WORLD HEALTH ORGANIZATION

REGIONAL OFFICE FOR THE EASTERN MEDITERRANEAN

SEMINAR ON SANITATION PROBLEMS
OF RAPID URBANIZATION

Lahore, 7-14 October 1971

EM/SEM.SAN.PROB.URB./Prov.Rep.
14 October 1971

ENGLISH ONLY

PROVISIONAL REPORT
OF THE SEMINAR

PART I - GENERAL

I INTRODUCTION

The world population has more than doubled over the past century. This is due to advances in medical sciences which have prolonged life expectancy and greatly reduced death rates. This population growth coupled with an unprededecedent migration of people from rural to urban areas has caused the number of city dwellers in most countries to increase more than five times during the past 100 years. The spectacular advance of urbanization continues in all countries of the world creating complex problems some of which pertain to environmental health. The magnitude of the trend toward urbanization is such that in some countries it has been forecasted that in the year 2000 more than 85% of the population of those countries will reside in urban areas.

In the process, environmental health consideration often tends to be forgotten. In fact, critical environmental health hazards already threaten many cities of the Eastern Metiderranean Region of WHO due to rapid urbanization. To solve the problems that are being created by the movement of people into the cities, adequate measures will be required to provide acceptable solutions.

It is difficult to delineate all of the environmental health problems that are involved in this trend toward rapid urbanization. Many urban areas do not have an adequate supply of potable and palatable water to meet the needs of the expanding population and increasing industrialization. Water is needed not only for domestic purposes but it is needed in the manufacture of goods and for irrigation. Special note should be made that at present only 25% of the population of the world residing in urban areas are provided with piped water under pressure into their homes. This is a serious situation which has been recognized by the World Health Assembly which was convened in Geneva, Switzerland, in May 1971. The Assembly at this time has endorsed the programme for the seventies of the United Nations in which the targets are as follows:

Present position : 25% of urban dwellers supplied in house or courtyard; 26% supplied from public standpipes.

Decade target : 40% to be supplied in house or courtyard; 60% to be supplied from public standpipes.

Another important problem of urbanization pertains to disposal of liquid wastes. Since many cities and towns have inadequate or non-existent wastewater collection and treatment facilities, serious problems of water pollution has resulted. The receiving waters into which these liquid wastes are discharged have often become so polluted that they can no longer sustain aquatic life. These discharges by man upset an ecological balance of nature.

Improper disposal of solid wastes is another urban problem in more of the nations of the world. Most cities lack the facilities to collect, process and dispose of the used goods of urban life. Some of the commonly used methods of solid wastes disposal result in water pollution, ground pollution or air pollution or a combination thereof.

In almost every country of the world there is an immediate need for the formulation and implementation of comprehensive programmes of environmental health. These programmes need to be formulated within the scope of national economic development plans and in accordance with local and national resources, customs and tradition. In developing these comprehensive programmes it is necessary that consideration be given to the provision of adequate protection to the health of the urban residents. Without this protection, future generations appear to be doomed.

II PURPOSE OF THE SEMINAR

There are many purposes for the convening of this Seminar. Some of the more important are:

1. To analyze the problems of rapid urbanization that have or may have a direct effect on the health and well-being of urban residents, particularly in the nations of the Eastern Mediterranean Region of the World Health Organization;

2. to exchange information between the member countries of the Eastern Mediterranean Region of the World Health Organization on specific problems of environmental sanitation related to the trend of rapid urbanization in this sector of the world;
3. to analyze proposed or in use solutions to some of these problems and to direct attention to the increasing need for preventive action;
4. to provide guidance for countries who need assistance in developing plans to cope with the sanitation problems of rapid urbanization;
5. to define the role of colleges, universities and other institutions of higher learning in developing the necessary manpower needed to cope with these problems; and
6. to encourage research institutions to study sanitation problems of rapid urbanization and to develop proposed solutions to these problems.

The Seminar was designed also to provide an opportunity for the participants to exchange, through dialogue, accounts of their experience in developing solutions to these problems and to propose constructive recommendations to national governments and WHO of suggested courses of action which may alleviate the health stress of rapid urbanization.

III ORGANIZATION

In 1969 the WHO Regional Committee proposed that a Seminar on Sanitation Problems of Rapid Urbanization be convened. An invitation from the Government of Pakistan was submitted to the Regional Office of the Eastern Mediterranean of WHO to hold the Seminar in Lahore. The planning and organization of the Seminar was conducted with the assistance of the Government of Pakistan and particularly of the West Pakistan University of Engineering and Technology. Many members of the Faculty of the University played important roles in planning, organizing and implementing the programme of activities.

The Seminar was held in Lahore, West Pakistan, from 7 to 14 October 1971. Official delegates came from Afghanistan, Cyprus, Egypt, Ethiopia, Iran, Iraq, Jordan, Libya, Pakistan, Qatar, Sudan, Syria, Tunisia and Yemen. In addition there were observers from some of other UN Specialized Agencies. A list of participants, observers, consultants and staff is presented as Annex I.

The Seminar was opened by Rear Admiral A.N. Ansari, Director-General of Health of Pakistan, who welcomed the participants of the Seminar and called for leadership in the development of plans to cope with the problems of rapid urbanization and industrialization. He expressed hope that the developing nations would not repeat the errors of the more developed countries. Admiral Ansari asked that the necessary resources and technical knowledge be mobilized to assist the developing countries in formulating plans of action which would preserve and protect the environment and at the same time avail people of the benefits of industrialization and urban life.

An introductory speech was given by Mr. Ahmad Hasan, the Vice-Chancellor of the West Pakistan University of Engineering and Technology in Lahore. He noted that it was the hope and conviction of all good men that the environment could be controlled adequately through proper sanitation so as to make urbanized areas a proper place in which to live. Mr Hasan acknowledged the health problems caused by ecological imbalances that have been created in the more developed countries of the world through urbanization and industrialization.

Dr A.H. Taba, WHO Director, EMR, gave a brief address in which he stressed the needs for the candour by the participants of such a Seminar in dealing with problems within the Eastern Mediterranean Region and in seeking possible solutions. He noted also that a number of member countries were proceeding to take steps for a thorough study of the major problems of sanitation in some of the rapidly urbanizing areas. Dr Taba called for the formulation of comprehensive programmes within each national development plan which would utilize all available resources effectively and efficiently.

The Seminar was opened officially by Lt. General M. Attiqur Rahman, Governor of the Punjab, West Pakistan, who made the inaugural address. He noted that one of the major problems facing the world in which we live

is uncontrolled urbanization. Lt. General Attiqur Rahman acknowledged that the survival of mankind depends in part upon the recognition of the basic issues of environmental health and the development and implementation of programmes to reduce the potential hazards from environmental pollutants. He felt that future action would necessitate the coordination of all public policies relating to industrialization, agriculture, power, energy and development of transport and the use of natural resources.

After the opening ceremony, the following officers were elected:

Dr M. Islam Sheikh — Chairman
Professor, Public Health Engineering
West Pakistan University of Engineering
and Technology, Lahore, Pakistan

Dr R.A.A. Gomaa — Vice-Chairman
Secretary General, Health Services
Supreme Council, Ministry of Public
Health, Cairo, Egypt

Mr V. Babazade Khamnei — Rapporteur
Deputy Director, General Environmental
Health Department, and Director,
Air Pollution Control and Occupational
Health Department, Ministry of Health,
Teheran, Iran

The Provisional Agenda was adopted by the participants and the Programme of Work was outlined by Mr L.J. Lovelace, WHO Regional Adviser on Environmental Health, EMR, who then introduced the WHO Consultant, Mr F.A. Jacocks, and WHO Temporary Advisers, Professor E.W. Mood and Mr R. Casanueva.

IV METHODS OF THE SEMINAR

The methods of this Seminar involved the preparation and presentation of twelve papers on the ~~scientific technological~~ and ~~administrative~~ aspects of sanitation problems of rapid urbanization. The presentation of each paper was followed by comments from the participants. Some of the basic documents were sent to each participant in advance of the meeting in order

to afford them an opportunity to read and study these papers prior to the convening of the Seminar. Outlines of other papers were also provided to the participants in advance of the sessions. A list of the documents which were made available to all participants prior to the meeting may be found in Annex III. A summary of each paper and of the discussions that followed constitute Part II of this report.

To supplement the material contained in the prepared papers and outlines, many additional publications were made available to the participants. A list of these documents appears as Annex IV. A working library of other pertaining material was available. To supplement the discussions several films dealing with subjects discussed were shown.

PART II
SUMMARY OF PRESENTATIONS

SUMMARY OF FIRST DAY PROCEEDINGS - THURSDAY 7 OCTOBER 1971

URBANIZATION AND RELATED HEALTH PROBLEMS

by Mr F.A. Jacocks, WHO Consultant

Man has made ill use of the earth. Exploding populations together with urban crowding, industrial expansion and uncontrolled use of technologic developments has threatened man's future existence on earth. Man is responsible chiefly for creating these problems and it is his duty to take such actions as will at least maintain the environment in its present condition. Even this, due to the anticipated population measures, over the next twenty-five years, will produce conditions considerably worse than they are today.

Human life has been affected by the stress of urbanized, industrial environment and the methods that man has employed to degrade his environment. Some of present pollutants of the environment could have a marked effect on future generations. From current data, it is clear that environmental degradation is not a localized issue but is indeed world-wide in scope.

Comments by the author also demonstrated that it is highly undesirable to attack these problems on a categorical basis, i.e. isolation of a problem and independent action. Most influences or actions affect other actions. The environment, as a whole, consists of interrelated, interacting and interdependent parts. An urban area is really a system of many sub-systems and while each sub-system may be studied independently and changes proposed, it is important to acknowledge the effect of change of a single sub-system upon the total system. Although we are considering here the effects of urbanization as they relate to the creation of sanitation problems, we must not lose sight of the economics, social, cultural and physical characteristics of the target area. We must recognize that there usually will be trade offs since

no urban area is so fortunate financially as to be able to correct all defects simultaneously. A further consideration is that to concentrate on correcting a single defect could possible accelerate the degradation of the total environment.

It is recommended that consideration be given to the use of mathematical interrelationships in the total environment (social, cultural, economic, physical, as well as man himself). This is a method in determining the best possible environment for the well-being of man.

Concluding remarks indicated that many mistakes have been made in the past. Seminars such as this should serve to eliminating the repeating of these mistakes.

DISCUSSION

The cost of abating pollution in developing countries will be great, however, if action is initiated early the ultimate cost could be substantially less. This will be particularly true in those countries now undergoing rapid urbanization.

A pristine environment and highly industrial and urbanized societies are incompatible. In formulating solutions to specific problems of environmental pollution, consideration must be given to the cost-benefit ratios.

Obtaining sufficient funds to provide all the essential sanitation services for the improvement of the environment within the decaying cores of old cities is financially infeasible. Health education and motivation of the people may be a solution. It is necessary to convince people that pollution of the environment causes many problems some of which effect health detrimentally and are costly to correct, but that sanitation services and facilities are worth the cost.

In the Sudan considerable effort has been expended to improve conditions in rural areas in an endeavour to reduce the migration of people to urban areas. In Pakistan similar efforts have been made through the implementation of a policy of rural development which includes the provision of an adequate and safe supply of drinking water, effective drainage and improved rural health

services with some financial assistance from UNICEF. This has partially stemmed the urban migration and some industries have decided to locate in rural areas thereby securing a better economic basis for these areas.

A question was raised as to the feasibility of reducing present pollution by engineering methods. There was a consensus of opinion that present degree of pollution can be reduced substantially but it would not be possible to create a pristine environment. However, a more healthful environment could be created through the effective application of present technology without excessive costs and inconvenience of the people.

SUMMARY OF SECOND DAY PROCEEDINGS - FRIDAY 8 OCTOBER 1971

ENVIRONMENTAL HEALTH PROGRAMME OF WHO AS RELATED TO URBAN DEVELOPMENT

Presented by Mr L.J. Lovelace, WHO Regional Adviser, EMR

Considerable interest has been and is being displayed by the World Health Organization in promoting and stimulating nation-wide environmental health activities in member countries with emphasis on urban areas where sanitation problems tend to be more acute, notably in congested zones owing inter alia to rapid urbanization and industrialization and the consequent increasing flow of people towards cities.

More attention is given accordingly to such areas and efforts are being made to meet environmental health requirements which in this Region, relate mainly to water supplies, liquid and solid wastes disposal, air pollution control and the organization of sanitation services.

Water Supplies

In line with a number of recommendations by various World Health Assemblies, and as part of the UN Second Development Decade Programme, specific targets were set up by this Organization, as follows:

- 40% of all urban populations to be supplied with safe water in house or courtyard (present position 25%)
- the remaining 60% of urban population to have access to safe water from standpipes.

In this Region the number of persons residing in cities is 45 millions and it is expected that another 45 millions more will be added by 1980. The proposed water supply programme will require about US $ 7.5 billion for implementation (for the whole world) including about US $ 800 million for the Eastern Mediterranean Region.

WHO is most willing to provide technical assistance in respect of this programme, specially in the formulation of master plans and feasibility studies which may serve as a basis for obtaining loans from banking institutions with a view to execution. These studies are usually carried out within the UNDP/SF programme. In this Region two important projects are presently being implemented under UNDP/SF financing with WHO acting as executing agency: a project in Yemen for the water supply for Sana'a and Hodeida; one scheme in Afghanistan for the supply of water to Kabul. In addition nation-wide schemes are carried out in Yemen, Pakistan and Ethiopia where a number of water supplies have been designed and constructed. It is also planned that extensive technical assistance will be given shortly to East Pakistan.

Mention should be made that this Organization is very much interested in research with a view to finding solutions to the special problems of developing countries. This relates to reducing costs of construction and operation of waterworks, to improving the efficiency of management and encouraging the provision of better water supplies to serve larger number of people at a price they can afford. To that effect WHO has requested the assistance of four universities in this Region, namely in Iran, Israel, Sudan and Egypt, to act as collaborating institutions to the WHO International Reference Centre for Community Water Supply at The Hague, Netherlands.

Wastes Disposal

The governments of this Region are now getting more concerned about the potentially vast array of endemic diseases which may be caused by wastes unless they are adequately disposed of. In fact in the countries of this Region, sewage treatment plants are often limited in extent and capacity. Sometimes they are completely lacking which creates problems of water pollution, and opportunities for the propagation of vectors of diseases which constitute an imminent threat to the healthful and economic development of a community.

It is encouraging however to note that many member countries now have taken steps to study these problems more carefully and are developing plans to solve them. For example, an important Special Fund Project is being implemented in Iran for sewerage and drainage facilities for Teheran. In Lebanon a request has been officially submitted by that Government to UNDP for consideration. This project covers waste-water and solid waste disposal studies for the whole of Lebanon.

In the field of solid wastes, interest has been displayed by some governments, in particular Libya and Tunisia, where WHO assistance is being granted to them. This awareness is, in part, the result of the WHO-sponsored course on the collection and disposal of solid wastes held in 1968 in Damascus, Syria, for engineers from twelve EMR countries.

As regards research, the Public Health Institute of Teheran, Iran, has already been designated as a collaborating institution, along with many others in other regions, to assist the WHO International Reference Centre for Wastes Disposal which was set up in Dubendorf, near Zurich, Switzerland.

Environmental Pollution

The gradual development of the water carriage system for human wastes has at the same time brought about, in this Region, some problems of stream and coastal pollution due mainly to the fact that municipal sewage effluents are often not treated or sometime subjected only to preliminary treatment. So far WHO consultants have been provided to seven countries of the Eastern Mediterranean Region assistance in surveying and assessing the situations. Relevant recommendations have been made and stream and effluent standards have been proposed. It is intended that these programmes will continue and that a seminar on water pollution will be convened by EMRO next year to discuss the problems of this Region.

As regards air pollution problems, there are no acute situations in this Region, except perhaps in limited areas or in a few big cities. WHO consultants have been provided to four countries already, i.e. Kuwait, Lebanon, Cyprus and Iran and assistance is being given to Iraq. Also another consultantship is being arranged for Iran.

In 1969 the Regional Office for the Eastern Mediterranean convened in Teheran a Seminar on Air Pollution Control in which some of these questions were discussed. Eighteen countries were represented.

It is very likely that the interest of Member States in Environmental Pollution will increase as a result of present development trends, specially in metropolitan areas. It is anticipated that the help of the Organization will be sought more often in the coming years.

Sanitation Services

It is satisfying to note that sanitation services are now being given greater consideration not only in health programmes but in national development plans as well. Since the implementation of such programmes presupposes the existence of an infrastructure capable of conducting effective planning, it has been found advisable both by member countries and this Organization to promote the development and/or strengthening of environmental health services with a view to stimulating environmental health activities and also to advising other government agencies concerned with sanitary engineering works.

So far advisory services have been or are being given by WHO in this field to most of the countries of this Region. In addition WHO has helped in the promotion and development of training courses and the granting of fellowships.

In line with this programme and owing to the need for French-speaking engineers in a number of regions, WHO has helped establish in Rabat, with the assistance of the Government of Morocco, a Sanitary Engineering Centre. Two engineers of this Region are now studying in Rabat and another one has completed one-year post-graduate studies.

The training of sanitarians continues to be an important element of most field projects of environmental health and basic health services. In this Region WHO-assisted sanitation courses are being given in ten countries. It is felt that this effort is justified and needs to be expanded.

Conclusion

EMRO has encouraged Member States to give high priority to environmental health programmes in particular those concerned with water supply and sanitation services. It is thought that stronger emphasis should now be given to

other environmental health activities such as wastewater treatments, solid waste disposal, housing and urban planning.

Increased attention should also be given by health ministries to give environmental health activities a higher priority in national planning. Adequate appropriation of funds should be made for basic sanitary engineering works which are critically needed in many places. It should be realized that 'in the long run, poor sanitation is more expensive than good sanitation'.

SUMMARY OF THIRD DAY PROCEEDINGS - SATURDAY 9 OCTOBER 1971

PLANNING OF METROPOLITAN AREAS AND NEW TOWNS

By Professor E. V. Mood, WHO Temporary Adviser

The solution of many sanitation problems of rapid urbanization require the application of the process of metropolitan planning which should be comprehensive and should take into account the special circumstances, requirements and resources of the metropolitan area.

Planning is a process on an evolutionary continuum that may be defined as a "model of an intended future situation" and consists of a "programme of action" which delineates implementation measures. Comprehensive metropolitan or new town planning usually consists of the three basic elements as follows:

1. Economic Planning, which generally involves the utilization of available economic resources to achieve a desired productivity goal.
2. Location Planning, which usually consists of the grouping of various land-use activities and of assigning those groups to specific areas or districts.
3. Physical Planning, which designates the use or uses to which land should placed. (Metropolitan planning tends to be primarily physical planning.)

Planning should be conducted at all levels of government i.e. national, regional and urban levels.

These are three basic phases of planning that should be followed sequentially as follows:

1. Determination of goals and general objectives.
2. Data collection and research
3. Plan preparation and programming.

Every plan document should fulfill six fundamentals namely :

1- The plan should be comprehensive.
2- The plan should be long-range in character.
3- The plan should be general.
4- The plan should focus on physical development.
5- The plan should relate physical design proposals to community goals and social and economic policies.
6- The plan should be first a policy instrument, and second a technical instrument.

Environmental health planning should include consideration of the attainment of the following objectives :

Objective 1 Prevention and control of transmission of infectious agents.

Objective 2 Prevention and control of human exposure to chemicals that are or may be hazardous to human health.

Objective 3 Prevention and control of human exposure to physical forces and agents that are or may be hazardous to human health.

Objective 4 Prevention and control of those biological, chemical or physical conditions, forces and agents that cause or may cause anxiety.

Objective 5 Promotion or enhancement of physical well-being.

Objective 6 Promotion or enhancement of social well-being.

Environmental health issues that should be considered in metropolitan planning are as follows :

i- Water Supply.
ii- Sanitary waste disposal (waste water and human excreta).
iii- Drainage of storm water.
iv- Solid wastes and land pollution.
v- Air pollution.
vi- Ionizing radiation.
vii- Housing and open spaces.
viii- Public Health Establishments (hospitals, clinics, etc.)
ix- Vector control.
x- Noise and vibration.

Environmental health criteria as defined by various WHO expert Committees, scientific groups, seminars, etc. may be found in Appendix I.

SUMMARY OF DISCUSSION

The methods involved in developing national goals and objectives were discussed. There was general agreement that in the developing countries national goals and objectives, and therefore national planning, should relate primarily to economic goals just as is the practice in the more developed countries. It was generally agreed that definition of goals and objectives should normally precede collection of data in order that only pertinent material be gathered, however, it was acknowledged that in some of the developing countires there is insufficient facts on hand of natural resources, etc. as to provide a base for economic planning. In those cases, an inventory of all natural resources should be made as quickly as practical to provide a basis for national goal setting and national economic planning. These steps seem necessary if regional and local planning is to be able to cope with the concommitent sanitation problems of rapid urbanization.

It was noted that before any plans for change are implemented, it is desirable to get public reaction to the proposed changes. There have been numerous cases in both the more developed countries and in the developing countries where considerable funds have been expended for an environmental change that should improve the tend of the health of the people, but which were rejected by the public as the change did not fulfill a basic need or did not conform with a standing tradition.

The discussion confirmed the fact that planning at all levels of government was a continuing process and that agencies of government should be established to conduct this activity. When planning agencies are established, particularly at the regional and local levels of government there should be considerable public health engineering and sanitation input. This input is particularly important in dealing with problems of rapid urbanization. Traditionally, planners have concerned themselves primarily with land-use planning and have ignored many of the factors that are important in the creation of a more sanitary and more healthful environment.

There was a general consensus of opinion that public health workers, particularly sanitary engineers and health administrators, become more familiar with and more involved in the planning process. Similarly, planners should become more knowledgeable about public health issues of the area, particularly those concerning sanitation. Ways and means should be sought to initiate and sustain dialogue between planners and public health workers.

APPENDIX I

ENVIRONMENTAL HEALTH CRITERIA FOR URBAN PLANNING

1. Criteria for Urban Water Supply

   a) Urban water supplies should be continuous, adequate and safe, and should have sufficient pressure.

   b) Urban water supplies should meet at least the standards specified in the current edition of the International Standards for Drinking Water recommended by WHO.

   c) Adequate supplies of potable and palatable water should be provided for the domestic use of every inhabitant of the urban area.

   d) Sufficient water with adequate pressure should be made available for fire services.

2. Criteria for Waste Water Systems

   a) Sewerage systems, sewage treatment facilities and adequate storm water drainage should be provided in urban areas.

   b) Sewage treatment facilities should be adequate to permit subsequent uses of receiving bodies of water.

   c) Adequate drainage of storm water should be provided in urban areas as to prevent localized flooding.

3. Criteria for Urban-Area Water Resources

   a) Water supply, sewerage and drainage should be considered as a unit or as a system and their coordinated planning as an integral part of the metropolitan plan.

   b) Water supply, sewerage, sewage treatment and, where possible, drainage should be considered as a public utility and financed on a self-liquidating basis.

4. Criteria for Solid Wastes Management

   a) The storage, collection, transport and disposal of solid wastes should be considered as units of a system, each inter-related to the other.

   b) The storage, collection and transport of solid wastes, particularly garbage, should be done in the most sanitary and efficiency way possible to assure proper control of infectious diseases.

   c) The collection and transport of solid wastes should not cause traffic congestion or create a nuisance situation.

5. Criteria Concerning Land Pollution

a) Seepage into, or discharge on the earth surface of chemicals, including oil should not pollute the soil or the ground water table.

b) Excavation for sand and gravel and spoil banks from mining operations should not create breeding areas for insect and rodents, nor nuisance conditions, and should not interfere unduly or seriously limit future land use of the site.

c) Discharge of radioactive materials on the earth surface or burial of these materials in the earth's surface should not create potential hazards to present and future generations of humans, plants or animals.

d) Land conservation practices should be developed in cooperation with soil conservation groups and these practices should be made an integral part of the urban plan for solid waste disposal.

6. Criteria for Air Pollution Control

a) The siting of new towns should be undertaken only after a thorough study of local topography and meteorology.

b) New industries using materials or processes likely to produce air contaminants should be so located as to minimize the effects of air pollution in the population.

c) Satellite (dormitory) towns should be restricted in use of pollution-producing fuels.

d) Provision should be made for the development and maintenance of green belts and open spaces to facilitate the dilution and dispersion of unavoidable air pollution.

e) Greater use should be made of hydro-electric and nuclear energy and of natural gas for industrial processes and domestic purposes as a means of reducing the pollution resulting from the use of conventional fossil fuels.

f) Greater use should be made of central plants for the provision of both heat and hot water for entire districts.

g) As motor transport is a major source of pollution, traffic should be planned as to reduce the level of pollution from motor powered vehicles in residential areas.

7. Criteria for the Use of Ionizing Radiation

a) If nuclear reactors are to be used for the generation of electric energy of an urban area, the location of such reactors should be planned so that radiation hazards to the

population experienced through the accidental release of radioactive wastes into the air, water and ground will be at an absolute minimum.

b) Nuclear reactors not used for power production and facilities for the processing of radioactive substances should be located in remote areas with low population densities.

8. Criteria for Housing and Open Space

a) Residential areas should be protected against all sources of pollution - air, water and soil.

b) Conditions in residential areas should not interfere with the provision of sunshine and natural ventilation.

c) Protection should be afforded against noise.

d) Roads and streets in residential areas should be designed to minimize accidental injury to the residents of the areas.

e) Residential areas should be designed as to eliminate undesirable segregation of individuals, families and groups of families.

f) Residential areas should be planned with ample provision of open spaces for recreation and relaxation and as to be easily accessible.

g) Open spaces should be provided for passive activities.

h) In residential areas, or in areas easily accessible from residential areas, provision should be made for schools, crèches, hospitals and health care facilities.

9. Criteria for Public Health Establishments

a) Establishments intended to meet the routine medicine needs of a population should be located as to serve residential areas.

10. Criteria for Vector Control

a) Provision should be made to eliminate and to prevent the creation of breeding areas and harbourages of biological vectors of human disease or to provide effective barriers and control measures to prevent the transmission of infectious agents to humans.

11. Criteria for Noise and Vibration

a) Noisy industrial establishments, airports, landing fields for helicopters, railway stations and junctions and superhighways should be located outside the city limits.

b) Planning should make provision for the surfacing of highways and urban streets with materials that will prevent or reduce noise from vehicles travelling on the highways and streets.

c) Green belts or open spaces should be planted with trees and shrubbery particularly if the green belt or open spaces is between a residential area and a source of noise, since vegetation has some sound absorbing capacity.

12. General Criteria

a) Wastes should not be transferred from one part of the environment to another without adequate study of the effect of the waste on the environment as a whole.

PLANNING AND DESIGN OF URBAN WATER SUPPLIES

by Mr. R. Casanueva, WHO Temporary Adviser.

In the development of metropolitan areas there is one important and common factor directly responsible for the rapid advance or stagnation of such urban communities. This factor is the availability of sufficient water and the possibility of its use for domestic and industrial purposes.

The world is facing now a trend to concentrate the national population using as nucleus the large urban areas. At-present the urban population is around 1.2 billions and very likely will get to 1.7 billions within 10 years period and reaching 2.5 to 3 billions at the end of the century.

Asia, Africa and Latin America are growing 3 to 4 times faster than Western Europe.

The increase of population requires new capital investment even if we want to remain with the actual standard of living. Several economic studies show that an increase of 1% of population requires 4% of the national income to be used as demographic investment. When the population increases 3% per year there is a need of 12% of the national income increase to be used as demographic investment.

The delay in solving the water problems in urban communities is due to a great extent, to the lack of basic information of city Master Plans and to the scarcity of technical personnel for planning, design, construction and operation of water systems.

It is of paramount importance to have good and efficient organization at national and local level to operate and maintain water services. Extension of water systems to new areas should not be at the expense of existing services. It is important to all the attention to the real population increase of one urban community in order to predict the water demand. Some areas will increase at a great speed due to the industrial development plan and some others will remain with the same population due to national migration.

The study of several cases in Latin America lead us to the conclusion that an investment of 0.5% of the total National Product (T.N.P) will be sufficient to cover the goals of Punta del Este (70% of urban population served with water and services in a 10 year programme). When the use of water for agricultural purposes is

predominent, it is important to start early multipurposes water projects to define priorities and the use of available water in each water bed.

In designing urban water supply systems special attention should be given to :

1- Demographic aspects.
2- Public Health aspects.
3- Financial and Economic conditions.
4- Technical aspects.

Demographic aspects. Population to be served for the next 15 to 50 years.

Public Health aspects: Technical and Bacteriological quality of water.
Water production to satisfy actual and future demand.
Piped water within premises.
Peramount service under pressure.

Financial and Economic Conditions

Self supporting services are becoming more popular all over the world. In some cases this is directly done by each service or in other cases the self supporting scheme is accepted under regional or national water programmes.

A survey made in 1962 for 75 countries in the world gave us the fact that 1/3 of the urban population had piped water, 1/3 of the urban population had access to piped water and the other third had no access to piped water.

External financial assistance for the period 1958-1969 in the world urban water supply programmes is as follows:

International agencies	220 million dollars
Regional agencies	407 million dollars
Bilateral agencies	268 million dollars
Total	895 million dollars

The financial effort put up by the countries involved is accepted to be 900 million dollars for the same period of time. WHO has estimated as feasible the following targets for the developing countries in the second UN Development Decade (1971-1980).

Urban Population Served	Now	By 1980
Courtyard service	25%	40%
Public standpipe	26%	60%
No service	49%	0%
Rural population served	10%	20%

Total Funds Required

Urban	US $ 7 500 000 000
Rural	US $ 1 600 000 000
External funds	US $ 2 300 000 000
Nation funds	US $ 6 800 000 000

This means that the external component should increase on average of three times per year and the national efforts required is more than six times the actual contribution.

Technical Aspects

1. Planning and development of water programmes.
2. Design of water systems.
3. Construction systems.
4. Operational and maintenance.

DISCUSSION

There was considerable interest among the participants about methods to disinfect municipal water supplies, particularly methods that are applicable in situations of rapid urbanization. The application of chlorine, either in its elemental form as chlorine gas or as a liquid solution of sodium or calcium hypochlorite, is the most satisfactory and least expensive method of disinfection available today. Chlorine should be applied at a rate sufficient as to provide a continuous free available residual chlorine of at least 0.1 ppm 30 minutes after application. It is important that this residual level be that of free available residual chlorine rather than total resídul chlorine. Combined available residual chlorine, which is the difference between total residual chlorine and free available residual chlorine, is an inefficient bacteriocide. (Unfortunately, there are many instances in which community water supplies of major cities contain no free available residual chlorine.) In many conditions of rapid urbarization, disinfection is the only practical method of water treatment. Therefore, it is imperative that the minimum recommended level of free available residual chlorine be maintained at all times.

There was some discussion about the acceptability of water which is high in hardness as a source of community water supply in a rapidly growing community. It was indicated that excessive hardness does not have any adverse public health effects, i.e. it is not harmful to health. However it has economic significance. Often it is more economical for the water user to pay a slightly higher price for water that has been softened during the purification process rather than to pay an increased amount of money for soap and other detergent or cleansing agents.

Many of the participants were knowledgeable of situations where persons, who had migrated from rural areas to urban areas do not utilize urban water supplies of potable water correctly. It is difficult to convert some people to use potable water properly and to discontinue use of polluted sources of water, such as ditches along the highways, as places to bathe or as sources of drinking water. There seems to be an increased need for health education in the proper utilization of potable water. If persons migrating from rural to urban areas are properly educated in the hygienic use of water, this knowledge should produce long lasting effects with many benefits.

There was considerable discussion concerning the financing of programmes to enlarge and modify urban waterworks that supply urban areas in which the number of residents are increasing at greater than normal rates. It was stated that since a community water supply could be made a revenue producing activity more emphasis should be placed on developing financial schemes that are self-sustaining and self-amortizing.

SUMMARY OF FOURTH DAY PROCEEDINGS - MONDAY 11 OCTOBER 1971

PLANNING FOR OPERATION AND MAINTENANCE OF COMMUNITY WATER SUPPLIES

by Mr. John V. Dibble, WHO Sanitary Engineer.

In the developing countries, conditions found in slum areas of rapidly growing cities are often quite shocking in the degree of insanitary conditions which have developed before the authorities have begun to start work on any sanitation measures. People living in new slum areas are basically from the more spacious rural areas where to a large extent nature takes care of waste disposal. It is only when country customs are practised in towns and cities that trouble occurs.

Planning agencies should take into consideration sociological conditions existing in new urban communities when planning for the adoption of policies for maintenance and operation of community facilities. It is desirable to formulate policy for financing operation and maintenance. In some prosperous areas, self financing throughout may be possible; in others government subsidization will be necessary. Usually, more rapid and unplanned the development, the greater the degree of subsidization needed.

The department implementing government policy by constructing the facility should continue to consider in detail sociological as well as the physical aspects of planning. Before any construction initiated it may be necessary to motivate people to accept and utilize properly the new facility otherwise they may continue to use old traditional facilities.

Planning should include extensive investigations into methods of reducing operating costs and of future forms of cheap power for operating pumps. In many countries cheap electric power is an innovation.

Standardization of plant and equipment is desirable for economic reasons, not only on initial costs but also on maintenance and replacement costs. Standardization also allows speedy replacement of defective or inoperative parts or units.

Planning for operation of community water supplies should be a continuing process during the construction phase and it is necessary to ensure that all training of staff routine operation procedures and all local legislation is completed well before the date of starting up the facility.

Motivation should be continued at this stage and the actual inaugural ceremony should be an important point in local history to create a sense of possession amongst those to benefit from the water supply facility.

Routine inspection maintenance presents no problem if carried out according to prearranged schedules. Every worker engaged in operation and maintenance of a community water facility should have a carefully laid down schedule of duties.

The operating authority of a community water supply facility should have byelaws for both the prevention of contamination, waste and misuse of water and also for the assessment and collection of revenue.

Training of water plant operators should not only include education in the mechanical aspects of their particular task but should also include training in the more specific aspects of the preventive health measures in which they are engaged.

SUMMARY OF DISCUSSION

Rapid urbanization is causing many water supplies and treatment facilities to become inadequate at a much earlier date than initially anticipated. In a few cases it has been necessary to plan further additions immediately upon completion of enlargement programmes which had been designed to meet the anticipated needs for an approximate ten-year period.

There was a concensus of opinion that people moving into urban areas from rural areas should be properly educated and motivated to use potable sources of water for domestic purposes and to discontinue the use of non-potable sources, such as water from irrigation canals, for drinking water.

In some areas there are many misconceptions in the minds of people who have recently migrated to urban areas from rural areas concerning piped potable water. There are instances where people who have recently migrated to urban areas and have refused to use piped water as they believe that it would affect adversely their sexuality; and in some instances there are former rural residents who believe that water from

pipes will cause baldness. Public health officials must consider ways to cope with these misconceptions and to conceive methods of health education and motivation that will encourage the proper use of potable water.

A practical means of providing an efficient water transmission system in an area of rapid urban growth is through the utilization of poly-vinyl-chloride (P.V.C) pipe. P.V.C. piping has a low initial cost and a low maintenance cost. It can be installed by relatively un-skilled labourers with minimum supervision. These pipes have considerable durability, in fact in areas where the ground is either excessively acid or alkaline, P.V.C. pipe is preferred to metallic pipe. However, there is a particular health aspect that must be observed when considering the use of P.V.C. pipe. P.V.C. pipes for transmission of potable water should be made only from virgin ingredients and should not be made from recycled plastic stock. Furthermore, it should generally be free from toxic substances. There are numerous producers of P.V.C. pipe that meet various national standards for use in the transmission and distribution of potable water.

SOLID WASTE COLLECTION AND DISPOSAL

by Mr F.A. Jacocks, WHO Consultant

Solid waste collection and disposal is a universal need. This is very important to the individual but it is of paramount importance to people when they are located in close proximity to each other. Solid waste collection and disposal is necessary not only from the health standpoint but also from an aesthetic standpoint.

The type of collection and disposal method to be used is dependent upon the types of waste involved. Residential collection is performed often on a twice-a-week basis, whereas some large commercial or industrial producers of waste must have daily collection. It may be feasible to stockpile certain wastes, those that do not create a health hazard. In these cases a monthly collection may suffice.

Regardless of the type of service needed it is essential that there be a fixed responsibility for solid waste collection and disposal. The fixing of responsibility is necessary for routine collections but not all wastes are generated on a fixed base. Some wastes, such as agricultural wastes, vary greatly on a seasonal basis. The attchment of responsibility here assures that variations in the system (collection and disposal) may be assured to meet the need.

It was stated t at proper planning must be accomplished to produce the most efficient operation. Poor planning can and will add greatly to the cost. Planning entails a multi-factor approach: (1) local conditions; (2) financing, policies dealing with number of collection, location of pick up; (3) routes of collection; (4) type of equipment that is to be used; (5) responsible agency and if this agency is a public body how it is to be administered and its structure; (6) numbers and salaries of personnel and type of equipment to be used, and the establishment of a records system so that planning can be a continuous operation.

There are many choices as to best way to organize and operate a solid waste collection and disposal system. Every precaution should be taken to put the best plan in effect so that the needs of the people may be met using the great efficiency possible.

SUMMARY OF DISCUSSION

There are many ways to collect, handle and dispose of solid wastes from urban areas. The method of choice will vary from community to community depending upon local conditions, needs and resources. Ideally, solid waste collection and disposal systems in rapidly urbanizing areas should be flexible to meet changing situations and inexpensive to install and operate. The method should be of such character as to be readily acceptable by the public.

Tipping or dumping on open land with or without burning is not acceptable method of refuse disposal under any circumstances, even as a temporary emergency measure. Incineration is a means used in many of the cities in the more developed areas of the world for the disposal of solid waste. It is a costly means of disposal, as it requires skilled operation and is not sufficiently flexible to meet changing situations, except in special circumstances. It is not a method that may be recommended generally in rapidly urbanizing situations.

The disposal of solid wastes by the sanitary landfill method is quick and inexpensive. It may be performed with a minimum of initial capital outlay and it does not require skilled operation or supervision. However, if the sanitary landfill method is to be used for the disposal of solid wastes particular care should be taken in selecting sites to be used for the landfill operations. These lands once filled must remain as open land or land with very low land loads for many many years to come. For all intensive purposes, these lands must remain as open spaces. Particular care should be exercised in the selection of landfill sites as not to contaminate ground water. The leachate from a sanitary landfill contains high concentrations of many pollutants. The sanitary landfill method for the disposal of solid wastes is recommended in rapidly urbanizing situations

but its use requires considerable planning in order that proper decisions may be made.

Composting is one of the newer method for disposing municipal solid wastes. It is a relatively inexpensive method but not as inexpensive as sanitary landfill. While it does not require a high capital investment it is more expensive to initiate than a sanitary landfill. Composting should have much merit in the developing countries. The end product from composting is stable and can be used as a soil conditioner, improving the character of the soil for cultivation. Since composting requires some degree of sorting of refuse, it permits maximum utilization of the recycling compound. Composting is a method of solid waste disposal that is acceptable to a rapidly urbanizing area.

Other older methods such as burial at sea are not recommended for rapidly urbanizing situations nor are some of the newer methods that are currently under development in some of the more developed countries.

SUMMARY OF FIFTH DAY PROCEEDINGS - TUESDAY 12 OCTOBER 1971

DESIGN OF SANITARY SEWERS, STORM SEWERS, SEWAGE FINAL DISPOSAL

By Mr. R. Casanueva, WHO Temporary Adviser.

Sanitary sewers are recognized as important urban community facilities by all Health Authorities all over the world.

Sewers can be designed as separate or conbined systems depending on the total cost for carrying sewage and storm water plus final treatment, if that is necessary. Generally speaking separate sewers are found more practical particularly when final treatment is requested, which is becoming necessary due to the rapid increase of urban population.

When designing sewer systems a design period should be established being 30 to 50 years for the system itself and 10 to 15 years for mechanical equipment used. Shorter periods of design are acceptable where the construction of supplementary future sewers is easy and does not imply modification of the original existing works.

The principal sources of sewage flow composition are the following :

1. House sanitary sewage flow
2. Industrial liquid wastes
3. Ground water infiltration
4. Storm water infiltration

Each source is studied in detail and relative importance is established.

A comprehensive revision of technical details in the design of sewers follows including standards accepted for minimum and maximum house connection pipe's size.

Storm sewers are designed on pluviometric statistics having the relation curve "intensity - duration time" of rainfall in the area to be drained.

Sewage treatment for domestic sewage takes care of less than 0.1% of the weigh of water which constitute the suspended and dissolved impurities in the sewerage, the rest is water. The composition of this 0.1% is important in order to establish the sewage treatment procedure to be acceptable.

Treatment procedures can be classified in ·

1. Pre-treatment.
2. Primary treatment.
3. Secondary and tertiary treatment.
4. Other advance treatment.

A summary revision of these 4 procedures is included in the working paper giving special attention to lagoons and stabilization ponds.

Attention was drawn during the Seminar to interim measures that could be established when it is not possible to construct the sewer systems and treatment facilities according to the proper manner established in a sewer Master Plan, taking into consideration the fact that old urban communities were in general not the result of a sound feasibility study involving what was best for the society but rather decisions were made by individual groups thinking more in what was better for their particular interest. In other cases the predominent factor to settle urban communities was the defence strategy against invasion. To-day the people is incorporated in the decision making bodies and they expect the technicians to advise on 'why' and 'how' to proceed and they will decide 'what' to do and 'when'.

The actual tendency for developing rapid urban communities is to prepare Metropolitan Master Plans including water and sewerage schemes as well as public utilities. These Master Plans constitute the basis for implementing specific projects. In many cases the national government or city authorities will not find the proper way to cover the construction cost. Temporary measures for excreta and sewerage disposal have to include great support from individual and community health education activities. In spite of the enormous progress in city development achieved during the last 50 years a large number of people have changed very little their standard of living, their level of education and economical and social status, in particular with regard to defaecation rendering them susceptible to infestation and responsible for keeping high indices of pollution. House sewer connections and a domestic minimum plumbing installation is important to be installed immediately after the public sewers are available. Several schemes were given as good examples to help the house owners to achieve this goal by providing technical and financial aid.

Community participation was emphasized as important measure in construction of community sewer projects in particular for fringed areas of urban communities. This contribution can account for 20 to 30% of the construction cost. The 'conservancy method' of exreta disposal should be discontinue as soon as possible on public health grounds.

Simple interim measures for excreta disposal were explained to be developed by stages in communities with or without water systems available.

SUMMARY OF DISCUSSION

In rapidly urbanizing areas, as in towns and cities with a stabilized growth pattern, the installation of separate sewers systems is preferred over a combined sanitary sewage and storm water drainage system. Usually, health goals and objectives are attained more efficiently and with less expenditure of funds if separate sewers systems are installed.

To prevent the creation of nuisance conditions and to maintain the efficiency of sewage flow, it is desirable to maintain self-cleansing velocities in the sewer lines at all times. Self-cleansing velocities is an item that should be considered in the design of sewers.

Water quality standards of receiving streams and bodies of water should be given to waste-water before discharge.

The effluent from sewage treatment plants may be used for irrigation purposes under certain circumstances and provided that the effluent is disinfected with chlorine to inactive pathogenic micro-organisms that may be in the sewage after treatment.

Generally, it is undesirable to permit excessive infiltration of ground water into the sewer system.

An adequate distance, depending upon local soil conditions, location of ground water level, etc. should be maintained between latrine pits and wells. Dwellings may be served by a well and a septic tank with a sub-surface drainage system located on the same plot of land provided that an adequate distance is maintained between the two systems. Similarly, the distance between these units will be dependent, in part, upon soil conditions, location of ground water level, etc.

OXIDATION PONDS

By Dr. M. Islam Sheikh, Professor,
Public Health Engineering,
West Pakistan University of Engineering
and Technology, Lahore.

The future of Asia is closely linked with two forms of natural resource - protein and water. Already these are in short supply in many parts of Asia. At best, current programmes to check the rising birth rates can only partially solve the vast problem. If social and political chaos are to be avoided during the coming decades, new techniques of resource conservation must be developed and applied. Reuse of human waste material is one approach that may be taken. The treatment of water borne sewage to the point whereby the treated liquid effluent may be reused as drinking, irrigation or industrial water supply would effectively combat the urban water shortage. A combination of this process with one which would reduce the human wastage of nitrogen and return it to the population in the form of edible protein would surely be ideal.

The cost of construction as well as operation of the conventional methods of waste water treatment are expensive, require skilled supervision and imported material and equipment. It is because of the prohibitive cost that not much work has been undertaken in the developing countries in respect of construction of sewage treatment plants. The choice of method or methods of safe disposal of sewage must be determined by economic consideration within the frame-work of sanitary needs.

Oxidation Pond method of waste water treatment seems to be adequate for the developing countries for the reasons mentioned above. Oxidation Ponds utilize natural processes under control conditions for the stabilization of organic wastes. They may be classified as aerobic, anaerobic or facultative according to the conditions of stabilization. Many factors are involved in the waste stabilization mechanism. Decomposition of the settled organic matter produces inert residue and soluble nutrients. In aerobic ponds surface aeration and the photosynthetic activity by the algae produces oxygen. This oxygen is taken up by bacteria and other micro-organisms which liberate CO_2, which in turn is taken up by algae. Oxidation ponds may be compared with other conventional treatment methods in many aspects. For Oxidation Ponds the land requirements are more as compared to activated sludge or biological filter processes, but the land is easily reclaimable. Oxidation Ponds have proved to be much cheaper than other processes. Operating and capital cost of Oxidation Ponds for a population of 1 000 000 persons was found to be only half than that of the conventional methods. For lesser populations the difference was still larger.

Due to the climatic conditions in the tropical countries, oxidation ponds have proved to be ideal for successful operation provided they are designed properly.

The effluent from an Oxidation Pond is never highly nitrified and in terms MPN of better quality than that from a humus tank.

It can be concluded that Oxidation Pond method is suitable, cheap and reliable for the waste water treatment for any size of community. The design of Oxidation Ponds depends upon many factors. Light is one of them. Seasonal changes in daily solar radiations determine the seasonal rates of photosynthesis and the depth of penetration determines how much of the volume will participate in oxygen production. Increased temperature may produce higher biological activity but favour the blue green algal growth which give rise to objectionable odours in the ponds.

Wind provides the surface aeration which is advantageous. However, the pond layout should be so planned that the direction of wind is never along the line of flow, as it produces short-circutting of the flow.

Another factor is that of evaporation which determines the level of water maintained in an Oxidation Pond since in some areas the rate of evaporation may be as high as 20% of the influent, it is recommended that fixed test should be made under the local conditions. Perculating test for the soil encountered should also be performed to check the danger of pollution of any nearby water supply. A loading of 100 - 150 Lbs of BOD per acre per day has been suggested for countries having similar climate as in Pakistan. The depth of the pond may vary from 2 to 6 ft, however due to high penetration of sun light deeper ponds are suitable.

If possible the pond site should be located leeward side of habitations so as to avoid the objectionable odours from the pond. The pond bottom should be free from vegetation and the inlet to the pond should be near the centre of the unit as to allow wave action to distribute the material uniformally over the area. Due to the varying climatalogical conditions at different places, it is necessary to study the performance of pilot ponds under local conditions for the evaluation of their applicability made.

Engineering University, Lahore has taken steps for the evaluation of design criteria applicable to local climate. Two years ago, Public Health Engineering Division of the University operated Oxidation Ponds at the laboratory scale and demonstrated the treatability of locally produced wastes by this method. The work has recently been extended to full scale units treating domestic sewage which is mixed with a small quantity of industrial waste water. It is hoped that with the help of this research the most favourable loading rates and the acceptable design and operating control standards for West Pakistan will be established.

Experimental ponds cover an area of one acre and are four in number each with four ft. depth. They can be operated in parallel as well as in series. Sampling can be done at five different locations to evaluate the distribution of the biochemical activity. Two of them have been built while the other two will be constructed in the second phase.

A developed form of Oxidation Ponds is the aerated ponds. Due to artificial aeration, it is possible to construct Oxidation Ponds as 10 to 12 ft. deep with loading three to four times higher than those used in conventional ponds. However, the cost factor recommends to design the ponds without artifical aeration.

Another developed form is that of high rate Oxidation Ponds. These ponds serve a useful purpose other than the waste treatment. They provide conditions for maximum yield of algae that is rich in protein. After due processing, this protein rich algae can be used for animal or even human consumption. One day retention period permits high rate of algal reproduction. It is of interest that algae have been used as a source of protein for centuries, especially in far east countries. The normal growth period for algae is one day in continuous mass algal culture. On an areal basis algae are 127 times more productive than soybean and 1460 times more productive than rice. It is seen that algae are similar to soybean in its protein quality and would compete with soybean for chicken feed markets. Due to these reasons, research work is proposed to be conducted at Engineering University's Research Pilot Plant.

SUMMARY OF DISCUSSION

It was reiterated during the discussions that the use of oxidation ponds is possibly the best method of handling liquid wastes for developing countries. Other methods were discussed but it was brought out that this was the cheapest to construct, required maintenance but not as much as other methods, and that it produced good results.

This is an admirable method to use in developing countries since its expansion due to rapid urbanization can be easily accomplished. The major and only obstacle to using oxidation ponds is securing the necessary quantity of land at a location which will be suitable and moderate in cost.

It was pointed out in the discussion that there are factors that should be considered when proposing the use of oxidation ponds. Some industrial wastes are difficult to handle and consensus indicated that special care should be exercised to assure that wastes were not put into the pond that would be detrimental. Care should be exercised to assure that pond use would not contaminate the surrounding ground water thereby making the ground water unfit for human consumption. Several methods were discussed the use of an impervious meterial such as brick and the use of plastic membranes. At this point it was agreed

research progressed and that they would also be supplied with a copy of the final report. This was felt to be highly desirable since it was apparent that many aspects of pond useage needed research to determine the desirable operating procedures for countries in the EMR

Discussion brought out the fact that ponds improperly designed or managed could be the source of mosquito breeding. Several aspects of design and management were discussed. These included the critical depth that would prohibit aquatic growth from occurring to the use of larvicides and top feeding fish.

Interest was evidenced in the use of this methodology since it was considered especially important for rapid urbanizing areas and the group desired that they be kept abreast with the research findings.

ORGANIZATION AND ADMINISTRATION OF ENVIRONMENTAL HEALTH DEPARTMENT

By Mr. F.A. Jacocks, WHO Consultant

Health Departments should be organized so that all aspects of preventive health can be covered. This consists of both the medical and environmental health aspects.

Environmental Health must be staffed by engineers, sanitarians, laboratory technicians and other ancillary personnel so that the total spectrum of problems in this field can be coped with. Size of area, number of programmes, and the severity of the problem will be the determinate.

Health Departments are of many forms. They are based upon a legal document but should be organized to meet the needs of the area to be served. In some cases they may perform primary advisory and consultative type functions while in other instances they will be organized on a strictly service or inspectional line. The area of responsibility based upon law is the governing factor in all cases.

This area of responsibility is clearly defined early and an early decision is required to determine the scope of work. Decisions dealing with these two items are largely dependent upon the size of the area to be served, the programmes to be initiated and the possible level of funding that can be made available. A listing of possible programme areas was listed and the usual level for authorizing authority as found in the United States. The level of authority for enactment of the basic laws is very important since some programmes are very local in nature such as those dealing with inspections of restaurants within a given city whereas other programmes such as those dealing with air pollution, must have a wider base for control. Air pollution affecting a given point could be quite distant from this point.

Although the list of possible activities was comprehensive it was stated that a given environmental health department might not initiate these. There are instances where programme

responsibilities are shared by different levels of administration. This could be necessary because of the diversity of the problem, that is that the same problem is found in many parts of the larger area and this would make uniformity of standards and enforcement procedures highly desirable. This is especially true when you are dealing with private industry on a broad area. To do otherwise might conceivably render an unfair advantage to a specific industrial plant.

There are many functions that health departments should perform but careful consideration must be given first to meeting the needs of the people to the greatest extent possible. Care should be exercised to perform the functions as competently and effectively as possible. It is by far better to perform a few functions efficiently that attempt to do many tasks and find that they are ineffective for any reasons. The public respects a task well done but has little patience with poor performance.

SUMMARY OF DISCUSSION

Public health agencies at the local government level usually are charged with the responsibility of conducting programmes in environmental sanitation. In a few instances, a special agency has been created outside the official health agency, but this is rare.

Sanitation problems of rapid urbanization usually are of such scope and of such magnitude as to need the full resources of a well organized and full-staffed public health agency.

One of the more pressing problems of many rapidly urbanizing areas if the provision of a potable water supply. The resources of a laboratory is desirable to augment the work of the environmental health division.

SUMMARY OF SIXTH DAY PROCEEDINGS - WEDNESDAY 13 OCTOBER 1971

LEGISLATION

By Professor E.W. Mood, WHO Temporary Adviser

The purposes of legislation are: (1) to establish a guide of acceptability; (2) to establish a legal basic for judgment; and (3) to provide punitive measures for persons who fail to comply. In a rapidly urbanizing area, laws concerning environmental pollution are needed to fulfill the initial purpose.

Most legislation concerning the control of the environment should be administration and administrative sanctions - not criminal sanctions - should be used in cases of non-compliance.

Usually sanitary and public health codes are part of the administrative law of the governmental unit and the authority to enact such legislation stems from the police power of that governmental unit. Police power is the sovereign right of government to enact the necessary legislation to preserve and protect the public health, safety, and welfare.

All urban areas, including that portion which may be beyond the corporate limits of the central city, should be governed by appropriate zoning, building and housing codes. The need for such legislation is particularly critical in areas affected by rapid urbanization.

A zoning code controles the use to which land may be placed and stipulates the conditions that must be met before applied to that use. It is an implementing device of the land-use plan of the master plan for the municipality.

A building code primarily the structural characteristics of all building and usually stipulates conditions to be met to provide for structural stability, fire protection and safety.

A leasing code concerns the conditions under which a structure may be used as a place of human abode and usually stipulates the requirements of maintenance, of occupancy, and of installed facilities and provided services.

While it is desirable that zoning, building and housing codes be of the performance type, it is not practicable for most urban areas to enact legislation of this type. Therefore, most codes covering the above subjects are of the specification type.

Zoning, building and housing codes should be reviewed regularly and revised as necessary or desirable. This is particularly true for rapidly urbanizing areas.

W.H.O. is embarking on a programme of the development of criteria, promulgation of recommended codes of good practice, and formulation of operating guidelines that should be of considerable aid to the developing countries in development solutions to sanitation problems in areas of rapid urbanization.

SUMMARY OF DISCUSSION

Development of national laws is of primary importance since this would be the appropriate method of controlling all national and natural resources. Laws, when developed, should begin with a statement of purpose so that it is clearly understood by all what is intended. Laws must be interpreted and the use of preambles or ~~statement of intent gives~~ a basis for appropriate interpretation.

There is need for national laws in the environmental health field and consensus was that these laws should be based upon realism. Realism is essential because lack of recognition of the customs of the people

could create an impossible enforcement situation.

Laws should be very clearly written not only as to purpose but should also include administrative procedures and penalty assessments, if any.

The feeling of the Seminar was that great case should be exercised to have environmental health laws enacted on the highest feasible level and that when the laws become operational that enforcement be initiated promptly. Care should be exercised to see that the law is clear in establishing not only the rights of the people but the rights and duties of the enforcing agency also. Clarity in the enabling act is essential so that the rights of all parties can be fully maintained.

Coordination of efforts was also stressed with the example given that although building codes, usually enforced by organizations other than health departments, deal with the physical and safety aspects of construction but when the construction project is a home there is need for coordination by the health department to assure that the humanistic factors are considered. This is a good example because the Health Department will be involved with the house when it is occupied by people, through the housing code, to see that the facilities, occupancy and maintenance of the structure is maintained in an appropriate manner.

Consensus also was that the protection of the people's health should be a part of the Constitution of the Nation and specific authority and duties should be stated. The creation of a national organization for health is highly desirable and the Ministry of Health should be a part of the cabinet, or executive, part of the national government.

FINANCING WATER AND SEWERAGE SCHEMES

By Mr. R. Casanueva, WHO Temporary Adviser

An outline was presented to the participants covering the most outstanding fitures on the subject, namely:

1. Background information
2. Goals to be achieved
3. Cost composition for capital investment and operational budget.
4. Financing of urban and sewerage systems.
5. Financing Rural Water Supply Programmes.

The information needed in order to establish the proper financing of water and sewerage schemes is the assurance that there is enough water available and that the existing natural conditions of the area makes it possible to design such systems within the economic capability of the community to be served. If there are limited water and sewer services already existing in the country an inventory should be made in order to size the necessary improvement and/or enlargement required.

The goal suggested by WHO to be achieved in a 10 year programme is 40% of the urban population served with piped water in the house in addition to 20% served by public standpipes. 20% of rural population served with acceptable water. It is important to emphasize the need of forecasting the future population to be served the density of such population by city zones, the sentative future industrial water consumption and the respective sewage flow. The life time aspected for a water system varies from 30 to 40 years for the system itself and 12 to 15 years for the mobile equipment. For sewers the life time spared for 30 to 50 years, reducing to 10 to 15 years. The life of pumps and mobile equipment. Unit cost for different construction activities is necessary for water and sewage programmes in order to prepare the tentative total cost of the projects. Long range programmes are considered to be those that cover 20 to 30 years period and are included in the national development plans. More elborated programmes are needed for the medium range programmes which are suggested to be prepared for 4 to 6 years period. The life time of this programmes are to be arranged in such a way that coincide with the administrative period of the government. The short range programme is formed by the annual water and sewerage projects including the budget brakedown by provinces and metropolitan areas.

When preparing the capital Investment Budget for water and sewerage is important to consider the following items: Pre-investment cost, construction and supervision cost; Improvement and enlargement of existing facilities and cost of financing. The cost of operation and maintenance is evaluated on yearly basis.

All the three programmes mentioned should be prepared showing a yearly time table and the medium and long range programmes should be corrected on the basis of actual cost of the annual programme.

There are several sources of funds to finance such programmes; the most important is the national source including grants and/or loans from the Federal or Central Government and from the Provincial or State level. Another national sources are the commercial or government banks. Before requesting any external loan for water and sewers schemes a thorough investigation should be made of the above mentioned possibilities. It is expected that national authorities will give first priority for financing this social investment which is essential for economical development of the country and their participation will be 2 to 3 times better than it has been up to now worldwide.

External lending agencies can be classified in multilateral and bilateral agencies. Examples of the first are the World Bank, the Inter American Development Bank, African Development Bank, East Asia Development Bank, etc. Bilateral lending agencies are the Export-Import Bank, AID in USA and several agencies in Europe from France, Holland, Switzerland, etc.

Self-supporting water programmes are of particular importance for developing countries because they focus the financial problem in the project itself without any other agency to be responsible for their economical commitments. These projects depend on water revenues coming from water rates and/or land taxes for the premises to be served. Water rates structure should be arranged in such a way that the low income people will not use more than 8 to 20 days salary to pay for the water consumption of his family in a year period. Meters should be established for 100% of the water service and high rates should be applied for consumers that use water far beyond their sanitary and health needs, when there is scarcity of available water. Sewerage schemes are usually financed in latin American countries through land taxes. There is recently a movement to establish sewer rates in the same water bill following the experience gained in some countries where they established flat sewer change of 20% of the water bill. Special rates could be established for large industries charging them for volume and chemical caracteristics of their sewage flow.

Community participation in the actual capital cost for water and sewerage schemes can be obtained through community organization in the fringe areas of urban communities and more likely in the rural areas where the people are normally organized in communal entitities.

Financing of water systems and exreta disposal in rural areas can be done by establishing a rotating fund procedure and cherging low rates calculated in such a manner that the capital cost will be recovered in a ~~4 to 6 years~~ period.

SUMMARY OF DISCUSSION

Participants were interested to know the proper method of converting the common line budgetary system used by many government agencies into a Programme budget which is now required by modern administration methods. It was recognized that the conversion was not an easy task because in a programme budget there is the need to introduce the 'unit cost' procedure which implies an identification of parameters. There is the tendency in water works programmes to use cost per million gallons or for house connection while the unit cost should be identified " per person" because this parameter has more meaning from the public health point of view. The transfer of the first to the latter is not easy when different family composition makes the total number of consummers.

The cost benefit ratio was discussed in connection with water programmes and it was recognized that serious and numerous attempts have been done to get a practical answer but the problems remain in the evaluation of the total benefit that water systems represent for health. A restricted answer to this problem is given by evaluating the cost of sickness including medical care and lost of production. This cost benefit ratio is not jet an answer that satisfy economists and national planners.

It was also necessary to clarify that amortization is an important factor of the financing cost of water projects and it should be included in the water rate structure.

Another matter discussed was the use of the same bill to pay water and sewerage charges and was accepted, for practical reasons, to have both changes in the same bill.

In order to have a water and/or a sewerage system accepted by the community it is necessary, in many cases for the Eastern Mediterranean countries, to preceed a water project by a health education programme to educate the people and create a demand for water services.

The need of starting the construction of water and sewerage systems at the same time was discussed and it was recognized that even when such a practice is desirable, there are few occasions in the EMR to put it into operation due to lack of money available and the need of meeting a national development programme based on priorities.

EDUCATION, TRAINING AND EMPLOYMENT OF SANITARY ENGINEERS, SANITARIANS AND OTHER AUXILLARY STAFF

By Professor E.W. Mood, W.H.O. Temporary Adviser

While the need for trained environmental health workers is generally great in most areas of the world, the need in rapidly urbanizing areas tends to be considerably more acute. In some cases, the needs may be made less critical through the more efficient use of presently available trained manpower resources, i.e. the assignment of engineers to engineering tasks, of technicians to technical activities, of administration to administrative duties, etc.

In rapidly urbanizing areas, there are two broad categories of personnel that need training, namely, present staff who may need retraining or advanced training in selected or specialized subjects, and potential staff who need to be fully trained to meet the demanding conditions of the new situation.

Particular case must be taken to ensure that the training endeavour will produce all of the skills necessary to have an efficient environmental or public team. Usually sanitation problems of rapid urbanization are of such character and of such magnitude as to require the skills and resources of an effective environmental or public health team.

Existing staff usually need training in only selected areas, while potential staff will need training in all of the basic subjects of a particular profession or skill plus some advanced training. In a pressing situation of rapid urbanization if may not be possible to provide all new staff members with a complete and balanced advanced training programme.

Training should be accomplished within the same country where the person is or may be employed, except that general professional training may be accomplished within the same regional area.

To the extent possible, all existing training facilities and resources should be utilized, schools, colleges and universities should be encouraged to gear their programmes of instruction to meet the training needs.

It is the basic responsibility of each country to use its training facilities to its best advantage to train the health workers that are needed to cope with the problems of rapid urbanization. If such an effort does not or cannot produce the needed manpower, the cooperation of and the assistance from international agencies should be sought.

SUMMARY OF DISCUSSION

Considerable interest was displayed in discussing this topic. There was a unanimity of opinion that there is a real shortage of trained personnel in the field of environmental health. Also that there was a real need to retrain health people to prepare them to cope with the complexities of urban life. Serious shortages in personnel requirements was expressed and to add to the difficulty in securing additional people

Coordination between activities was stressed and the use of multi disciplines could be employed to help overcome the reported shortage. World conditions have changed so that it is required that health people utilize people who have been trained to render supportive services. Health engineers could be used in securing the construction of safe and sanitary water supplies but could greatly benefit from persons trained in the social services field to secure implementation of their use. Possibly the best approach to the problem is to use many people trained in many professions each performing the tasks for which he is best suited. It was suggested that the use of females in the enforcement activities might be a method of securing additional employees since this has not been a common practice in the past.

There was agreement that training activities should be on a practical field basis with the theoretical components taught only to those who would be involved with high level leadership's roles. The practical field type training, hopefully in an environment similiar to the ultimate working setting, can produce persons to do specific jobs. These courses should be of a short duration teaching the rudiments of sanitation. As a person progresses, the trainee can be given additional training so that his capabilities are broadened and he can operate in a wider sphere.

Discussion also revealed that there were funds that could be used to train but that the Government of the Country must make a request to WHO for such training and also stipulate the type of training required.

RECOMMENDATIONS

It was unanimously agreed by all participants that the following recommendations be proposed that:

1. Due the severity of sanitation problems created by rapid urbanization, member countries are urged to place the highest priority on programmes aimed at studying these problems and seeking technical and economical solutions.
2. Member nations give high priority to the development of community water supply systems particularly for urbanizing areas and that the quality of drinking water in such systems should at least conform to the minimum requirements, as found in the current edition of "International Standards for Drinking Water" published by WHO.
3. When planning for community water supply and wastewater systems special recognition be given to all relevant socio-economic factors.
4. As a means to reduce the initial cost and cost of operation an attempt should be made to standardize equipment in community water supply and wastewater systems.
5. In the planning of community water supplies, consideration be given also to the disposal of wastewater to avoid the creation of new or the intensification of the existing problems of sanitation.
6. Consideration be given by WHO for the development of appropriate guidelines that may be utilized by industries to pretreat their liquid wastes before discharge into community sewers in order that the industrial wastes will not affect adversely the sewerage system or the sewage treatment process.
7. Comprehensive studies be made of the environmental pollution of air, water, land and soil in order to more succinctly identify the causes of the pollutions and to develop appropriate measures for environmental control.
8. All appropriate research institutes be encouraged to study new methods of design, construction and operation of community water supply and waste collection systems in an attempt to obtain greater economy.
9. Each member country, according to its needs, should be encouraged to establish laboratories and monitoring systems for the measurement of the quality of air and water. If funds are not available assistance could be sought from international agencies.
10. EURO be encouraged to extend their existing programmes in the field of water pollution control to all countries of this region, especially in the fields of planning and organization.

11. The development of a code of good practice which would be applicable to developing countries and will pertain to the operation and maintenance of public water supply systems, wastewater and solid waste collection and disposal systems.
12. Environmental health be given consideration in national development plans - which should cover each town with a view to solving the problems raised by rapid urbanization - and that the agencies and ministries concerned with environmental health activities take an active part in the formulation of such environmental health programmes at the highest planning level.
13. The setting up where appropriate of Environmental Health Boards with representation from agencies concerned with environmental health issues for the establishment of comprehensive environmental quality criteria, guidelines for preventive measures and methods of determining priorities and allocating resources based on health needs.
14. Housing should be acknowledged as an integral part of environmental health, and that Member States should enact enforceable minimum standards of housing accommodation and formulate a national programme for housing improvement.
15. Member countries continue their efforts in training environmental health personnel.
16. Training facilities be developed for water supply and wastewater treatment plant operators.
17. WHO and other competent organizations should continue their endeavours to achieve uniformity in measurements and in collecting and reporting of data specially on environmental pollution.

PART III

STATEMENTS BY PARTICIPANTS

AFGHANISTAN

Afghanistan is an agrarian society where 85% of the population still lives in rural areas, but due to the pattern of socio-economic development we are following the same trends as most of the countries in Asia, Africa and Latin America.

In order to conduct urbanization on sound lines, a central housing and town planning department has been established with headquarters in Kabul. The department has so far drawn up master plans for many cities and towns in the country. The department also chooses and surveys sites for new towns being built beside the old ones. The master plan of the city of Kabul which has been prepared with the help of Soviet experts, envisages complete urbanization of the city in a span of twenty-five years. The micro-district built east of the city along the Kabul-Jalalabad highway could be considered a first step in this direction. The micro-district possesses all the modern amenities of life, viz. sewerage, electricity, drinking water, central heating, etc. There are also schools, playgrounds, market places, a cinema and an indoor recreational centre.

As anywhere else in Afghanistan also, municipalities are responsible for the supply of drinking water, waste disposal and establishment of sewages. Most of the municipal organizations in the towns and cities of Afghanistan have succeeded in providing safe drinking water to their citizens, but some are building and others have yet to build their water supply networks.

In order to better cope with the problems of waste disposal, water supply, etc. the government have created a new department, called the Bureau of Environmental Health in the framework of the Ministry of Public Health. This Bureau is responsible for the control of environmental health activities throughout Afghanistan. But in the present circumstances, it has also taken over the responsibility for the design and construction of rural waterworks, latrines and composting programmes. These programmes which are closely connected are being carried out through the Health Centres and Sub-Health Centres which are being established. It is worthwhile to mention that the Central Housing and City Planning Department, besides having launched new housing projects in Kabul and other cities, has also undertaken slum clearance, especially in Kabul, which is going to assist a great deal the Bureau of Environmental Health in the implementation of its plans.

The new housing projects undertaken by the Central Housing and City Planning Department in Kabul and other cities, have first of all the purpose of moving out the urban population from their decrepit and unhealthy houses in the older parts of the cities to new well-planned

surroundings, where most, if not all, of the conditions for leading a healthy urban life are fulfilled. In the second place, the purpose of the townships is to ease the rush on the towns and to relieve congestion. In the long run the Central Authority for Housing and Town Planning plans to demolish all the substandard buildings and dwellings in towns throughout Afghanistan, and replace them with habitations possessing the qualities that we have already mentioned. The plans for the towns have been compiled in such a manner that both high and low income groups may be enabled to build houses in accordance with municipal specifications.

A project to provide more drinking water to the citizens of Kabul and to build a more efficient waste disposal system was undertaken by the United Nations. United Nations Development Programme has assisted the Central Authority for Housing and Town Planning together with WHO to provide a comprehensive plan for safe drinking water, sewage and waste disposal. This is being studied and it is hoped that with its implementation other cities in Afghanistan will also have a vivid example before them of how to cope with water supply and waste disposal on more modern and scientific lines.

Treatment and disposal of industrial water has also received the attention of the authorities concerned. But some difficulty is being felt in this regard, both by the Government authorities and the managements of the industrial enterprises, in view of the scarcity of qualified personnel and financial resources to acquire laboratory and other equipment required for the successful development of an industrial waste control programme.

Therefore, it is evident that early Government action is required for determining the extent of the problems and for planning and implementing efficient measures for the control of the environmental health programme, something on which the Environmental Health Bureau of the Ministry of Public Health of the Government of Afghanistan has rightly embarked.

CYPRUS

Cyprus is the third largest island in the Mediterranean with an area of 3 572 square miles. The island is divided in six districts, each one has its own capital. Each town is governed by a Municipal Corporation and the suburbs around the towns are under the Improvement Board Law.

The distribution of population in Cyprus is as follows:

Towns and suburbs	247 100
Villages	385 900
Total:	633 000

Water Supply

Since Cyprus is a semi-arid country the supply of water is abundant. All available water in Cyprus comes from rainfall. The annual mean rainfall is 20-21 inches, ranging from a maximum of 27 inches per year to a minimum of 9.7 inches per year. Most of the rainfall occurs during the winter months. But there is great variation in rainfall according to the meteorological conditions. Troodos has an annual average of about 40 inches per year and Morphou area has an average of only about 11 inches.

Water for domestic use is generally obtained from boreholes and springs. All communities have their own water supply system, either on an individual or regional basis.

At the present time shortage of water is sometimes experienced in certain areas, particularly during the period of drought. The expected increasing demand for water necessitates the development of plans for new sources.

Air Pollution

At the present time Cyprus does not have any major problems resulting from air pollution, but the trend for urbanization and industrialization may create such a problem. The Government is considering the designation of special zones for industrial development. These zones will be provided with adequate supply of water, sewerage system, electricity, etc. In designating these zones special consideration is given to the control of air pollution. One of these industrial zones has been established at the site of about 60 acres outside Nicosia on the main road to Famagusta.

The main problem of air pollution stands from carbonaceous fuel and is due to the emission of smoke and sulphur dioxide. The concern of these pollutants do not appear to be causing a public health hazard.

Waste Water

No city in Cyprus as a community has a water-borne sewerage system. The present practice utilizes the disposal of sewage by septic tanks and absorption pits. This existing method is no longer suitable because of a lack of permeable soil and the increasing density of the population. In certain areas of some towns raw sewage flows on the ground polluting streams and causing nuissances. In general refuse is not being disposed in a sanitary manner. Much of the material is collected by the local authorities and dumped in ravines, buried in trenches and scattered on the ground uncovered. Some of the material is burned. It has been recommended that in addition to planning for a sanitary means for disposal of liquid wastes plans be developed for the proper disposal of solid wastes.

Old Automobiles

There are many old automobiles in Cyprus. This may be the cause of public nuisance and may be unsightly. Recently an area has been designated near Nicosia where old cars may be taken for salvage.

The improvement of environmental pollution in Cyprus is depending upon the availability of qualified manpower to perform necessary tasks.

EGYPT

The sanitary situation in Egypt and the main problems created from rapid urbanization, can be summarized in the following six categories:

1. Water Supply Problems

The urban environment is divided into two levels, big cities which include Cairo, Alexandria and canal cities, and moderate cities which constitute 120 cities in all the country.

Filtered and chlorinated water is available for 90% of the total urban population at a rate 200 to 250 litres/capita/day in big cities and 120 litres/capita/day in other cities.

The main problems in cities include:

a. Some parts deprive of water facilities 'slum areas'.

b. Other parts not served by water piping inside houses, but free water stands are available.

c. The need of increasing the water production to increase the rate per capita.

The existing plans for the future are aiming to increase and improve the water quality.

2. Sewage Problems

Approximately 40% of the total urban population is served by public sewerage systems and treatment plants, the rest have other unsatisfactory means of sewage disposal.

Nevertheless, the sewage plants in Cairo and Alexandria are overloaded due to the heavy increase in population and in industrial plants; this situation has led to the disposal of raw or partially treated sewage in drains and lakes. As a result, the dissolved oxygen in some of them is depleted to a level insufficient for fish breeding or to maintain the normal aquatic life.

Another problem related to the proper disposal of sewage is the inefficiency of the pumping stations to cope with the actual discharge. In Alexandria, a certain percentage of raw sewage is discharged into the Mediterranean Sea to some distance from the shore, leading to a certain degree of nuisance to the bathing beaches, although no health hazard has been encountered according to the numerous studies done on that subject.

3. Solid Waste Disposal

Refuse collection and disposal are practised in all cities and towns as well as big villages. The deficient methods of manual street cleaning, the lack of efficient cartage and deficient disposal systems cause considerable problems. Tipping is badly carried out due to poor transport and to lack of

suitable space. Efficient incineration would require heavy capital expenditure. The transformation of wastes into manure is practised on a small scale but expansion requires a high level of investment in suitable plants.

4. Problems of Urban Dwellings

a. Shortage due to the great growth caused by the progressive increase of population and migration from rural to urban areas.

b, Density per dwelling unit.

c, Old buildings which needed to be replaced by new and safe buildings.

d. Lack of public utilities in many dwelling units.

5. Situation of Air Pollution Control

Air pollution begins to constitute a real health hazard to the urban communities. Smoke and poisonous gases emitted from industries, internal combustion engines and various kinds of vehicles, are increasing day after day. For that, a high standard committee of all concerned agencies is established. Several activities of this committee are achieved, yet they are just at the begining stage.

6. Present Solution to Eliminate Rapid Urbanization Problems

a. More interest to elevate standard of living in rural areas and erect small industries for agricultural production to eliminate migration.

b, Electricity is now entering the village.

c, Increasing the agricultural land.

d, Planning for water and sewage facilities as financially available.

e. The country now pays attention to public cleansing, refuse collection and disposal, as well as to use insecticides to control flies and mosquitoes.

f. The government builds new dwellings, and provides aid, and encourages individual investments for housing projects.

g. There are several existing laws to prevent pollution of the environment and considering the issuance of new law for drinking water.

ETHIOPIA

General

Most of the urban centres having 9.4% of the country's population, grew around inaccessible high land villages for reasons of security, mild temperature and better health. The fact that rural development can hardly be achieved for many years to come and because of the widely scattered settlement of the rural communities rural exodus will occur and exceed the present rate of growth of 4%.

Despite the fact that Master Plans for 41 towns have been drawn and the Five Year National Plan covering city planning and housing urban infrastructure programmes include water supply, sewerage systems and environmental sanitation, the unsuitable location of the old towns makes urban development schemes very difficult and expensive. The problems of sanitation will continue to threaten the health, physical well-being and survival of the urban population unless drastic measures are taken.

Water Supply

To-day it can be generalized that only 3% of the total population of 24,317,000 have access to safe piped water, though not in adequate quantities. Among the 250 urban centres, about 50 of them have got some kind of piped water systems of intermittent flows with occasional bacteriological examinations. Becuase of shortage of water and inadequate distribution system where water is available, the low income group has no access to piped water and as a result get their water from grossly polluted streams and shallow wells. The problem of unsafe water has been substantiated by high infant morbidity and mortality rates encountered.

Waste-water Disposal

The urban areas, both domestic and industrial wastes are disposed of in septic tanks, cesspools, or soaking pits and dry laterines are used by the low income group. The discharge of liquid wastes in storm sewers and nearby streams is not uncommon in many big towns. Municipal sewage trucks are employed to emply full septic tanks and the waste is dumped in an open area outside the cities. Open areas in the cities are fouled with human exrement; thus the pollution of ground water, streams and soil cannot be overemphasized and has been evidenced by high rates of infection due to helmenths. The capital city, Addis Abeba, however, will have a sewage treatment plant in about 3 years time. The sewerage scheme covers only 10% of the city leaving out the high density and low income group areas potentially exposed to health hazards.

Solid Waste Disposal

All towns have irregular and partial solid wastes collection services by municipalities using vehicles, wheel barrows and animals as the case may be.

It is not uncommon to see garbage and rubbish piled up on street curbs, in the backyard of living quarters, in narrow paths and open places. Collected refuse are usually tipped or dumped and burnt in the open at the out skerts of the towns. The uncontrolled urbanization has led to the encroachment of houses into the dumping as the result of which residents are complaining of the situation. The unsanitary collection, transportation and disposal of solid wastes have been the cause of a large population of flies, rodents and strayed dogs and other types of scavangers.

Housing

Housing which has not yet received attention, constitutes a great problem in all urban centres. The big number of families (3.5) sharing a multipurpose rooms, the inadequacy or absence of sanitary facilities infrastructures including water, lack of housing and plumbing codes have aggrarated the situation. The ideal climate makes it conducive for homeless persons to sleep in the open and in delapidated and abandoned buildings.

Air Pollution

The problem of air pollution, though not acute and this stage of industrial development, the smoke from the use of wood as a fuel incooking, factory fumes particulates, automobile exhausts and foul air from open sewers and piled up garbages are increasing from day to day. The locations of new factories are now being considered to minimize air pollution.

Man Power

There are 7 Public Health Engineers, 4 Sanitarians of M.Sc. qualifications and 296 Sanitarians of sub-professional level. 64% of these personnel are in the Ministry of Public Health, serving in the relevant fields of sanitation while the rest are absorbed by the Municipalities and private firms. 25 graduate Sanitarians are being turned out by the Public Health College of Haile Selassie I. University every year. Future plans include securing fellowships to train Public Health Engineers, Sanitarians of supervisory cadre and periodic refresher courses for provincial and health centre sanitarians. For a vast country like Ethiopia the number of trained environmentalists are by far inadequate to tackle the existing environmental helath problems.

Additional Information

With the recent cholera outbreak the importance of environmental health has captured the attention of both higher officials and the public strengthening these by the overall activities planned for the years to come. In its five year national development plan, the government has foreseen rural and urban development with emphasis on the provision of safe water and healthful housing. Feasibility

and pre-investment water studies have been carried out for a number of towns including the capital city, the sewage scheme of which will be finalized in 3 years time. Water supplies for smaller communities are being constructed by the government bilateral and international agencies. Existing water supplies are being improved. With the use of the modified WHO drinking water quality standards surveillance activities of water supplies will be intensified. As regards liquid waste disposal, municipalities are urged to construct additional public laterines, to enforce laws for factories and institutions to have their own treatment plants and houseowners to provide laterine for their rental premises. Sanitary land fill method has been suggested by the Ministry of Public Health for all municipalities in their disposal of solid wastes.

Low cost house construction schemes to be financed through local bankand foreign loans have already started in the capital and hopefully this will extend to other municipalities as well. Roads have been opened up in the capital to provide sewage and refuse collection service, water standpipes, sewage treatment plants and refuse incineration are under study for institutions and factories situated in the capital city.

Imported and exported food stuffs beverages are routinely inspected at ports of entries by Public Health Sanitarians. All other activities in the towns are left to the municipalities concerned. The Ministry of Public Health is now reviewing its public health laws and all the scopes of environmental health are included in the basic laws for subsequent enactment of by-laws as the need arises. The establishment of National Environmental Health Policy Committee is envisaged.

IRAN

Location·

Iran is a part of Iranian plateau which consists of Iran, Afghanistan and West Pakistan. It is situated in the northern temperate zone, between 44° and 63° longtitude and 25° and 40° latitude. It has an area of 628 thousands Sq. miles and has a population of 30 millions.

Climate:

The country rimmed by mountains on all sides and is consequently shut off from surface climatic factors that affect neighbouring areas.

The highest point in Iran is the volcanic cone of Damavand, a little northeast of Tehran, with an elevation of 18,375 feet. The lowest point lies along the Caspian Sea at about 85 feet below sea level. There are great differences in climatic conditions, which range from cold polar climates over the high grounds to hot-tropical conditions of lower altitudes.

Environmental Pollution:

Owing to population growth, urbanization and industerialization of the country, the problems of environmental pollution are increasing almost every-where in extent and complexity.

Mechanization of agriculture, industrialization of the country and easy way of earning money, increase the migration of people toward the cities. For example the population of Tehran is a 3 millions and the growth rate of population for Tehran is 5.5% per year. Also it is reported that the population of Tehran will be 5.5 millions after 20 years.

There is another risk of pollution of streams, coastal waters, underground water sources, due to the fact that municipal and industrial sewage are not treated.

Air pollution is an another problem which depends on the population growth and industrialization of the country.

W a t e r :

Fortunately progress has been made by the Iranian government in solving potable water shortage and unsafe water problems, as a result of sanitation problems of rapid urbanization in urban areas. The latest report from the Iranian Plan Organization shows that during three five year plans a very high percent of urban population is supplied with potable water.

No. 5 year plan	No. Towns.	Population	Capital cost $
1	6	874,910	31,700,000
2	103	6,464,886	330,000,000
3	196	5,028,234	317,300,000
TOTAL	305	12,468,020	679,000,000

Also it is planned to spend 215 million dollars, in the forth five year plan, to construct water supply and sewage collection and treatment plants.

In the meantime approximately 2 million people in rural areas are served by piped water. The rate of capital investment per capita in rural areas varies between 6 to 9 dollars.

But as another aspect other side of this development programme, the construction of dams and new irrigation schemes in the Southern part (Khozistan Ostan), may raise bilharzias problems.

The government of Iran is aware of this problem and strong steps are going to be taken to eradicate bilharziasis, before the construction of the 14 dams in the Khozistan Ostan is completed.

Sewage Disposal :

Generally speaking each property is provided with means of sewage disposal simply by constructing a cesspool or digging a dry well, into which the sewage is discharged and then lost by percolation into the porous strata. This is a very inefficient and unhealthy method.

The latest report from Plan Organization shows that during the last three five year plans, only 6 sewage collection and treatment plants were established, that they serve 960 693 people and that the capital cost was 12,130,000 dollars.

As a result of the above mentioned way of sewage disposal, there is great risk of breaking the safe water cycle by the contemination of water sources. The safe water cycle means water source, water supply net-work, waste water collection disposal, and return through natural channels to water source.

Air Pollution :

There are many aspects of air pollution in the rapid urbanization areas of the country. But the most significant aspect is the pollution created by the exhaust of fuel burning equipments and internal combustion ~~engines. For example there are 240~~,000 motor vehicles in Tehran (police and army motor vehicles not included). The concentration of carbon monoxide, which is monitored continuously by the Ministry of Health, varies between zero to 150 p.p.m., which is very clear evidence of pollution from fuel burning sources.

Also there are other sources as industries, workshops, refineries, brick kilns, cement factories and etc. which increase the air pollution of every main town.

Housing :

The growth rate of population at the rate of 5.5% per year in Tehran and at a lower rate in the other main cities of the country, brings up housing problems as under :

High rate of population per dwelling and room or high number of families which live in one Sq. mile. Sometimes it happens that one family lives in one room without any yard.

The Green areas of the town are too small and the main source of the oxygen generation, such the green areas, is also too small.

Refuse Collection and Disposal is not effective and is not adequate from the sanitary stand points.

Noise Pollution is increasing day by day.

City Planning :

Considering all the problems which have been mentioned, and to solve them, at least in the future, and also to plan towns and communities throughout the country, high commision of town planning has been established under the Ministry of Housing & Development. The Commission hire town consultant engineers to prepare the 25 year general development plans for every town of the country. There are representatives of the all responsible ministries and organizations in this Commission. Every aspect of town development is carefully studied by Consultant Engineers and the government representatives. There is great hope that all sanitation problems will be solved in this way. The point has to be mentioned is that each municipality has to put into execution the 25 years general development plan for its town.

Acts and Regulations

They are as follows :

Health laws, Food, Casmetics and Health-act 1966. This includes water pollution control and the control of drinking water and their regulations. There is under approval an Air-pollution Control Act. Also there is under preparation:

The regulations for radio active protection for industries, medicine and natural and unnatural radio-active fall out.

IRAQ

Iraq covers an area of 116600 Sq. miles. The population of the country is 9.2 millions, 49% of them living in urban areas the others live in the rural areas and very few in the desert.

The Iraqies are 80% of Arabs, 15% Kardish and 5% other different races.

Social Conditions

The general division of the Iraqi population is based on economical factors :

1- Urban population.
2- Country population.
3- Nomadic population.

This classification results among others from the following processes :

a) Stabilization of nomadic elements changing into country peasant population. This process is presently still taking place.
b) Relocation of members of country population into the towns.
c) Assimilation of these elements by the urban society. The present society of Baghdad, the capital of the country, is also the result of such process. The last great migration from the country to the city of Baghdad due to economic reasons has started in 1929 and reached its focal between the year 1952 - 1962. Presently some decline in the migration movement is noticeable, but the process is not completed and its continuation has to be accounted for.

Existing Situation

Rapid urbanization can be shown in Iraq in a number of cities. The city of Baghdad is one of the acute situation in this respect, since it is the largest centre of public administration, high education, learning, culture, trade, finance services and industry, accounting to 18% of the country's population.

The population of the town increased from 500 thousands in 1947 (first census) to 1500 thousands in 1965 (last census). This indicates an increase of about 8% annually which is composed of natural increase and of balance of migration.

As a result of the rapid increase of the population of a number of cities among the country during the last 3 decades, problems arised respectively mainly the development of large areas of slums around the cities occupied by the new inhabitants. These slums are lacking all kind of social and municipal services.

The trend of the population increase show a high participation of migration to the cities. It has been noticed that there is a declining tendency in respect of migration in the population. This is due to several actions taken by the government according to a wide national planning process. The main acts are :

a) The issuing of the law of agrarian reform, this law has changed the agricultural relations by combating the feudal system, giving the land to the peasants. This regim decreases the migration of country population towards the cities.
b) Improving the social and health conditions of rural areas by furnishing it with water supply and necessary medical care.
c) The distribution of the new industries geographically among the country to encourage the growth of the small cities.

Housing

To overcome the situation caused by the formation of slums as a result of the migration, the government of the Republic of Iraq started projects for housing on a national level to provide new houses for persons with low income, also distributing governmental lands freely to the new inhabitants and giving them the necessary assistance to build their own houses.

Water Supply

All cities of the country now provided with drinking water supply, new units and extensions are always added to increase the capacity of the existing plants according to the growth of the population.

In the rural areas where there are about 1500 villages still lacking sanitary water supply, the government recently made a general survey and funds allocated to provide all these villages with drinking water within 5 years. The estimated cost of this project is 200 million dollars.

Sewage

Sewerage and sewage treatment is found in one half of the city of Baghdad, the other half is now under construction. Another six main cities of the country are to be provided with sewerage and sewage treatment plants during the five year plan 1970-1974.

The other parts of the country are still using the method of ordinary septic tanks and cesspools.

Town Planning

New master plan for the city of Baghdad has been designed by a Polish firm (Polservice), takinginto account the further needs and eloborating new zoning for the city. New master plans for another 26 important cities have been completed.

Solid Wastes and Garbage Disposal

The usual method used for solid wastes and garbage disposal is by sanitary landfill in all the important cities of the country. New incinerator is being built in the city of Baghdad and nearly to be completed.

The situation of solid wastes and garbage disposal is quite satisfactory in Iraq.

Environmental Health Sanitation

The Ministry of health takes the responsibility of controlling the environment of the country by a number of laws and ordinances through city health departments & a number of public health doctors, sanitary engineers and sanitarians. The control of sanitary conditions of the environment has not reached to a satisfactory condition due to the shortage of staff specially sanitary engineers and occupational health doctors.

Training of Staff

Fellowships are granted to doctors, engineers and other health personnel to go abroad by the government sponsored by W.H.O. and other agencies.

School for the training of sanitarians is available in Baghdad, two others must be opened in the coming future.

Nurses, midwifes and other auxiliary personnel are always taken for training courses in all the provinces each year. Students are chosen locally to serve in local areas.

The Ministry of Health is confronted with difficulty in giving the motivation to the staff in remaining to serve in the field of public health - specially sanitary engineers and doctors.

JORDAN

Jordan covers an area of about 35,000 square miles. The population is about 2 millions. Amman, the capital had a population of about 600,000. Jordan is a poor country with a few natural resources.

Water Supplies

The development of adequate water supplies for domestic purposes and for agriculture is one of the major problems in Jordan. With the exception of the Jordan, there are few perennial rivers: most streams are seasonal, and the flow is often scanty and unreliable. Springs and cisterns provide the principal sources of water supply, but shallow or deep wells are found in some localities. The water supply for 'Amman' is pumped from springs inside several places and stored in about 8 reservoirs located on hills located above different sections in the City. Distribution is by graity, and the flow is so irregular that storage in tanks on the roofs of buildings is usually necessary. The supply is chlorinated, and chemical and bacteriologic examinations are made at different intervals in the public health laboratory in Amman. New sources of water have been found by pumping from the underground to meet the need of the people.

Waste Water Disposal

Cesspito and septic tanks are used in connection with the houses. In rural villages latrines or cesspools are generally used but in some rural areas the soil is polluted. Increased rapid urbanization in Amman and other big cities caused a more rapid rise in the pollution of water and of the environment leading into public health hazards. To meet the need for waste water disposal a new sewerage system with a modern treatment plant was constructed in Amman.

Solid Waste Disposal

It is collected from houses and streets and stored in sacks. Then it is transported by vehicles, disposed of into a dumping place near the city and burned. But this way is insanitary and creates serious problems of air pollution in addition to harbouring rats, flies, mosquitos and other disease-carrying vectors. The Municipality is now thinking of incineration as a method of choia for the treatment and disposal of solid wastes.

Housing

The number of people in Amman itself had increased twenty times within the last forty years. The pressnce of about one third of the people in Amman as refugees due to the Isreali - agression resulted into a new health problem regarding housing. Now, new units of houses are built by the government and sold to the people for installation.

Air Pollution

The major source of air pollution is motor vehicles which emit pollutants

such as carbon monoxide, bad, nitrogen oxides and particulate matter. The industrial and domestic combustion of fuel which produces, smoke, dust and sulphur oxides are also polluting the air. Therefore, to bring the type of pollution under control, application of techniques pertaining to vehicles is necessary.

Man power employed in environmental health

There are more than 15 public health doctors.

There are more than 12 public health engineers.

There are about 150 Sanitarians.

Situation of Environmental Health Training

The Ministry of Health is responsible for the training of not less than 50 persons per year in the field of environmental sanitation.

Food Sanitation

Inspections on restaurants, shops or industries where foods are processed or sold are made by the Ministry of Health Doctors or Sanitarians. But in Amman, the Capital such establishments are licensed and inspected by the Municipality. Meats are subjected to Municipal Ordinance and the Public Health Law. The meat animals and carcasses are examined by the veterinarian and the inspectors of the Municipality in the slaughter houses. Samples are collected daily or at intervals and sent to the Municipality Laboratory in Amman for Chemical examination and food analysis to detect adultration.

L I B Y A

General

Libyan Arab Republic is situated between two different natural environments, the Mediterranean sea to the north and extensive sahara desert to the south. The northern belt of some 15 km. is influenced by the sea having maritime climate of warm-arid Mediterranean type. All major cities, Tripoli (300,000 inhabitants), Benghazi (over 100,000), Derna and Misurata (over 20,000 each) are located in this bett. Prevailing wind direction is north (north - east and north - west). Southern very hot wind called ghibli blows mainly in the spring carrying a lot of sand and dust. These sand-storms affect the life of people and impose particular requirements on planning.

Water Supplies

Main and almost single source is ground water. Hydrogeological studies that have been carried out give relatively satisfactory data for planning. At present, general comprehensive study is being made which will give still more accurate data. Generally speaking quantity of water is not a problem in the near future although water table continues to decline. However, quality is deteriorating owing to greater withdrawal than recharge (mineralized water intrusion) and for some cities possibilities of installing demineralization plants are being examined. The water supplies of the cities and towns are being extended following the requirements of the lay-out and Master plans. The ultimate goal of urban water supply is adopted according to the W.H.O. recommendations.

Piped water to be available in all the premises in sufficient quantity and at necessary pressure.

Quality of water not to be of lower standard than that set by WHO for drinkable water.

Water supply schemes to be administered independently on sound management practice and revenues established.

The design capacity of a scheme is based on a future population and an assumed ultimate per capita rate. For urban areas of low and medium density the rate ranges from 50 to 250 liters/capita/day. For high density areas 300 to 600 l.c.d.

It is worth mentioning that in the new plans, roof tanks are abolished and stress put on overall design of the scheme to ensure required quantities in premises all the time, day and night. This was suggested by the WHO representative and it is going to cut the rate of water borne diseases since the roof tanks are the only place were contamination of safe, chlorinated water can take place.

Sewerage

For bigger cities and towns separate sewerage system has been adopted. Each system includes a purification plant that is able to purify a quantity of water equal to 3 to 6 dry weather flow. In most cities the systems are completed or about to be completed. However, the net-works cover central parts of the cities while plans for suburbs are being studied. By means of the purification plants the contamination of the under-ground sources (intakes), which are in or close to the towns, will be avoided and thus spreading of water borne diseases. On the other hand collection of sewage and its purification is designed to stop pollution of the sea which now occurs as sewage is freely discharged at the shores. Effluents from the purification plants are to be used for irrigation.

Solid Wastes

Garbage collection and disposal can be considered satisfactory. The Municipalities concerned are dealing with, increasing staff and facilities following the requirements of rapidly growing cities. At present collected garbage is incinerated and for some other cities plans provide for burying the garbage in 30 cm. layers, in safe places.

Air Pollution

At present and in the near future this problem does not appear as a serious one. Lack of heavy industry, extensive areas and almost permanent breeze from the sea make this problem nearly nonexistent, although some pollution, due to the rapid increase in the number of cars, is to be mentioned.

The only serious air pollution can be attributed to the occasional blow of southern wind (Ghibli) carrying sand and dust. However these days are few and effects shall be minimized by increasing the green belts around cities to keep the sand firm and also by proper design of houses. Link between Ghibli and respiratory tract diseases seem to exist, however there are no studies dealing with the problem.

Housing

There is a plan to provide a house for every family. The plan is almost completed. Some time ago the design of houses has been improved particularly as regards environmental health aspects and the location, distribution, planning and execution of corresponding public utilities.

General Note

All the aspects of public health connected with environmental factors are integrated in the overall Governmental planning. Some assistance in this field has been given by the World Health Organization.

PAKISTAN

Introduction

The State of Pakistan which consists of two Wings - East Pakistan and West Pakistan, separated by 1000 miles or Indian territory, came into being in the year 1947. The areas falling under the jurisdiction of new State of Pakistan were mostly under-developed and were lacking in basic amenities of water supply, sewerage, drainage etc. A great upheaval took place just after the partition due to the migration of refugees from one State to another. The country was confronted with the enormity of complex problems of national importance and as such nothing significant could be done in providing community services on large scale, except the development of Satellite Towns in a few cities, till the 2nd Development Plan 1960-65.

Extent and Trend of Urbanization

There had been rapid urbanization due to influx of refugees from India and accelerated population growth within the country. Development projects around Cities attracted rural population migration to urban areas to find better prospects of living. Due to this, some of the towns have expanded from 5 to 10 miles. For example the Lyallpur Town in West Pakistan which was only an agricultural market has grown to one of the largest industrial cities of Pakistan and its population has arisen from 70,000 persons to more than 7,50,000 persons since 1947. Similarly Khulna in East Pakistan during the same period has grown from a small town of 30,000 persons to a population of 3,30,000 persons. The general increase in population is as under:

(Figures in Million)

	1951			1961			1970 (Estimated)		
	*EP	WP**	Total	EP	WP	Total	EP	WP	Total
Rural.	40,22	27,76	67,98	48,20	33,23	81,43	67.9	42,9	110,8
Urban.	1.85	6.02	7.87	2.64	9.65	12.29	4.5	17.0	21.5
Total:	42.07	33.70	75.85	50.84	42.88	93.72	72.4	59.9	132.30

Water Supplies

Since 1947, lot of improvement in the existing systems had been made and many new towns have been served with piped water supply as under:-

	Number of cities.	No. served in 1947	No. served upto 1970
EAST PAKISTAN	78	8	22
WEST PAKISTAN	88	45	55

* East Pakistan.
**West Pakistan.

Inspite of all the efforts, hardly 30% of the urban population is served with piped water supply.

Sewerage

Very little attention has been paid to improve the Sewerage System of cities except 2 in East Pakistan and 15 in West Pakistan. A lot of work is required to be done. No treatment has been provided. Raw Sewage is mostly used for irrigation. Only about 20% of the population is connected with Sewerage System.

Garbage Disposal

Very primitive methods of garbage collection and disposal out of the towns is the practive in many cities, schemes are under preparation for proper disposal in a few towns.

Housing

Although Government has been developing housing colonies in many cities, the slum areas continue to increase. People don't want to go to distant housing colonies.

Air Pollution

Problem is on the increase due to industrialization but nothing has been done so far to control the situation. Stream pollution problem is also coming up.

Environmental Health Training

Except M.Sc. in Public Health Engineering Course, there is no training for Sanitarians. Sanitary Inspector courses are available within the country, which has no engineering subjects and are of low standard.

Manpower

Public Health Engineering Departments exist in both Wings for Planning, Designing and execution of Sanitary Works. Specialists for Trade Waste Disposal are required.

QATAR

Qatar is an Arab State, on the Western Shore of the Arabian Gulf. Its population exceeds 130,000. The capital Doha is a rapidly growing city, and 80% of the population live in and around it.

The country is desert-like and its climate is distinguished by a great difference of day and season temperature, high humidity and minimal amounts of rainfall in winter months.

Water Supply

Qatar has no rivers, and domestic water is obtained from 2 sources:

1. from distillation plants with total distillate capacity of seven million gallons per day.
2. from well-fields yielding 3 million gallons per day.

The water is chlorinated before distribution and regular check up samples are taken for chemical and bacteriological examination.

Refuse and Sewage Disposal

There are 2 methods of treating refuse:

1. Tipping
2. Incineration

A fleet of cesspit emptiers attend to cesspit clearing. They empty their contents on natural rifts outside the town. There is a sewage collection and treatment system designed on 2 stages. The first stage has already been terminated.

Housing

Qatar is dependant for all its labour force on immigrants from neighbouring countries. No provision whatever has been made to accommodate this large number of people. The condition under which they live is appalling and highly unsatisfactory. Otherwise, the condition of housing is moderate.

Air pollution

No problem of air pollution for the time being is present. Houses are widely spaced except in limited areas of the town, and there is no threat of industrial waste pollution. However, motor vehicles with their exhaust fumes are increasing year after year threatening the capital Doha with air pollution.

Manpower

Most of the environmental health work is entrusted to a group of unqualified staff. The government has appointed some foreign health inspectors from Jordan and Pakistan, to supervise them.

Training

The implementation of the WHO Project. Qatar 0002 ' Health Training Institute' - started in 69 - will provide the Public Health

Department and Qatar Municipality with trained health personnel which will be graduated in 1972. In-service training of the present staff is arranged for periodically.

Future Plans for Remedy

1. Lack of qualified staff will be overcome by graduates of the Health Training Institute.
2. Occasional breakdown of Municipal fleet of trucks. This has already been budgeted for.
3. Town planning in some congested areas should be re-organised.
4. Lack of co-operation from the side of the population will be overcome by re-inforcing the Health Education Centre with qualified staff and equipments.

SUDAN

The Sudan is a large country of about one million square miles and with about 15 millions of inhabitants.

Its climate is temperate - the degree of heat in the summer month, in June may reach 115° F. There are climatical variations where the Southern part of the country enjoy a rainy season of about 9 months of year, the far north has little rains but hard winter, the East which lies on the Red Sea Hills have a raining winter, but the western part and central part are more or less of the same nature.

There are also differences in habits and traditions and mode of living in the various regions of the country and this is mostly found in the rural area.

Administration

The Republican Democratic Sudan is devided into 9 Provinces and each Province has its administration set up which is headed by a Commissioner.

Environmental sanitation work in the country is financed by ministry of Local Government and its different Councils, and the curative and social medicine and the training of all Public Health personnel is undertaken by the Ministry of Health.

The rapid increase of towns as an alarming problem is perceived every where and possibly discussed in the same terms which include water supply, sanitation, employment, frustration with low standard of living and migration from rural to urban areas.

Water Supply Sources

1. The Nile that runs South North accross the country provides sufficient supply in its basin for both drinking and agricultural use.

2. The Western part of the country mainly two Provinces with about 3 millions of population rely on their water or rains. Water is stored in dug out excavations, wells, or trunk of trees in certain areas.

In the capital of the Provinces, water is normally treated in water in water works and distributed to houses. In other rural areas public stand points are established for clean water supply. There are other groups of people who have no supply and collect their water from distant areas and in the majorty of cases to have 4 gallons of water when they require to collect it.

The Government is now undertaking a serious plan to provide water supply for these areas and funds are being rai ed to meet such expensive scheme where the people are only too anxious to have a wholesome supply.

Waste Matter Disposal

1. Human waste matter is disposed of in:

a. Bucket system in many big cities.

b. Pit latrines in a bigger scale in both rural and urban areas.

c. Drainage system in small scale in main towns.

d. Aqua services in some towns.

e. A large proportion of people in Rural and agricultural areas use the open this endangering the local water supplies.

Waste Water

Where water carriage system is installed we have no problem in getting rid of the waste water. In some areas waste water is disposed in deep wells and cesspools. A big proportion of waste water is allowed to run on the surface to dry and here we come accross the problem of mosquito breeding.

Solid Waste Collection

House to house collection is only made in first and second class residential areas in a city where they pay a bit more. In other areas the refuse is taken to public refuse bins.

Removal of all refuse is done by mech.refuse transport and finally incenerated. In certain areas the reclamation of land is conducted.

Other big problem is the shortage of transport which is a matter of finance since the rapid increase of towns is bringing with it more demand for the increase of budgets.

Housing

The differences of habits and mode of living is bound to make some variation in the type of house and its requirement. Law provides that a minimum area of a living house should not be less than 200 sq. meatres. The house in first class area can go up to 1000 matres sq. Material of construction and are to be covered with buildings is governed by law. Light and ventilation are not a problem.

Recently a Ministry of Housing has been formed to undertake the planning responsibilities and all of its present schemes is the provision of houses for the different levels of income.. The project involves material and cost of construction.

We have been faced with very rapid increase of population in Khartum Province. Figure was about 1/4 of a million in 1965 and not it is approaching 1 million of inhabitants.

Air pollution

As a developing country the problem has not yet developed and we hope that we shall benefit from the experience of other people before embarking on it.

Man power

The categories of man power engaged in environmental sanitation are:

Qualified Health Officer.
Sanitary Overseer or Sanitary Aid.
Assistant Sanitary Overseer or Sanitary Aid.
The Workers.

According to our last evaluation of services made in the Ministryof Health it was found that our figures are below that required, and measures are

now taken with Ministry of Local Government to adjust these requirements as far as possible. For example our ratio of qualified Public Health Officers in the population is 1 per 75000.

Training

We have a school of Hygiene to graduate qualified Sanitarians with Diploma of Public Health Inspectors from the Royal Society of Health, London. We graduate about 20 every year and candidates from other countries are always welcome. The course takes three years and the intake from those who successfully completed the secondary education.

Sanitary Overseers get at least two years practical training with Councils before given 6 months course in the school of Hygiene to qualify as Sanitary Overseers. Short courses for other categories are also conducted in the school and locally in the different Provincies.

The carriculum of school of Hygiene and all training Centres is now being revised.

Other Activities

Minimum Standard of Service

a. In order to attempt to make a fair distribution of services and minimize channels of migration, minimum standard of services are now discussed to include

- Water supply
- Waste Matter Disposal
- Food Preparation Places
- Housing Accommodation.

b. The distribution of factories and industries throughout the country is also being considered seriously for the some purpose of migration.

c. Full use is made of voluntary organizations such as that of the youth, women and cadets, in all fields of Health, Education and even in the practical process of cleanliness.

d. Refugees from other countries are accommodated in certain areas and the assistance in the way of food medical facilities, land to cultivate is provided for them.

Great efforts are made not to overload the existing services of the area.

e. Fellowships of different specialities are being greatfully granted by WHO and we feel they are of great benefit to us.

In conclusion I feel it my duty to thank the WHO and its efficient officers of the region for giving us the opportunity to this valuable Seminar which is giving us very useful material through its highly qualified staff. Also to extend the sincere gratitude to the country host and its authorities for their efficient organization, assistance and sincere reception.

SYRIA

Syria is about 6 million population and 187000 Km^2. The average rate of increase of the population is 3.3% annually, irrigation to urban area have raised this rate to 5% annually in some cities. This has resulted in sanitation problems of rapid urbanization.

More than 2 millions people are living in cities of over 50,000 inhabitants while the rest lives in villages and towns and small communities.

The Ministry of Municipalities and Rural affairs is now responsible for water supply systems (sources, treatment if necessary and net works), solid waste disposal, waste water disposal, city planning, and housing.

The Ministry of Public Health is concerned with medical aspects only. 66% of the population of Syria lives in municipalities which may include villages the rest are living in rural areas only.

a) Water Supply

About 58% of the population is now served with piped water in their houses. It is hoped that this figure will reach 68% by the end of 1975, while 7% will take their water from public fountains.

Water consumption in rural areas varies from 30 - 75 litres/capita/day. Present planning provides for design figures of not less than 75 litres/capita/day in the year 2000 in the communities of less than 5000 habitants. In villages and cities which are bigger the water consumption is from 100 - 250 litres/capita/day in the more.

About 1 million people are drinking treated surface water, while the rest are drinking water from under-ground sources which does not need any treatment.

Water supply standards have been fixed by law. Most of these standards are according to WHO standards. Chemical and bactrialogical routine examinations are done daily in big towns and it is hoped that this can be extended to all communities even in rural areas by the end of 1975.

The maintenance and operation of rural water supply projects is not easily achieved and there is a need to train technical personnel for this purposes.

b) Waste Water Disposal

Most of the municipalities which have water supply have sewers too, while in rural areas there are no sewers and even no latrines. All the sewage is discharged into rivers and summer-dry streams. The combined system (storm and sanitary sewers) has been adopted throughout the country. There exists no sewage treatment plants at all. During the fifth five years plan (1970-71) the design and construction of sewage treatment plants for Damascus, Homs and Hama will be

carried out.

c) Solid Waste Disposal

Solid waste collection is practised in all municipalities. Donkies as well as tractors are used for this purpose in small and big cities, while vehicles are used in well planned city zones. Difficulties are experienced in the collection of solid wastes in slums where narrow streets are common.

Most of the solid wastes are dumped and part of it is burned in the open air while other parts are utilized as raw fertiliser in agriculture. A composting plant is operating now in Hama and a new treatment plant in Allepo is under construction. Part of Damascus city garbage is treated.

d) Housing

The migration of rural population to urban areas creates a very great housing problem. There are no sufficient staff for city planning. Assistance is provided by UN experts in an attempt to solve this problem which can be found in any city.

e) Air Pollution

In the city of Homs where there is a refinery, air pollution is big problem. Also in Damascus where air pollution is created by motor cars and in winter by petroleum stoves. Nothing has been done for this problem, so far.

f) Water Pollution Control

The Orient (ASSI) river which is now the source of water supply for Homs and Hama, is highly polluted by the effluents from the petroleum refinery and from many different factories. Besides the sewage of Homs and Hama is discharged in this river. This big problem is being dealt with. A department has been organized which will impose water pollution standards for both the effluents and the river water. All factories are now obliged to treat their effluents in accordance with these standards before discharging them in the river. The Baroda River (where Damascus discharges its sewage) has the same problem and it is now under study. It is hoped that Barada will fallow the Orient as soon as possible.

g) Environmental Health Training

There exists an Institute for the training of both medical and environmental health personnel and it is hoped that it can be extended to train operators for water supply and sewage treatment plants.

TUNISIA

Tunisia has about 4 millions inhabitants with 40% living in rural areas. The population growth (2.3% per year) and the industrialization especialy the touristic industry resulted in a rural exodus which characterises developing countries. These two factors created a growth of the towns and the extension of urbanized areas with slum conditions around the cities.

1. Water Supply

Except the 'Medjerdah' river, which supplies Tunis in part, Tunisia has seasonal streams. Therefore springs and deep wells provide the principal sources of water supply besides some agricultural reservoirs. A national society called 'SONEDE', financed in part by the World Bank was established in 1968. Having an industrial and commercial outlook it has the responsibility for water distribution systems for realizing new developments and satisfying the need for clean water. The quality control is the responsibility of the Public Health Department(PHD) which has 5 regional bacteriological laboratories and a reference laboratory in Tunis namely the 'INSTITUT PASTEUR'. Every inhabitant in the urban areas (more than 5000 inhabitants) can be provided with water and the connection costs can be paid under easy terms. This water supply is almost continuous, with rare exceptions in summer, adequate and safe (less than 10% of the bacteriological examinations was positive in 1970) and the pressure is in the average range provided that each building having more than 3 stories should have a storage tank. Unfortunately, these water supplies do not meet the chemical and even sometimes the physical standards specified by WHO. Disinfection is made by chlorination (liquid hypochlorite) usually at the pumping stations or in the reservoirs in a manner to leave at least 0,1 - 0,3 ppm of free available residual chlorine. This figure can be raised at the request of the Public Health Department which controls daily and throughout the country this residual chlorine. In the rural areas, water is supplied by dug surface wells and lately the P.H.D. has begun a programme to improve these wells to make them sanitary and to equip them with hand pumps with the assistance of UNICEF and CARE MEDICO. Besides, mobile crews (one for each governorate) make bi-monthly desinfection of public wells.

2. Waste-water Disposal

This is the responsibility of each Municipality. We can say that the major cities having more than 10,000 inhabitants are provided with adequate sewerage systems and each house can be connected to the system with some facilities in the payment of the taxes. The actual sewage treatment plants (5 in number) are unfortunately nearly out of operation due to the lack of operators. For example 'chargnia' sewerage treatment plant in Tunis, is somehow treating only 1/3 of the total flow it receives, the 2/3 left, goes to the lake of Tunis which is

highly polluted. Some areas, and some industrial sites are also polluted creating big problems of odours, flies and mosquitos. In the rural areas, the most common system of waste-water disposal is the cesspol and the PHD is doing his best to control the use of sewage effluents for irrigations and to carry out health campaigns. With the help of the World Bank and Sida, it is believed that in the near few years, all the touristic areas and their cities will be provided with complete sewerage systems and adequate treatment facilities, the effluent of which might be used for irrigation.

3. Solid Wastes

This is also the responsibility of each municipality. In general, it can be said that the collection is somewhat adequate but the treatment does not exist anywhere. In the last few years, however, the PHD has had a great success, in the wake of the 1970's flooding and epidemics, in convincing the municipalities (not all of them but the most important and even in rural areas) to do one, some incineration, landfill or composting. By 1971 several small municipalities have taken interest in that last method and it is believed that some authorities are now convinced that they should entrust this work of collection and treatment of solid wastes, to private agencies for the benefit of sanitation and fly control.

4. Housing

As mentioned above, housing difficulties exist in Tunisia and the rural exodus with the help of the touristic boom creates slum conditions all around major cities. In the past, in Tunisia, urbanism was not aided by any long term national plan. To-day it has become evident that each town should have, very soon, its planning programme involving the control of its expansion within a plan for the organization and development of the whole country in order to stop the depopulation of rural areas. The Ministry of Public Works and Housing have now the situation under control, They make planning with the help of all authorities concerned, deliver building permits for housing or industries; control clandestine construction with assistance from the municipalities and give loans for the improvement of housing.

5. Air Pollution Control

With the except of industrial areas, in the environment of which there is a beginning of air pollution, Tunisia does not yet have any problem of this kind and it is not expected that there will be any in the near future provided that Recreational Gardens, green belts and public parks continue to be developed or extended around cities and that there is no considerable increase in the number of motor vehicles.

Environment Health Manpower and Training

All environment health activities are, at the regional levels, in the hands of Public Health Doctors.

Two sanitary engineers(one WHO, one national) are in the central service of the Public Health Department and control the sanitation of the country through 13 regional sections. They are assisted by about 400 Sanitarians trained in Tunisia with the help of WHO. In the next few years the Public Health Department will be able to start the training of a higher category of sanitarians capable of performing supervisory functions, about 10 sanitary engineers will graduate from Rabat (Morocco).

Tunisia still has a great deal of work to do in environmental sanitation. Many programmes are under study with the assistance of WHO and help will be required from UNICEF, World Bank, and UNDI more and more.

YEMEN

Yemen is a small country. The population is not exactly known, as no census was ever made in Yemen but it is about 5 Millions and seems not have varied very much over the years.

The rainy season coincides with the summer time and the population depend on rain for water, either to irrigate their land or for drinking.

Urbanization in Yemen is not a problem of to-day because criteria of urbanization has not yet been established and emigration comes mostly from abroad.

Health

In Yemen there are about 13 hospitals containing 1800 beds

Health Centres: 3 of them, in the big cities helped by WHO.

Sanitarian School: None (closed since 2 years)

Nursing Schools: 3 helped by WHO

Man Power Institute planed to be built in the near future.

Doctors: 2 Specialists
12 General Practitioners
70 Physicians
50 Foreigners

Preventive medicine:

One Dr. works in this field with about 100 Sanitarians. Most of their work is concentrated on vaccination and supervision of the public places.

No Sanitary Engineers at all.

Health Problems:

In children: Malnutrition - Gastro enterities and bad handling of mothers.

In adults: Parasitic infestation and nutrition defficiency diseases specially due to kat cheewing and now bilharziasis is the problem of the day.

Water

The uptodate problem in Yemen is lack of water. We depend on rainfall. Four years have passed without rain in about half of the country. As a result, most of the land produced nothing in agriculture this year and we may well have a famine within few months exactly as happened last year. In the capital Sanaa every house has its own well and most of the city dwellers have to deepen their wells ~~every few~~ months to search for water. Others buy water daily paying nearly 1/5th of their salary for water. In rural areas this is even worse. Now WHO, acting as UNDP/ executing agency, is going to build a water supply for Sanaa and Hodeidah and it is hoped that they will find sufficient water resources for their Project.

It is believed that they should plan for a sewerage system and proper sewage disposal as soon as possible instead of meeting this problem only in the future.

Sewerage System

This is not yet established in Yemen and every house dig a hole in the ground for about 20 meters for excreta disposal. This is too bad, because of possible ground water cantamination, account being taken of the great no. of wells in the city, as the houses are crowded and as every one has a well also in addition to the deep latrine. Other houses use under ground or street level latrines and the faecal matter is collected by private people who take it and dry it for use as fuel in the turkish baths.

Waste

Waste disposal is not a serious problem nor because the quantities of waste of the domestic type is relatively small. They are put in a container and disposed of into barrels in the streets and public cars transfer them outside the city. The average quantity of waste is about one kg./capita/week (mostly solid type).

Air Pollution

Such problems do not yet occur in Yemen, as the process of urbanization is still rather slow. In Yemen, there are only a few hundreds motor cars and not more than one or two factories in the big cities. There are no railways at all. Therefore, there exist only the natural and pure air to breath.

Housing

Inspite of the fact that each family live alone in a big house yet, the houses are crowded and nearly all the family sit, and sleep in one or 2 rooms and ventilation is not adequate.

The Government

The Government of Yemen plans to build a Man Power Institute and Water Supply with the help of WHO under the UNDP Programme, but without money, water, agriculture or petrol, they can do only just as much as others in their position can do.

ANNEX I

LIST OF PARTICIPANTS

EASTERN MEDITERRANEAN REGION

AFGHANISTAN

Mr Shah Aqa
Director
Environmental Sanitation Division
Ministry of Public Health
Kabul

CYPRUS

Dr M. Economopoulos
Director
Department of Medical Services
Ministry of Health
Nicosia

EGYPT

Dr R.A.A. Gomaa
Secretary General
Health Services Supreme Council
Ministry of Public Health
Cairo

Mr A.M. El Shebokshy
Director
Environmental Health Department
Preventive Medicine Administration
Ministry of Public Health
Cairo

ETHIOPIA

Mr K. Tadesse
Head, Environmental Health
Division
Ministry of Public Health
Addis Ababa

IRAN

Mr V. Babazade Khamnei
Deputy Director, General
Department of Environmental Health, and
Director, Air Pollution Control and
Occupational Health Department
Ministry of Health
Teheran

Mr H. Hassanizadeh
Director, Planning and Budget
General Health Department
Ministry of Health
Teheran

IRAQ	Mr A.R.H. Khayat Director, Sanitary Engineering Ministry of Health Baghdad
JORDAN	Dr T. Abdul-Razak Amman Municipality Amman
LIBYA	Mr R.A. Akrami Head, Water Supply Department Ministry of Housing and Public Utilities Tripoli
PAKISTAN	Mr M.F. Qureshi Director Public Health Engineering Department Lahore
	Mr Iqbal A. Beg Chief Engineer Lahore Municipal Corporation Lahore
	Dr Abdul Qadeer Khan Medical Officer I/c G.H.Q. Hospital, Loralai Baluchistan
	Mr M.H Rahimtoola Chief Engineer Karachi Development Authority Karachi
	Dr Amir Ali Shah Deputy Director Health Services North West Frontier Province Peshawar
	Dr M. Islam Sheikh Professor and Head Public Health Engineering Division West Pakistan University of Engineering and Technology Lahore
	Mr Latifar Rahman Chairman Water and Sewerage Authority Dacca

QATAR	Dr S.A. Tajeldeen Medical Officer of Health Ministry of Public Health Doha
SUDAN	Mr A.I. Idris Chief Public Health Inspector Ministry of Health Khartoum
SYRIA	Mr M. Youness Sanitary Engineer Sanitary Engineering Department Ministry of Municipal and Rural Affairs Damascus
TUNISIA	Mr S. Atallah Chief, Environmental Sanitation Service Ministry of Public Health Tunis
YEMEN	Dr Y.A. El-Seraji Medical Officer Ministry of Health Sana'a

OBSERVERS FROM HOST COUNTRY

PAKISTAN	Dr Safdar Bokhari Secretary General Public Health Association of Pakistan Lahore
	Mr Mazharul Haque General Manager Greater Lahore Water Supply Drainage and Sewerage Project Lahore
	Raja Sultan Mahmud Health Officer Lahore Municipal Corporation Lahore
	Mr Shamsul Mulk Director Water and Sewerage Central Development Authority Islamabad

OBSERVERS FROM HOST COUNTRY (Continued)

Dr Arshad Hussain Sethi
Health, Education and Social Welfare Department
Government of North West Frontier Province
Peshawar

Dr Ghulam Mohammad
Deputy Director
Health Services, Peshawar Division
Peshawar

Mr Gholam Mohammad
Secretary
Dacca Municipality
Dacca

Dr Muhammad Safdar
Health Officer
Karachi Municipal Corporation
Karachi

Mr Mohammad Tayab
Superintending Engineer
Public Health Engineering Department
Hyderabad

Mr T.A. Jafrey
Director
Town Planning Sind
Hyderabad

Dr S. Hasan
Assistant Director General Health
Health Division
Ministry of Health, Labour, Social Welfare and Family Planning
Islamabad

Mr A. Rachid Quraishi
Assistant Chief
Physical Planning and Housing
Planning Commission
Islamabad

Mr Naeemullah
Superintending Engineer
Public Health Engineering
Peshawar

REPRESENTATIVES FROM OTHER UN BODIES

UNDP	Mr A.S. Geair Programme Officer United Nations Development Programme Islamabad
UNICEF	Mr A.V. Zabolotsky Deputy Representative UNICEF Country Office Islamabad
	Mr M. Bulawa Deputy Representative UNICEF Country Office Islamabad
UN	Mr A.B. Jedraszko Chief Adviser and Project Manager Master Plan for Karachi Metropolitan Region Karachi

OBSERVERS FROM OTHER ORGANIZATIONS

US AID	Mr A.D. Swisher, P.E. Environmental Health Service Agency for International Development Washington
	Mr W.J. Waylett Officer-in-Charge Agency for International Development Lahore

WHO SECRETARIAT

Dr A.H. Taba	Director	WHO Regional Office for the Eastern Mediterranean, Alexandria
Mr L.J. Lovelace	Adviser on Environmental Health	WHO Regional Office for the Eastern Mediterranean, Alexandria
Mr F.A. Jacocks	Consultant	Special Assistant to the Director, Bureau of Community Environmental Management, Department of Health, Education and Welfare, Public Health Service, Rockville, Maryland, USA

WHO SECRETARIAT (Cont'd)

Professor E.W. Mood	Temporary Adviser	Associate Professor of Public Health and Chief of Environmental Health Section, Department of Epidemiology and Public Health, School of Medicine, Yale University, New Haven, USA
Mr R. Casanueva	Temporary Adviser	Consultant Engineer in Environmental Health, Santiago, Chile
Mr J.V. Dibble	Sanitary Engineer	Community Water Supply and Sanitation, Lahore
Miss C. Cartoudis	Conference Officer	WHO Regional Office for the Eastern Mediterranean, Alexandria
Mrs G. Pappas	Secretary	WHO Regional Office for the Eastern Mediterranean, Alexandria

ANNEX II

PROGRAMME

1. THURSDAY, 7 OCTOBER 1971 — Venue: Intercontinental Hotel

8.30 a.m. - 9.30 a.m.	- REGISTRATION OF PARTICIPANTS
9.30 a.m. -10.30 a.m.	- OPENING SESSION
	- Welcome address by Rear Admiral A.N. Ansari, Director-General of Health, Pakistan.
	- Short speech by Mr. A. Hasan, Vice-Chancelor of the University of Engineering and Technology, Lahore.
	- Address by Dr. A.H. Taba, Director, WHO, Eastern Mediterranean Region.
	- Inaugural address by Lt. General M. Attiqur Rahman, Governor of the Punjab, West Pakistan.
11.00 a.m.* - 2.00 p.m.	- Elections of Officers: A Chairman, a Vice Chairman and a Rapporteur
	- Adoption of the Agenda
	- Programme of Work by Mr. L.J. Lovelace
	- URBANIZATION AND RELATED ENVIRONMENTAL HEALTH PROBLEMS by Mr. F.A. Jacocks Doct/4
	- Health problems arising from water pollution and defective waste disposal
	- Socio-economic aspects of slums
	- Sanitation control as preventive measure

2. FRIDAY, 8 OCTOBER 1971

8.30 a.m. - 9.00 a.m.	- Steering Committee
9.00 a.m. - 11.45 a.m.	- ENVIRONMENTAL HEALTH PROGRAMME OF WHO AS RELATED TO URBAN DEVELOPMENT presented by Mr. L.J. Lovelace Doct/5
	- SANITATION PROBLEMS OF RAPID URBANIZATION IN EMR (Statements by participants)
1.00 p.m. - 4.00 p.m.	- Field visit to Paper Mill in Lahore

3. SATURDAY, 9 OCTOBER 1971

8.30 a.m. - 9.00 a.m.	- Steering Committee
9.00 a.m.* - 2.00 p.m.	- STATEMENT BY PARTICIPANTS (Continued)
	- PLANNING OF METROPOLITAN AREAS AND NEW TOWNS by Professor E.W. Mood Doct/6
	- PLANNING AND DESIGN OF URBAN WATER SUPPLIES by Mr. R. Casanueva Doct/7

4. SUNDAY, 10 OCTOBER 1971

7.00 a.m. - 7.30 p.m.	- Field visit to Mangla Dam (90 miles from Lahore)

* 10.30 a.m. - 10.45 a.m. - RECESS

5. MONDAY, 11 OCTOBER 1971

8.30 a.m. - 9.00 a.m.	- Steering Committee
9.00 a.m.* - 2.00 p.m.	- PLANNING FOR OPERATION AND MAINTENANCE OF COMMUNITY WATER SUPPLIES by Mr. J.V. Dibble Doct/8
	- WASTE COLLECTION AND DISPOSAL by Mr. F.A. Jacocks Doct/9

6. TUESDAY, 12 OCTOBER 1971

8.30 a.m. - 9.00 a.m.	- Steering Committee
9.00 a.m.* - 2.00 p.m.	- PLANNING AND DESIGN OF SANITARY AND STORM SEWERS - SEWAGE FINAL DISPOSAL by Mr. R. Casanueva Doct/10
	- OXIDATION PONDS by Dr. M. Islam Sheikh Doct/11
	- ORGANIZATION AND ADMINISTRATION OF ENVIRONMENTAL HEALTH SERVICES by Mr. F.A. Jacocks Doct/12

7. WEDNESDAY, 13 OCTOBER 1971

8.30 a.m. - 9.00 a.m.	- Steering Committee
9.00 a.m.* - 2.00 p.m.	- LEGISLATION by Professor E.W. Mood Doct/13
	- FINANCING WATER AND SEWERAGE SCHEMES by Mr. R. Casanueva Doct/14
	- EDUCATION, TRAINING AND EMPLOYMENT OF SANITARY ENGINEERS, SANITARIANS AND OTHER AUXILIARY STAFF by Professor E.W. Mood Doct/15

8. THURSDAY, 14 OCTOBER 1971

10.00 a.m. - 10.30 a.m.	- Films
10.30 a.m. - 11.30 a.m.	- Summary of conclusions and recommendations
	- Adoption of recommendations
	- CLOSING SESSION

---

* 10.30 a.m. - 10.45 a.m. - RECESS

ANNEX III

LIST OF BASIC DOCUMENTS

PROVISIONAL AGENDA	EM/SEM.SAN.PROB,URB,/1 Rev.2
PROVISIONAL PROGRAMME	EM/SEM. SAN.PROB.URB,/2 Rev.1
PROVISIONAL LIST OF PARTICIPANTS	EM/SEM.SAN.PROB.URB./3
URBANIZATION AND RELATED ENVIRONMENTAL HEALTH PROBLEMS by Mr F.A. Jacocks WHO Consultant	EM/SEM.SAN.PROB.URB,/4
ENVIRONMENTAL HEALTH PROGRAMME OF WHO AS RELATED TO URBAN DEVELOPMENT	EM/SEM.SAN.PROB.URB./5
PLANNING OF METROPOLITAN AREAS AND NEW TOWNS by Professor E.W. Mood WHO Temporary Adviser	EM/SEM.SAN.PROB.URB/6
PLANNING AND DESIGN OF URBAN WATER SUPPLIES by Mr. R. Casanueva WHO Temporary Adviser	EM/SEM.SAN.PROB.URB./7
PLANNING FOR OPERATION AND MAINTENANCE OF COMMUNITY WATER SUPPLIES by Mr J.V. Dibble WHO Sanitary Engineer	EM/SEM.SAN.PROB.URB./8
WASTE COLLECTION AND DISPOSAL by Mr F.A. Jacocks WHO Consultant	EM/SEM.SAN.PROB.URB./9
DESIGN OF SANITARY AND STORM SEWERS SEWAGE FINAL DISPOSAL by Mr R. Casanueva WHO Temporary Adviser	EM/SEM.SAN.PROB.URB./10
OXIDATION PONDS by Dr M. Islam Sheikh Professor of Civil Engineering, University of Engineering and Technology,Lahore, West Pakistan	EM/SEM.SAN.PROB.URB./11
ORGANIZATION AND ADMINISTRATION OF ENVIRONMENTAL HEALTH SERVICES by Mr F.A. Jacocks WHO Consultant	EM/SEM.SAN.PROB.URB./12

LEGISLATION

by Professor E.W. Mood
WHO Temporary Adviser

EM/SEM.SAN.PROB.URB./13

FINANCING WATER AND SEWERAGE SCHEMES

by Mr R. Casanueva
WHO Temporary Adviser

EM/SEM.SAN.PROB.URB./14

EDUCATION, TRAINING AND EMPLOYMENT OF SANITARY ENGINEERS, SANITARIANS AND OTHER AUXILIARY STAFF

by Professor E.W. Mood
WHO Temporary Adviser

EM/SEM.SAN.PROB.URB./15

ANNEX IV

LIST OF BACKGROUND MATERIAL

URBAN HEALTH SERVICES(Expert Committee on public Health Administration - 5th Report)	TRS NO. 250
ENVIRONMENTAL CHANGE AND RESULTING IMPACTS ON HEALTH (Report of a WHO Expert Committee, Geneva, 1964)	TRS NO. 292
ENVIRONMENTAL HEALTH ASPECTS OF METROPOLITAN PLANNING AND DEVELOPMENT(Report of a WHO Expert Committee, Geneva,1964)	TRS NO. 297
TREATMENT AND DISPOSAL OF WASTES(Report of a WHO Scientific Group, Geneva, 1966)	TRS NO. 367
THE EDUCATION OF ENGINEERS IN ENVIRONMENTAL HEALTH(Report of a WHO Expert Committee, Geneva, 1967)	TRS NO. 376
RESEARCH INTO ENVIRONMENTAL POLLUTION(Report of Five WHO Scientific Groups, 1968)	TRS NO. 406
WATER POLLUTION CONTROL IN DEVELOPING COUNTRIES (Report of a WHO Expert Committee, Geneva,1967)	TRS NO. 404
URBAN AIR POLLUTION WITH PARTICULAR REFERENCE TO MOTOR VEHICLES(Report of a WHO Expert Committee, Geneva, 1968)	TRS NO.410
COMMUNITY WATER SUPPLY(Report of a WHO Expert Committee,Geneva, 1968)	TRS NO. 420
NATIONAL ENVIRONMENTAL HEALTH PROGRAMMES: THEIR PLANNING, ORGANIZATION AND ADMINISTRATION (Report of a WHO Expert Committee,Geneva, 1969)	TRS NO. 439
URBAN WATER SUPPLY CONDITIONS AND NEEDS IN SEVENTY-FIVE DEVELOPING COUNTRIES, Dieterich, B.H. and Henderson, J.M.(1963)	PUBL.HLTH.PAP. NO.21
HOUSING PROGRAMMES: THE ROLE OF PUBLIC HEALTH AGENCIES,Andrzejewski, A. et al(1964)	PUBL. HLTH.PAP. NO.
NOISE: AN OCCUPATIONAL HAZARD AND PUBLIC NUISANCE	PUBL. HLTH.PAP.

PROBLEMS IN COMMUNITY WASTES MANAGEMENT Ellis, H.M. et al (1969)	PUBL. HLTH.PAP.NO.38
THE PHYSIOLOGICAL BASIS OF HEALTH STANDARDS FOR DWELLINGS, Goromosov, M.S. (1968)	PUBL.HLTH.PAP. NO.33
URBANIZATION IN DEVELOPING COUNTRIES by International Union of Local Authorities, December 1967	
PLANNING OF METROPOLITAN AREAS AND NEW TOWNS (UN Publication)	Sales No. 67. IV.5 (ST/SOA/65)
THE CENTRAL PUBLIC HEALTH ENGINEERING RESEARCH INSTITUTE, NAGPUR, INDIA (UNDP/WHO Report, Geneva, 1968)	
POLICIES FOR SOLID WASTE MANAGEMENT	US PHS Publication No.2012
REPORT ON THE SEMINAR ON AIR POLLUTION Teheran, 21-29 April 1969	EM/ES/144 EMRO 0122
IRCWD NEWS by the WHO International Reference Centre for Wastes Disposal, March 1971	No.1
SECOND ANNUAL REPORT 1970 by WHO International Reference Centre for Community Water Supply	
THE CHALLENGE TO PUBLIC HEALTH OF URBANIZATION (Report on the Technical Discussions at the 20th World Health Assembly, 17 May 1967)	A20/Techn. Disc./6