	1974-1976		1978-1980
	Planned	Actual	Planned
New Construction Work			
Inputs (in US$ 000)			
Total cost			
External assistance			
Government loans			
Government grants			
Funds generated within sub-sector, through tariffs and other charges			
Estimated community participation in kind and cash			
Outputs			
Number of projects			
Number of additional people served (000) by size of community			
.....			
.....			
.....			
.....			
Rehabilitation and upgrading			
Same entries as above			
Studies			
Inputs (in US$ 000)			
Total cost			
External assistance			
Outputs			
Estimated value of resulting projects (in US$ 000)			
Others (identify)			
Inputs in US$ 000			
Total Cost			
External assistance			
Total inputs for sub-sector (in US$ 000)			
Total cost			
External assistance			

6. Constraints to Sector Development

A brief description of the existing situation in the various sub-sectors and views of the central planning agency and other informed Government or WHO officials on the relative importance of financial and other constraints which hamper sector development.

6.1 Financial Constraints

National investment in the sub-sectors, in terms of loans and/or grants.

Internal fund generation, and the ability of users' charges to cover operation and maintenance costs, debt service and replacement costs, extensions etc.

Tariff policy.

Availability of foreign exchange.

External loans and grants.

Others.

6.2 Other Constraints

Water resources, with respect to present and projected constraints in quantity, quality and spatial distribution.

Planning, legal and institutional framework.

Coordination mechanisms.

Manpower and manpower development programmes.

Project generation and preparation, outlining the mechanism for project identification, incorporation into programmes, preparation, financing criteria etc.

Technology.

Operation and maintenance practices.

Surveillance procedures for quality control.

Construction firms and construction materials.

Logistics.

Community involvement.

Others.

7. Present and Prospective Absorptive Capacity, by sub-sector

This should consist of a broad estimate, to be derived from information available from the preceding sections of the rapid assessment guide.

8. Suggestions for International Collaboration

Resolutions WHA 30.33 identifies the following main areas in which collaborative support by international agencies may be required:

- Elaboration of sector development policies and plans through comprehensive studies of the national water supply sector.
- Development of alternative approaches and materials so as to suit best the particular conditions of the country.
- Identification and preparation of investment projects.
- Improvement of operation and maintenance of facilities, including surveillance of drinking water quality.
- Assessment of water resources and their conservation.
- Prevention of pollution of water resources.
- Prevention of spread of disease resulting from water resources exploitation.
- Improvement of manpower and management capabilities.

Using this or other appropriate framework and taking into consideration the different characteristics of the sub-sectors, a preliminary proposal for international cooperation projects should be prepared. A brief description of the projects, their relative ranking, the suggested timing and the desired external inputs should be given.

III. GUIDE FOR PREPARING RAPID ASSESSMENT REPORT

1. Situation Analysis

1.1 Present and projected coverage

This could be compared to a "Market Survey".
Example of contents: coverage and levels of service by population grouping; evaluation of present and future needs; community involvement.

1.2 Current and projected performance of sector agencies

This could be compared to an "Industry Survey".

Example of contents: Efficiency of water resources utilization; coordination within the sector; manpower and financial resources; technology and design criteria; design and construction capability; quality of service.

1.3 Responsiveness of planning mechanisms to sector needs

This could be compared to a "Planning/Programming Survey".

Example of contents: Sector goals; insertion of sector programmes into national plan; allocation of resources to competing sector projects; inter-sectoral planning; policy options.

1.4 Prospects for accelerated sector development

This could be referred to as "Sector Prospects".

Example of contents; New initiatives; internal and external investment trends; trends towards inter-sectoral collaboration; influence of factors external to the sector; absorptive capacity; technical options.

2. Information Gaps

Areas in which additional information is required.

3. Recommendations

This major output of the Rapid Assessment exercise should be given most careful attention. Recommendations should be ranked in order of importance and suggest general lines of Government action to implement them. The estimated budgets for inputs from external technical and financial cooperation programmes may also be indicated.

SAMPLE RAPID ASSESSMENT REPORT

A fictitious case study is developed below in sections corresponding to the preceding headings. This "sample report" illustrates a method of presenting the findings of the rapid assessment exercise.

1. Situation Analysis

1.1 Present and projected coverage

In 1977 the total population is about 3 000 000, divided into 40% urban and 60% rural. Agglomerations larger than 5 000 people are officially classified as urban. Overall population growth is 2.5% but some urban areas are growing at twice this rate. The average density is very low, even in urban areas. Only three cities are over 100 000, while about 50 towns fall within the range of 5 000 - 20 000.

About 25% of the total population has access to water from public systems. This service is provided almost exclusively to the three larger cities, where about 46% of the population is served, nearly all by private connections, at an average per capita allowance of 100 liters per day. In the smaller towns there are few public supplies, mostly by public standposts at an average per capita allowance of 30 liters per day. Less than 15% of the population in these towns is served. Public water supplies are practically non-existent in rural areas, where private wells, traditional sources and rain-water cisterns are used.

Sanitary sewerage is rare, being confined to the denser central areas of the larger cities. Alternative ways of excreta disposal are septic tanks, pit privies and, for most of the rural areas, nature.

The need for improved water and sanitation services is justified on health grounds by the high prevalence of gastro-intestinal and parasitic diseases, especially in the rural areas. The need for improved water service is also justified on social grounds by the high cost of re-sold water in the towns, the distance and difficult access of traditional sources and by the precarious situation prevailing in some areas during the dry season. The demand for sewerage and excreta disposal services is less explicit. Although many sources of water are polluted through the direct discharge of human wastes, there is no analytical information on the extent and level of contamination.

The degree of community involvement is low and as a consequence local needs are not made known to regional and central planning levels. Reliable information is lacking on the ability or willingness of the underserved groups to pay for improved systems or to contribute on a voluntary basis to their construction and operation.

The present unmet needs are large. As population grows, particularly in the urban areas, needs will become much more pressing. The backlog in sewerage services might become unmanageable. Recent increments in services have not been

sufficient to keep up with population growth. If this trend continues, levels of service will deteriorate steadily in urban areas and will remain almost non-existent in rural areas.

1.2 Current and projected performance of sector agencies

Water resources are generally abundant with many large and perennial rivers, which constitute the source of almost all the existing water supply systems. Groundwater resources are not well known as to extent and quality, since their development has been limited to the supply of one large city and to scattered public and private wells. It is therefore difficult to assess whether water resources are utilized efficiently.

The urban water supply agency has the main responsibility in the sector. Other agencies concerned are the Ministry of Planning, the Ministry of Health, the Agency for Rural Development, municipalities and town councils. There is no established coordination mechanism among the various agencies and this aggravates the negative effects of fragmentation of responsibilities.

There are only two sanitary engineers for the entire sector. Qualified professional and sub-professional personnel is scarce, and there are no facilities or programmes for local training. The staff of some agencies, including the urban water supply agency have good salaries and fringe benefits. The staff of other agencies such as those responsible for rural water supply and sanitation have fewer advantages and little opportunity for promotion.

There is no charge for basic sanitation services or rural water. Funds are internally generated only in the urban water sub-sector, through water tariffs and connection charges. The income from water sales is generally insufficient to offset production costs. Water tariffs favor the large consumers many of whom do not settle their bills, while the small consumer is forced to pay otherwise service is cut off. Central government investment is small because of limited funds, scarcity of foreign currency and priorities in different areas.

In the last three years the urban water supply agency was able to implement only three large-scale projects, despite sizeable assistance from bilateral sources. Rehabilitation and upgrading work is seldom undertaken. The agency's design capacity does not go beyond routine extensions of the distribution systems.

Design criteria are ambitious as to water allowances but deficient as to population coverage. Sophisticated technology is used in treatment and considerable money has been invested in treatment plants without corresponding efforts in the extension of distribution systems. The study of alternative technical and financial solutions is seldom practiced.

There are only two local construction companies, the larger works going to foreign contractors. Construction materials are available locally but piping and machinery must be imported. All of this increases the foreign exchange component of most projects.

Logistics are ill developed, especially for regional stocking of operational supplies and spare parts. Ordering procedures are cumbersome and time-consuming. Interior towns and rural areas suffer most from this state of affairs.

Difficulties of general nature come from the very limited average income; the undeveloped state of transport and communications and the low coverage of the electrification programme. For comparable work unit prices in the interior can be as much as twice those prevalent in the three major cities.

The quality of service is consistently poor, even in the urban systems. There is no control over the efficiency of treatment, operation is hampered by frequent lack of fuel and chemicals, maintenance by the absence of a programme and the unavailability of spares. Many systems provide service only a few hours per day. Quality control and general surveillance by the health agency are at an embryonic stage for both water supply and excreta disposal. The country has adopted the water quality standards recommended by WHO but has no mechanism to make them effective. There is no certainty that water anywhere is safe.

If recent trends continue unchanged, the performance of sector agencies will not improve substantially, being affected by severe constraints in terms of knowledge of water resources, qualified manpower, project preparation capability and logistics.

1.3 Responsiveness of planning mechanisms to sector needs

The current four-year national development plan was prepared at a time when the economy was in rapid expansion. A large drop in export earnings, coupled with high inflationary trends in the import market, has since caused sizeable cuts in all programmes.

The sector's share of total public investment was 3% but was further reduced when the above mentioned cuts were made, showing that the relative position of the sector in the total development effort is rather weak.

There is no long or medium term development plan for the sector or any of the sub-sectors and sector goals have not been formulated. Short-range development targets of the urban sub-sector, as proposed by the agency concerned, have been entered into the national plan in the form of financial allocations to specific projects. This project selection was made on the basis of availability of funds and state of readiness of the relevant projects rather than on social or economic considerations. Rural water supply and sanitation, which were not mentioned in the national plan, find themselves excluded from the planned development process.

The planning agency has no specialized section looking after the interests of the sector and, as already mentioned, coordination among agencies is weak. Sector planning does not adapt itself to unforeseen events, such as a prolonged drop in export earnings, chiefly because priorities have not been clearly identified. Knowledge of field conditions tends to remain localized and consequently unavailable to planners who operate from the central level. This affects the quality of planning and its implementation.

Except for sporadic cases, planning links have not been established with housing and town planning, rural development planning and health planning.

Objective sector policies are lacking, with the result that important decisions are taken by the various agencies in function of expediency. For example, the water supply needs of the large cities and the main administrative centres are considered well before those of the smaller towns and rural populations. Finding standposts unprofitable, the urban water agency is progressively closing them and plans all new service through private connections. The urban poor are thus increasingly being deprived of public service.

In spite of the explicit government goal of social equity, the sector is not doing enough to meet the targets inherent to a more equitable distribution of services between the rich and the poor, the urban and the rural.

1.4 Prospects for accelerated sector development

As a result of recent consultations with international agencies and regional development Banks, the Government plans to establish an inter-agency committee on water supply and sanitation, entrusted with studying the sector in depth and making proposals for immediate and medium-term action. The Committee's Terms of Reference will include the elaboration of specific targets for the decade 1981-1990. If the Committee's work is effective, prospects are that a sector policy will be adopted to enable the progressive adjustment of sector services to the national goal of social equity.

Although it is not expected that national investment levels will increase appreciably, substantial progress is possible through a better utilization and distribution of resources, improved institutional arrangements and increased internal fund generation. Improved sector planning and plan implementation will substantially increase the level of funding from international and bilateral cooperation programmes.

Probably better performance in the rural environment could be achieved if the Ministry of Public Works assumed a stronger technical assistance role and if the Ministry of Agriculture strengthened its Rural Development section to deal with rural water supply and sanitation. Additional resources from outside the sector should become available if links with rural development programmes are established as expected.

As the road construction and rural electrification programmes gain momentum, some of the external constraints to the development of the sector will be removed and more progress will be made in providing water and sanitation services to the interior.

The absorptive capacity of the sector cannot be built up rapidly. The prospects for comprehensive manpower development programmes are not bright and the need for expatriate professional personnel will continue for several years. A proposal under study to concentrate local training on middle-level supervisory personnel should, if implemented, lead to progressive improvements in operation

and maintenance. The health agency is also planning a phased programme to train personnel in sanitary surveillance and quality control.

An international consultant on low-cost technology has recently cooperated with the urban water supply agency in preparing project designs which considerably reduce water treatment costs. If this approach takes hold, coverage of service can be increased at no extra cost, since treatment savings can be used for much needed improvements to distribution systems.

Government is aware of the need to decide soon on whether to make a long-term commitment to the exploration of groundwater resources. The decision will affect future orientation on the use of water resources.

2. Information gaps

As shown by the preceding analysis, adequate knowledge is lacking in the following areas:

2.1 Policy.

2.2 Present and projected manpower needs.

2.3 Applicability and acceptance of low-cost technologies.

2.4 Groundwater resources.

2.5 Condition of existing systems, to justify rehabilitation and upgrading work.

2.6 Quality of water delivered to the consumers.

2.7 Nature and extent of surface water pollution, in relation to sources of public water supplies.

2.8 Community involvement in terms of felt needs, willingness and ability to participate in the construction and operation of rural schemes.

2.9 Mechanisms to refer local needs and priorities to the awareness of central planners.

International cooperation is required in conjunction with subjects 2.1 through 2.4 and is described in the following section on recommendations. It may be required to a limited extent in subjects 2.5, 2.6 and 2.7. The remaining action can be planned and implemented using local resources.

3. Recommendations

The main recommendations, in order of priority, are:

3.1 Government to provide full support to the National Inter-Agency Committee on Water Supply and Sanitation entrusted with the formulation of appropriate sector policies and of a sector plan for the years 1981-1990. Under technical international cooperation, a consultant, based in the Ministry of Planning, will provide technical documentation and advice to the Committee members.

3.2 Government to conduct a manpower development study to determine present and future needs in the sector. A complementary output of the study would be a guide for international cooperation inputs in the main areas of a fellowship programme abroad, and local training programmes for middle-supervisory level personnel and for surveillance and quality control personnel. Under technical international cooperation a consultant will provide planning and curriculum advice to the urban water supply Agency, the Ministry of Public Works and the Ministry of Health.

3.3 The urban water supply Agency to undertake project preparation for the small towns so far neglected. Under technical international cooperation a team of consultants will help develop typical schemes for various sizes of communities including low-cost technology among the alternative solutions to be considered.

3.4 Government to undertake a groundwater exploration programme. Because of the need of costly equipment and skills unavailable in the country, this project would rely heavily on international cooperation. In the preparatory phase a consultant would assist the Ministry of Public Works in the determination of Terms of Reference for the large-scale project. Project operations will be carried out by a specialized firm and will consist not only of test borings but also of equipping and exploiting selected successful borings.

It is estimated that international cooperation inputs for the above programme will consist of approximately 70 man-months of expert services, cost about US$ 1 000 000, including US$ 500 000 for equipment and extend over a five-year period starting in early 1978.

The above recommendations have been accepted in principle by Government. Follow-up action, including that required for project preparation, has been discussed in detail and agreed upon during the consultation phase with Government.

IV. STRATEGY AND SUGGESTED PROCEDURE

1. Strategy

Acceleration of National Effort in Water Supply and Sanitation

<table>
<tr><td colspan="2">A. General timetable
1977-1978</td><td>1978-1980</td><td>1981-1990</td></tr>
<tr><td colspan="2">Rapid Assessment
(stage setting)</td><td>Planning
(Follow-up action)</td><td>. Implementation
(International Decade)</td></tr>
<tr><td colspan="2">B. General content
Rapid Assessment</td><td>Planning</td><td rowspan="3"></td></tr>
<tr><td>Data review
by WHO</td><td>Consultation
between Govt and WHO</td><td>Concerted action
Govt (with inter-
national community)</td></tr>
<tr><td>Known
Unknown
Skeleton report</td><td>Fill in missing
information
Decide on follow-up
Complete Rapid
Assessment report</td><td>Elaborate National
Plan</td></tr>
</table>

Rapid Assessment consists of:

a) a review of available information and its presentation in a form which identifies missing information
b) consultation with Government to verify data presented, obtain missing information, identify information gaps, agree on actions required to establish a national sector plan including the identification of the nature and extent of cooperation required from outside, and complete the rapid assessment report.

Planning consists of the preparation of national plans for the international decade and will generally include contacts and mobilization of external support.

Implementation consists not only of the actual execution of studies and pre-investment and construction projects, but also of continuing planning, periodic assessments of the progress of the programme and maintaining close relationships with external technical and financial cooperation agencies.

2. Suggested Procedure

2.1 Regional Advisers'meeting, with participation from some Government Officers with sector responsibility, to discuss and agree on content and procedure of Rapid Assessment. (Geneva, 1-5 August 1977).

2.2 Director-General's circular letter to Member Countries informing them of initial action taken by WHO and announcing that Regional Directors will follow up with a more specific communication on this subject. (August 1977).

2.3 Regional Directors' letter to Member Countries indicating action WHO can take to assist and asking specifically whether WHO cooperation is required for the Rapid Assessment. (August - September 1977).

2.4 Regional Advisers identify those countries most likely to respond positively to WHO's offer of cooperation, estimate initial manpower requirements (until end 1977 for example) to carry out the data review phase and inform Chief, PIP what Cooperative Programme resources are needed, (by specialty and/or name), where, when and for how long, and what documentation is available in the Regional Offices. (August 1977).

2.5 Data review phase. Compilation of available information and shaping it as far as possible into the form of a report following the general guide given in this document. This exercise should start with countries where no sector studies have been made and use only WHO staff from Headquarters and Regions. WHO country staff can also participate, provided that there is no dialogue with Government counterparts, unless Government agreement to WHO cooperation is already in hand. Work for most countries will take place in the respective Regional Offices, although in a few cases it might be documented in Geneva. (September - December 1977).

2.6 Consultation phase.

a. For countries willing to undertake the assessment and requesting WHO cooperation. Acknowledgement on the part of the Regional Office proposing time and staff for country discussions. Country visit. Discussions at various Government levels. Field work as required. Preparation of Rapid Assessment country report and agreement in principle on follow up action. Positive response will receive immediate attention and modif the priority criterion given in 2.5 above. Regional Offices will make a detailed estimate of manpower requirements and scheduling, including inputs from the Cooperative Programme and inform Chief, Pip at the earliest.

b. For countries proposing alternative ways of proceeding, the situation will be analysed on its merits.

c. For countries responding negatively or not responding. Work will be stopped on the data review phase but means for stimulation of interest will be considered case by case.

2.7 Review of progress of exercise and proposals on how further to stimulate the interest of countries. July 1978 in conjunction with scheduled Regional Advisers' meeting.

THIRTIETH WORLD HEALTH ASSEMBLY

WHA30.33
18 May 1977

COORDINATION WITHIN THE UNITED NATIONS SYSTEM - GENERAL MATTERS

United Nations Water Conference

The Thirtieth World Health Assembly,

Having considered the report of the Director-General on the United Nations Water Conference;[1]

Noting the recommendations made by that Conference, particularly with respect to community water supply and the priority given to the provision of safe water supply and sanitation for all by the year 1990; the priority areas for action within the framework of the Plan of Action formulated by the United Nations Water Conference; the actions to be undertaken at national level as well as through international cooperation; and the proposal that 1980-1990 be designated as the International Drinking Water Supply and Sanitation Decade;

Recalling resolutions WHA29.45, WHA29.46 and WHA29.47 concerning directly and indirectly the interests of WHO with respect to the provision of adequate and potable water and sanitary disposal of wastes;

Considering that previous mandates of the Organization, as stated most recently by the Twenty-ninth World Health Assembly in the resolutions referred to above, and the ongoing and planned programmes of WHO in the field of community water supply and sanitation enable the Organization, making maximum possible use of its national collaborating institutions, to play a leading role in implementing the relevant recommendations of the United Nations Water Conference, including the request to WHO to monitor the progress of Member States towards the attainment of safe water supply and sanitation for all by the year 1990, through technical cooperation with individual Member States and in cooperation with other concerned organizations, institutions and programmes of the United Nations system,

1. URGES Member States:

(a) to appraise as a matter of urgency the status of their community water supply, sanitation facilities and services and their control;

(b) to formulate within the context of national development policies and plans by 1980 programmes with the objectives of improving and extending those facilities and services to all people by 1990 with particular attention to specific elements such as:

(i) the elaboration of sector development policies and plans through comprehensive studies of the national water supply sector;

(ii) the development of alternative approaches and materials so as to suit best the particular conditions of the country;

 (iii) the identification and preparation of investment projects;

[1] Document A30/28 Add.2 and Corr.1.

(iv) the improvement of the operation and maintenance of facilities, including the surveillance of drinking water quality;

(v) the assessment of water resources, and their conservation;

(vi) the prevention of pollution of water resources and spread of disease resulting from water resources exploitation;

(vii) the improvement of manpower and management capabilities;

(c) to implement the programmes formulated in the preparatory period 1977-1980 during the decade 1980-1990 recommended by the United Nations Water Conference to be designated as the International Drinking Water Supply and Sanitation Decade;

(d) to ensure that people consume water of good quality by periodic inspections of water sources and treatment and distribution facilities, by improving public education programmes in the hygiene of water and wastes, and by strengthening the role of health agencies in this respect;

2. **REQUESTS** the Director-General:

(a) to collaborate with Member States in the above-mentioned activities, including the provision of specialized staff upon the request of Member States, with immediate efforts to be made for a rapid assessment of ongoing programmes and the extent to which they could usefully be expanded to meet the objectives recommended by the United Nations Water Conference;

(b) to revise as appropriate the review being undertaken in accordance with resolution WHA29.47 operative paragraph 5 (4), with a view to meeting the terms of the recommendation of the United Nations Water Conference concerning country plans for water supply and sanitation, and as a major contribution to the preparations for the proposed International Drinking Water Supply and Sanitation Decade;

(c) to ensure WHO's fullest participation in implementing the Plan of Action formulated by the United Nations Water Conference and in the actions to be undertaken during the proposed International Drinking Water Supply and Sanitation Decade, in close collaboration with the concerned organizations of the United Nations system, other intergovernmental bodies, and nongovernmental organizations;

(d) to reinforce if necessary WHO's longstanding ability, making maximum possible use of its national collaborating institutions, to play a leading role in the field of community water supply and sanitation in cooperation with the other concerned organizations of the United Nations system;

(e) to strengthen collaboration with multilateral and bilateral agencies and other donors regarding the provision of resources to Member States in the development of their water supply and sanitation programmes;

(f) to study the future organizational, staffing, and budgetary implications for the Organization, and the role it should assume in the light of the recommendations of the United Nations Water Conference; and

(g) to report on developments occurring in the light of the present resolution to a future Health Assembly under a separate agenda item.

Thirteenth plenary meeting, 18 May 1977
A30/VR/13

* * *

Check List by Mr G.H. Goh, Asian Development Bank for Development Plan Preparation*

1. Establishment of clear policies and guidelines for each sub-sector (by certain target year).

2. Formulation of the sector plan (breaking down into sub-sector). The sector plan shall include, to the extent possible, the following:

a) projection of population served;

b) projection of investment requirements;

c) projected targets for financing the plan from cash surplus to be obtained within the sector

d) projected targets for reduction of unaccounted for water;

e) projected targets for phasing out subsidies, if any, for operations and maintenance;

f) a program to develop water quality surveillance;

g) manpower projections and training program;

h) a program to collect planning data needed and establishment of information system by sub-sector (target years);

i) target years for review of plans of each sub-sector;

j) target years for obtaining government approval;

k) target years for reaching self-sufficiency in major supplies commonly needed for the sector development;

l) target years for reaching self-sufficiency in project preparation and project implementation.

3. Target years for integration of the rural sub-sector plan in regional development plan.

4. Target years for completing the needed institutional changes by sub-sector.

* This list should not be construed as a complete list. It is presented mainly to stimulate thinking and to initiate early action.