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Wider Caribbean Region

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Overview on Environmental Health in the Wider Caribbean Region

*prepared with the co-operation of
the Pan American Health Organization*



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IN REPLY REFER TO:

OVERVIEW ON ENVIRONMENTAL HEALTH
IN THE WIDER CARIBBEAN

MAY 1979

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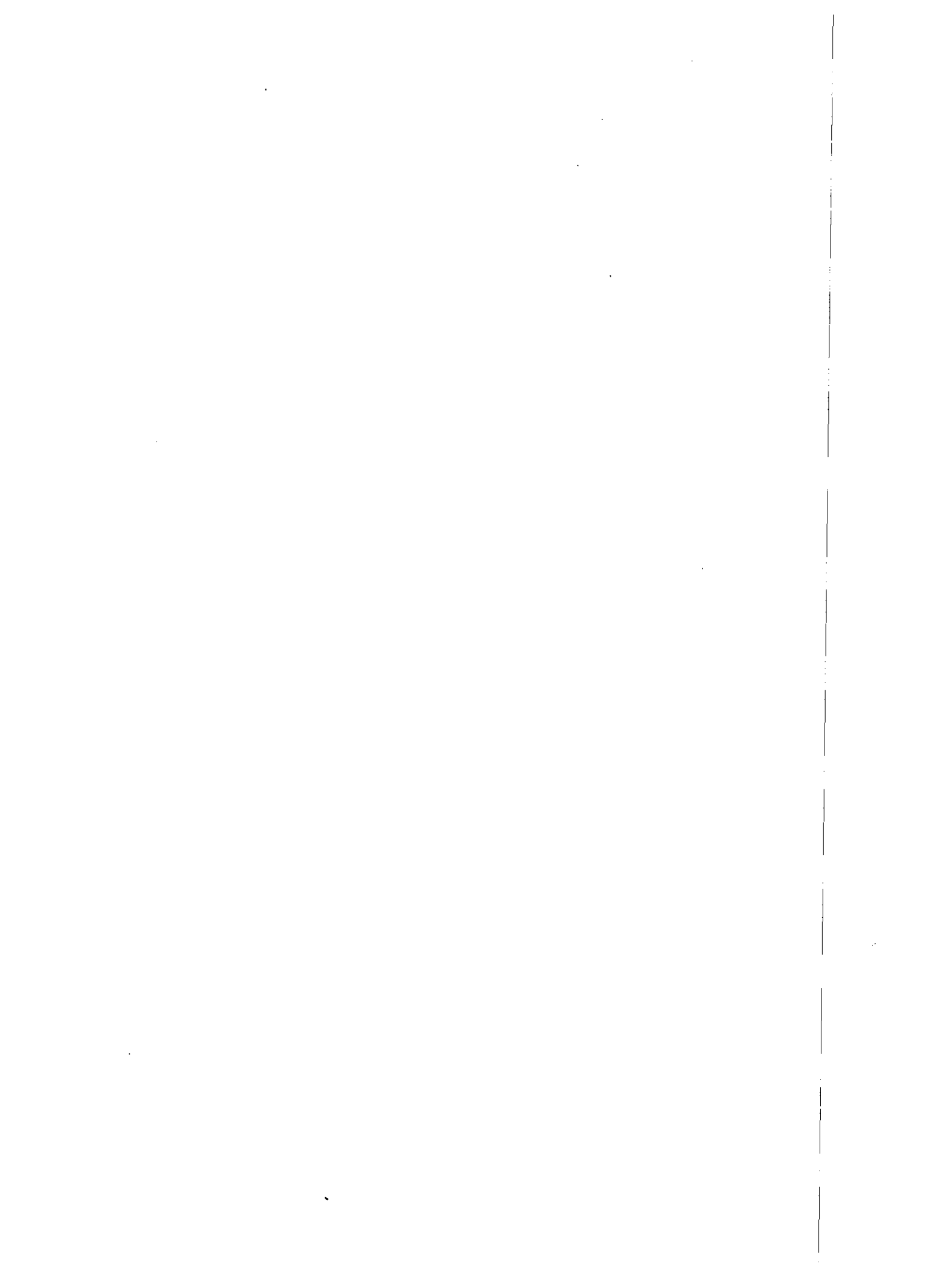
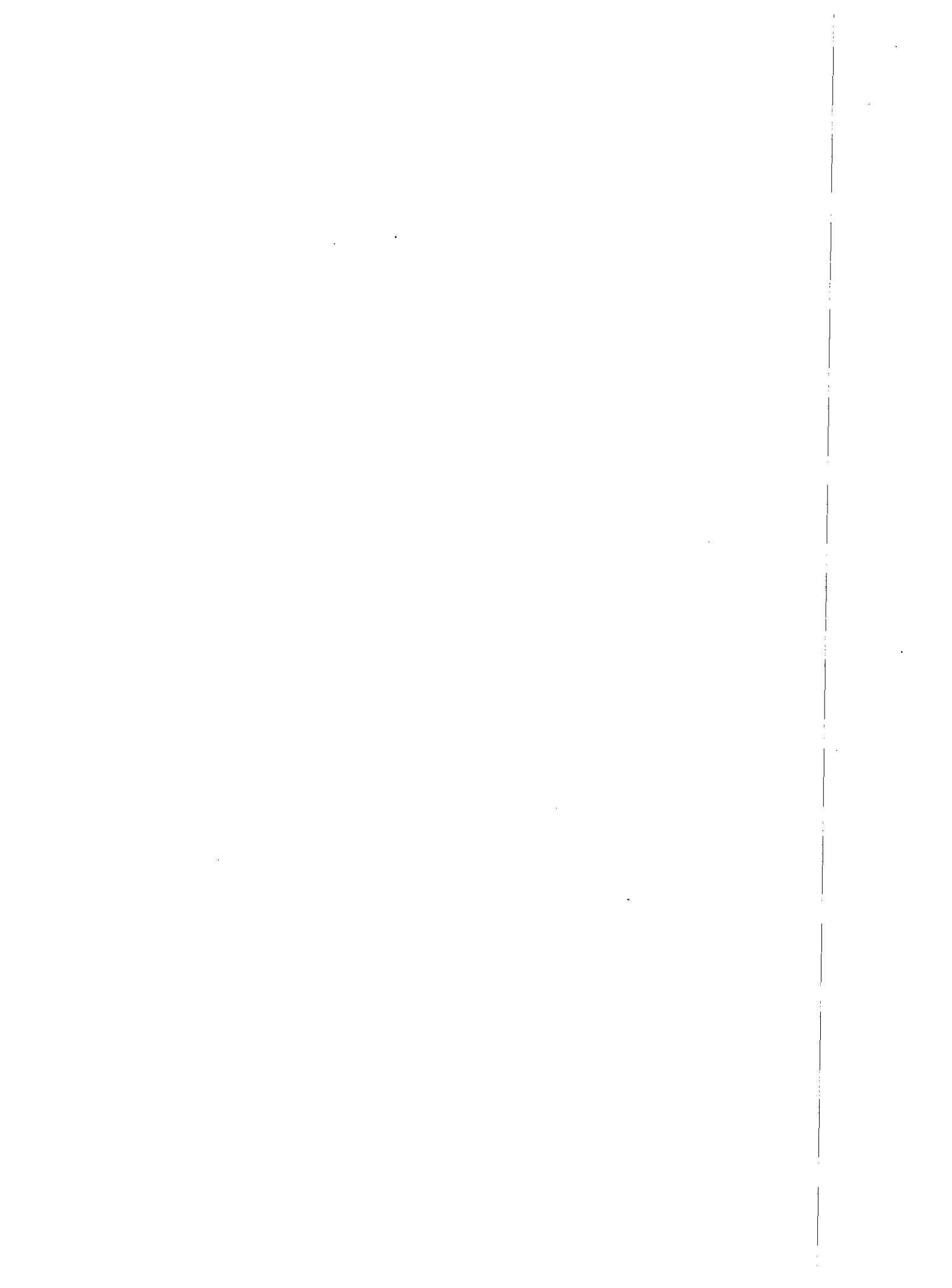


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OVERVIEW ON ENVIRONMENTAL HEALTH
IN THE WIDER CARIBBEAN AREA

INTRODUCTION

This overview is concerned with the environmental health conditions in the Wider Caribbean. It focuses mainly on critical areas of the environment which may have a direct effect on health. It analyzes the present situation, the constraints and prospects in the following sectors:

- i Water Supply
- ii Sanitation
- iii Solid Waste Management
- iv Chemical Pollution
- v Undernourishment, malnutrition
and food contamination
- vi Working Environment

The terms-of-reference for the overview were agreed upon at the Inter-Agency Meeting of the Joint UNEP/ECLA Project for Environmental Management in the Wider Caribbean (CEP) in Mexico City (23-25 August 1978).^{1/} The overview is intended to provide decision makers with a feel for environmental health problems, identifying management and other problems at national, subregional or regional level (i.e. Caribbean-wide) as a basis for formulating recommendations for the Action Plan of the CEP.

With the assistance of various agencies of the United Nations such as ILO, and Centers such as CAREC, CFNI, INCAP, and based on available information within PAHO, special effort was made to collect statistical information relevant to the analysis of the various above mentioned components. Nevertheless, some serious data deficiencies remain: specifically in those areas such as chemical pollution, solid waste and the working environment where little has been done and where the countries have not attained an infrastructural development that allows for the compilation of reliable statistics. Analysis of comparable statistic is made somewhat difficult by the difference in interpretation and definition of various data in the countries; for example such as the definition of urban and rural communities.

In view of the heterogeneous nature of the countries bathed by the Caribbean Sea, and the Gulf of Mexico the differences in size, economic conditions and cultures, political and legal systems, the usual comparisons are often irrelevant in many respects. The size of the countries vary from a mini state like Montserrat, a British colony with a population of 14,000, to a country like Mexico with one of the most populated city in the world: Mexico City, 14 million inhabitants. Comparison can only be made between

1/ See Annex 5 for Terms-of-Reference

countries on a subregional basis such as: the Commonwealth Caribbean or the Central American countries. The data presented are organized, as far as possible, in this manner in order to facilitate analysis.

Environmental health problems in the Caribbean Area vary with the level of social and economic development achieved by the respective countries. In many cases they are linked to poverty, the absence of adequate water supplies, lack of sanitation services, poor housing conditions as well as the prevalence of vectors causing high incidence of parasitic and communicable diseases. At the same time, exposure of large segments of the population to chemical and physical hazards associated with industrial and agricultural development and congestion of urban areas is a common problem.

In general, the lack of planning and inadequate management have been an important element in frustrating the efforts of the countries to deal effectively with their growing environmental problems. Among the major interrelated factors are the absence of national policies on environmental health, the fragmentation of environmental health functions among various governmental agencies that often have overlapping mandates, the inadequacy of existing legislation, the insufficiency of trained manpower, and the lack of surveillance of environmental quality.

The institutional framework for integrating environmental services in the national development plans and providing for a coordinated multi-agency approach to program planning and execution is not fully developed in most countries.

The report is divided into six parts. In Part I, main conditioning factors of a healthy environment in the Caribbean are reviewed. Part II reports relevant health statistics including mortality and morbidity pattern of diseases associated with the environmental factors. Part III is a summary of resolutions, goals and strategies for improvement as agreed in international or regional fora. Part IV briefly reviews the major national or international programs in each sector. Part V identifies gaps in information, and shortcomings of some of the programs. Part VI presents certain recommendations arising from previous analysis or otherwise agreed upon at international or national meetings and identifies certain possible areas of cooperation to be considered for incorporation into the Action Plan of the Caribbean Environment Project. Additional information appears in Annexes.

PART I
ENVIRONMENTAL FACTORS

1. Water Services

1.1 Water Services Coverage

Considerable progress has been made by the countries in the provision of drinking water to their population, however, much remains to be done. Based on population service with water either by house connections or having easy access* to a potable source of water such as a standpost, the available statistics indicated that at the end of 1977 the median level of coverage for the countries was above 80%^{1/}. The level of coverage varies from a low of 10% in Haiti with a population of some 5 million inhabitants to almost 100% in Barbados (250,000 population). If the countries with a population less than a million were excluded, this median coverage would drop considerably to slightly above 65%. Countries reporting coverage below 50% of their total population were Guatemala (40%), Honduras (42%), Guadeloupe (35%) and Haiti.

Table 1 shows the status of water supplies on an overall basis for the countries of the Caribbean Area. It also indicates that out of a total of 141 million inhabitants for all the countries for which data is available, 55 millions (39%) are not served by adequate water supplies. The severity of problems arising from the lack of potable water supplies stands out clearly in the analysis of morbidity and mortality from diarrheal diseases particularly among children under 5 years of age. These statistics are reported in detail in Section II.

During the last decade and continuing in the 1970's, the government of the countries in the Caribbean have given primary importance to the task of providing adequate supply of water to their population in the context of their social and economic development. How well they have done so far, and their expectation to accelerate current water programs, can only be viewed in the framework of available resources as the proposed water projects are expected to consume a larger share of the Gross National Product than in the past.

Figure I shows the relationship between coverage and per capita Gross National Product (GNP)^{1/} for selected countries in the Caribbean. The figure indicates that countries with per capita GNP above \$1000 have reached a significant level of water coverage. It also shows that the

* WHO defines easy access a walking distance of 200 meters to a water standpost.

^{1/} Meaning that 50% of the countries reported coverage in water supplies above that value on an overall basis.

^{2/} GNP per capita (1975) World Bank Atlas 1977.

Table 1
WATER SUPPLY COVERAGE AT YEAR END (1977) 1/

Country	Population in 1000s	House Connection	Easy Access	Total	%
<u>Sub-Region I</u>					
Belize	146	65	31	96	66
Costa Rica	2,095	1,613	58	1,671	80
El Salvador	4,445	1,212	1,238	2,450	55
Guatemala	6,496	1,062	1,524	2,586	40
Honduras	2,842	784	400	1,184	42
Mexico	61,974	34,610	1,750	36,360	59
Nicaragua	2,346	1,088	658	1,746	74
Panama	1,745	1,030	403	1,433	82
Subtotal	82,089	41,464	6,062	47,526	58
<u>Sub-Region II</u>					
Colombia	25,920	14,300	2,300	16,600	64
Guyana	828	501	309	810	98
Suriname	396	216	115	331	84
Venezuela	13,307	7,753	3,000	10,753	81
Subtotal	40,457	22,770	5,724	28,494	70
<u>Insular Caribbean</u>					
<u>British West Indies</u>					
Bahamas*	120	103	14	117	98
Antigua	72	29	40	69	96
Barbados	249	176	73	249	100
Dominica	76	19	44	63	83
Grenada	96	34	48	82	88
Jamaica	2,091	1,125	590	1,715	82
Montserrat	14	12	1	13	93
St. Kitts	38	14	24	38	100
St. Lucia	108	37	45	82	76
St. Vincent	93	23	60	83	90
Trinidad	1,098	553	513	1,066	97
Virgin Islands	10	1	-	1	10
Subtotal	4,063	2,126	1,451	3,577	88

Table 1 (cont.)

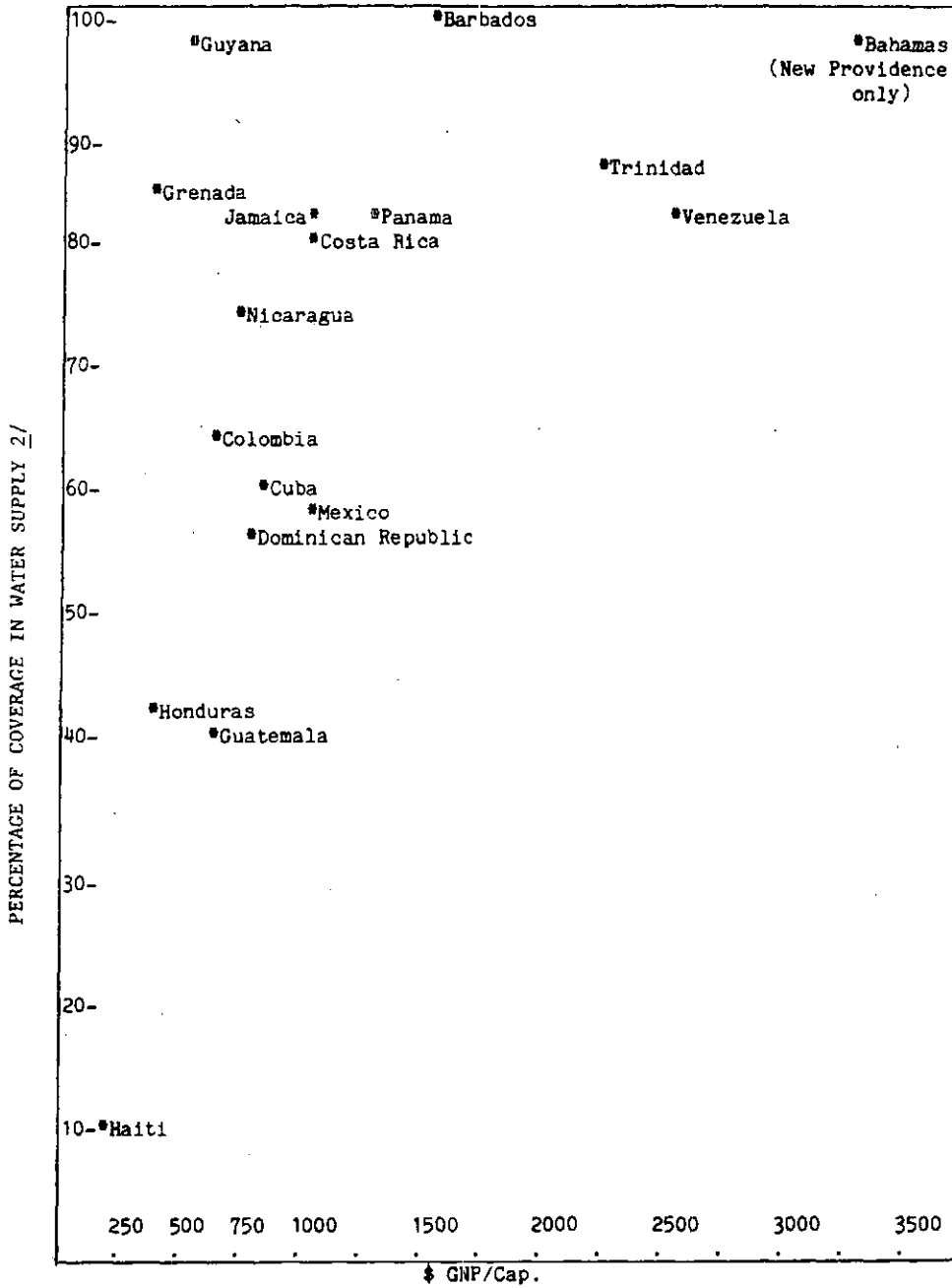
Country	Population in 1000s	House Connection	Easy Access	Total	%
<u>Other</u> <u>Caribbean Islands</u>					
Cuba	9,539	5,690	-	5,690	60
Dominican Republic	4,835	1,804	928	2,732	57
Haiti	4,749	181	272	453	10
Netherlands Antilles	NA	NA	NA	NA	NA
Puerto Rico	NA	NA	NA	NA	NA
Guadaloupe	213	75	-	75	35
Martinique	NA	NA	NA	NA	NA
Subtotal	<u>19,336</u>	<u>7,750</u>	<u>1,200</u>	<u>8,950</u>	<u>46</u>

* Island of New Providence only

1/ Source: Water Supply and Sanitation in Latin America and the Caribbean (PAHO) - Current Estimates of population served as received by PAHO Environmental Health Division

Figure I

RELATIONSHIP BETWEEN GNP PER CAPITA AND COVERAGE OF WATER SUPPLY ^{1/}



^{1/} World Bank Atlas, 1977 - Relationship between Water Supply Coverage and GNP/Cap.

^{2/} PAHO Water Supply and Sanitation, 1977

countries of the British Commonwealth Caribbean, even those with low per capita GNP, have attained a fairly high level of water services. Other countries like Haiti, Dominican Republic, Guatemala and Honduras with lower overall coverage and GNP will need to spend considerable amount of resources to achieve a significant level of improvement.

1.2 Water Supply Goal

In the Ten-Year Health Plan for the Americas the Ministers of Health in their Third Special Meeting in 1972 set the goals to provide piped water supply through house connection to 80% of the urban population and water services to 50% and 30% of the unserved population respectively for urban and rural population.

The available statistic reported in Table 2 indicate that 50% of the countries for which data is available reported coverage in urban area through house connections above 70%. The goal of supplying water to urban area appears to be attainable to the majority of countries, however, the process of urbanization in the Caribbean Region will continue to make urban water supply a major problem in the Region. Some of the countries are experiencing an average annual rate to growth as high as 4.5% which is expected to continue to the turn of the century. This figure is considerably higher in certain parts of the cities reflecting substantial migration from rural areas and resulting in fringe and slums which are difficult to service. Mexico City and Bogotá are respectively expected to reach 31.5 million and 9.5 million by the year 2000 from a 1975 population of 3.4 million for the latter and 10.9 million for the former.^{1/}

One unsolved problem in the urban areas is the high rate of unaccounted for water due to leaks and wastage. The reported figures for some cities are as high as 55 to 60% of the total water produced.

Achievement in the extension of water services to rural areas is less spectacular, 50% of the countries reported combined house connections and easy access coverage below 45% and below 30% for one third of the countries. This data is reflected in Table 3.

The management and operations of rural water supplies still present a great problem, a major task remains to be done particularly to ensure that the poor in urban fringes and rural areas obtain an adequate supply of water.

1.3 Investment in Water Supplies

It is reported that the countries in the sub-region I spent a total of 560.7 million US dollars in water supply investment both from national and external funds for the period 1971-75 distributed as follows:

^{1/} Source: The Urban Edge Council, for International Urban Liaison

Investments in Water Supplies 1971-75

	\$US Million <u>1/</u>	\$US/Capita <u>2/</u>
Costa Rica	44.6	22.70
Guatemala	51.6	8.22
Honduras	17.8	6.16
Mexico	356.5	5.95
Nicaragua	27.7	12.25
Panama	54.3	32.65
El Salvador	8.2	2.05

In Subregion II a total investment of 451.6 million dollars was reported for the same period according to the following distribution:

	\$US Million <u>1/</u>	\$US/Capita <u>2/</u>
Colombia	100.4	4.26
Guyana	20.8	27.01
Venezuela*	330.4	27.55

In the British Commonwealth Caribbean the Caribbean Development Bank provided a total of 1.94 million dollars during the period 1973-77 for water supplies in the following countries: Grenada (.72 m), Dominica (.79 m) and St. Lucia (.43 m)^{3/}. During the same period the financing of water in Jamaica amounted to 16.6 million dollars. In addition, the Canadian International Development Agency reported a total amount of 19 million dollars in supplies and technical assistance to water related projects in the Leeward and Winward Islands in the past 5 years ^{4/}.

The Dominican Republic and Haiti respectively reported 42.3 million dollars (1971-75) and 2.9 million dollars in water investment ^{1/} representing investments per capita respectively of \$9.01 and \$0.63.

1.4 Constraints in Water Supplies

While a detailed analysis of the constraints and issues the governments of the Wider Caribbean area need to address themselves to for improving water supply is beyond the scope of this overview, the following summarizes the major elements:^{5/}

- a) There is still a need for more political commitment at the highest level to provide the urban poor and rural population with adequate water supplies ^{5/}.

* Investments reported for urban supplies only

^{1/} World Health Statistics Report, 1976

^{2/} Using population mid 1975 - World Bank Atlas

^{3/} Source: Caribbean Development Bank

^{4/} Source: CIDA Report

^{5/} Source: Medium Term Program for Environmental Health (AMRO)

- b) Management in the sector could be made more efficient by better defining the role of various agencies dealing with water resources management, design, construction, production and distribution of water supply. Water utilities are less accustomed to using modern economic, financial and management methods than other types of utilities. Most projects are developed in response to crisis rather than by orderly advance planning.
- c) Support to water systems particularly in rural areas is deficient. Not only the technical services for operations and maintenance are inadequate, but also administrative services to back-up such systems are sometimes lacking.
- d) Increased community participation in the conception, design, management and operation of supplies is needed to improve support services, reduce cost and wastage.
- e) Quality control should be given more consideration since water can act as a vehicle of transmission of diseases.

2. Sewerage and Excreta Disposal

The goals established by the Ten-Year Health Plan in this respect included the provision by 1980 of sewerage services to 70% of the urban population, and sewerage services or other sanitary facilities to 50% of the rural population, or as an alternative goal, a reduction by 30% of the urban population without sewerage services and a reduction by 30% of the rural population without any sanitary facilities.

2.1 Urban Services

The availability of urban sewerage services has failed in the Caribbean Area to keep up with the extension and improvement in water supplies. The available data indicate that at the end of 1977 none of the countries, with the exception of Panama has yet reached the above goals. In fact, 50% of the countries in the Caribbean Region reported servicing less than 35% of their urban population.

The situation of sewerage service in the urban areas is summarized in Table 4 which also reports the total population served by sewerage system. The information indicates that there is little sewerage services outside the urban areas. The sewerage situation appears more critical in the Insular Caribbean where 60% of the island reported little or no services.

The available statistics indicated that the percentage of population connected to sewerage systems remained static between 1970 and 1975 meaning that the increase in connections is just keeping pace with population increase.

Table 2
URBAN WATER SUPPLIES ^{1/}

Country	Population in 1000s	% House Connection	%Easy Access	Total %
<u>Sub-Region I</u>				
Belize	80	64	14	78
Costa Rica	957	97	3	100
El Salvador	1,787	50	32	82
Guatemala	2,305	41	45	86
Honduras	928	66	33	99
Mexico	39,881	69	4	73
Nicaragua	1,286	77	23	100
Panama	900	93	7	100
Subtotal	48,124	68	8	76
<u>Sub-Region II</u>				
Colombia	15,320	80	6	86
Guyana	272	94	5	99
Suriname	226	80	20	100
Venezuela	9,566	63	31	94
Subtotal	25,384	73	16	89
<u>Insular Caribbean</u>				
<u>British West Indies</u>				
Antigua*	-	-	-	-
Bahamas**	120	86	12	98
Barbados	114	98	2	100
Dominica	22	50	50	100
Grenada*	-	-	-	-
Jamaica	620	99	1	100
Montserrat*	-	-	-	-
St. Kitts*	14	57	43	100
St. Lucia*	-	-	-	-
St. Vincent*	-	-	-	-
Trinidad	366	78	9	87
Subtotal	1,256	88	5	93
<u>Other</u>				
<u>Caribbean Islands</u>				
Cuba	6,038	91	NA	91
Dominican Republic	2,264	66	22	88
Haiti	1,079	17	21	38
Subtotal	9,382	76	-	76

^{1/} Source: Water Supply and Sanitation in Latin America and the Caribbean (PAHO Report)

* Data Reported Island-wide Basis

** Island of New Providence only

Table 3
RURAL WATER SUPPLIES 1/

Country	Population in 1000s	%House Connection	%Easy Access	Total %
<u>Sub-Region I</u>				
Belize	66	21	6	27
Costa Rica	1,138	60	3	63
El Salvador	2,658	12	25	37
Guatemala	4,191	3	11	14
Mexico	22,093	32	-*	-
Nicaragua	1,062	9	34	43
Panama	845	<u>22</u>	<u>41</u>	<u>63</u>
Subtotal	29,395	29	-	-
<u>Sub-Region II</u>				
Colombia	10,600	20	13	33
Guyana	556	44	53	97
Suriname	170	20	42	62
Venezuela	<u>3,741</u>	<u>47</u>	-	<u>47</u>
Subtotal	15,067	27	-	-
<u>Insular Caribbean</u>				
<u>British Caribbean**</u>				
Barbados	135	47	53	100
Dominica	54	15	61	76
Jamaica	1,471	34	40	74
St. Kitts	24	25	75	100
Trinidad	<u>718</u>	<u>37</u>	<u>53</u>	<u>90</u>
Subtotal	2,402	36	-	-
<u>Other Caribbean Islands</u>				
Cuba	3,501	6	-	6
Dominican Republic	2,571	12	17	29
Haiti	<u>3,678</u>	<u>0</u>	<u>2</u>	<u>2</u>
Subtotal	9,750	5	-	-

* Not available

1/ Source: Status of Water Supply and Sewerage Services in Latin America and the Caribbean at Year End (1977), PAHO Report

** Other countries report data on island-wide basis

Table 4
POPULATION SERVED WITH SEWERAGE SYSTEMS

Country	Urban Pop. Served in 1000s	%	Total Pop. Served in 1000s	% Total Pop.
<u>Sub-Region I</u>				
Belize	4	5	5	3
Costa Rica	404	42	446	21
El Salvador	648	36	659	15
Guatemala	725	31	725	11
Honduras	444	48	445	16
Mexico	16,390	41	16,483	27
Nicaragua	403	31	403	17
Panama	874	97	1,534	88
Subtotal	19,892	41	20,700	25
<u>Sub-Region II</u>				
Colombia	9,958	65	10,611	41
Guyana	118	43	118	14
Suriname	85	38	85	21
Venezuela	5,000	52	5,267	40
Subtotal	15,161	60	16,081	40
<u>Insular Caribbean</u>				
<u>British West Indies</u>				
Antigua	0	0	0	
Barbados	0	0	0	0
Dominica	0	0	0	0
Grenada	10	36	10	13
Jamaica	133	21	153	7
Montserrat	0	0	0	0
St. Kitts	0	0	0	0
St. Lucia	0	0	0	0
St. Vincent	0	0	0	0
Trinidad	252	69	292	27
Subtotal	385	30	456	11
<u>Other Caribbean Islands</u>				
Cuba	2,788	46	2,988	31
Dominican Republic	600	27	1,030	21
Haiti	0	0	0	0
Subtotal	3,388	36	4,018	21

1/ Source: Status of Water Supply and Sewerage in Latin America and the Caribbean at Year End 1977

The amount of investment in sewerage system by the respective countries is less than the money invested in water supplies, except for Mexico which has undertaken a major sewerage development program. Based on data provided by the countries in the Caribbean, a total capital expenditure of 835.3 million dollars were reported for sewerage, 75% of which was accounted for by Mexico. These expenditures are reported as follows:^{1/}

Investment in Sewerage 1971-75

	\$US Million	\$US/Capita ^{2/}
Costa Rica	10.4	5.29
Guatemala	3.1	0.49
Honduras	1.6	0.55
Mexico	626.3	10.47
Nicaragua	11.7	5.17
Panama	12.6	7.55
Colombia	44.2	1.87
Guyana	1.0	1.30
Suriname	1.6	4.35
Venezuela	106.9	8.91
Dominican Rep.	14.1	3.0
El Salvador	0.8	0.2
Haiti	1.0	0.2

Recent studies carried out in the Commonwealth Caribbean summarized the situation in the sector as follows:^{3/}

- a) The urban areas were allowed to developed subdivisions by subdivisions in most cases without any integrated planning for sewerage services resulting in large numbers of septic tanks and cesspools in concentrated urban areas where the population density warrant central collection and disposal. These facilities tie up capital by way of individual owners investments which would sum up to the cost of a central system.
- b) In some countries, i.e. Jamaica, where regulations require the provision of sewerage system for urban subdivisions, this has also proceeded in a fragmented manner resulting in a number of small systems and sewage treatment plants in urban areas discharging in drainage channels with little prospects for integrating those systems in a comprehensive manner.
- c) The core of sewerage which exists in some urban areas is extremely old and overloaded. Considerable improvement and expansion is needed. These systems in most cases discharge raw or inadequately treated sewage in harbors and beaches.

^{1/} Source: WHO Statistics Reports (1976)

^{2/} Using population mid 1975 - World Bank Atlas (1977)

^{3/} Report on Sewage and Excreta Disposal (R. Reid, PAHO/CARICOM
EH Strategy 1978)

- d) Small package type sewage treatment plants which have been installed as in the case of hotels and subdivisions deteriorate in fairly short time or produce unsatisfactory effluents due to lack of maintenance and operating skills. Sewage effluent outfalls are usually broken or improperly designed to prevent pollution.
- e) Even with the multitude of cesspools and septic tanks, large number of countries do not have adequate regulations for controlling these facilities, nor do some countries have any facilities for cleaning them. These systems also have presented in some cases the danger of ground water pollution due to increase in the nitrate content.
- f) Design parameters and procedures used to develop sewage treatment facilities are not adequate to warrant good operating characteristics.
- g) Health departments in the region often do not have the required expertise to assess the design of sewage treatment plants and evaluate their performance.

2.2 Domestic Waste Disposal

Associated with the provision of sanitary sewers in urban areas is the growing problem of adequately disposing of the waste in order to avoid pollution of rivers and beaches in the Caribbean. Since the volume of waste produced is directly proportional to the population served, large metropolitan areas experience more critical problem than smaller communities. The volume of waste will also substantially increase as sewerage services are extended to serve the rapidly growing urban areas due to population migration.

The degree of treatment required for domestic waste prior to discharge is a function of the waste volume, concentration in pollutants, the characteristics and use of the receiving body of water. Even though the following data is not specific to the Caribbean Region, since it covers the whole of Latin America, it gives the following pattern for waste disposal in the region for 1974.^{1/}

<u>Urban Population</u>	<u>%</u>	<u>Possible Effect</u>
With sewer and treatment*	5%	Partial control of pollution
With sewer without treatment	33%	Raw sewage pollution
With water connection without sewer	22%	Contamination of drains and groundwater contamination
Easy access to water without sewer	16%	Localized problems
Without access to water and sewer	24%	Public health problems

^{1/} Simposio sobre Ambiente, Salud y Desarrollo en las Americas (Mexico 1974)

* Include people served with treatment and outfalls.

The above data indicate that less than 10% of the sewage produced is treated. The following information shows the points of discharge of the major cities sewerage systems in the region (for cities above 1 million population).

Metropolitan Centers With Over a Million Population
In the Caribbean Region ^{1/}

City	Estimated Population in million (1974)	Water Bodies Used for Discharge
Havana	1.7	Caribbean Sea
Bogotá	2.8	Bogotá River
Caracas	2.2	Guaire River
Medellin	2.2	Medellin River
Mexico	12.0	Tula River
Guadalajara	1.3	Lerma River, Lake Chapala

Smaller municipalities between 500,000 and 1 million are also experiencing considerable problems in disposing of the waste without a potential danger of pollution. This danger is emphasized by the economic value of the beach and the ocean in the Caribbean as a tourist attraction.

The number of sewage treatment plants in the Caribbean has considerably increased since 1971. A result of a survey carried out indicated a large number of sewage treatment plants of various types in the Caribbean mainly in the form of oxydation ponds and secondary treatment facilities, an increase of almost fivefold over the last decade. The situation is summarized in Table 5. The large number of sewage treatment plants in Jamaica is mainly resulting from hotels and small subdivisions having to provide their own treatment facilities and is not indicative of large percentage of sewage being treated.

The operation and maintenance of sewage treatment plants particularly those of the secondary type require special skill to provide a satisfactory degree of treatment. So far, the training of operators has not been given any attention in the region.

3. Rural Sanitation

The availability of sewerage service to rural areas is very limited. Among the countries which data is available in 1977 only the Dominican Republic and Panama provided sewerage services to more than 10% of their non-urban inhabitants. Disposal of waste in the rural area is mainly by individual systems including septic tanks and various types of privies. The difficulty in collecting data and carrying out surveys in rural area make the picture somewhat incomplete. However, out of the 12 countries for which data is available 50% reported less than 25% of their rural population served by adequate means of disposing of excreta.

^{1/} Simposio sobre Ambiente, Salud y Desarrollo en las Americas (Mexico, 1974)

Table 5
SEWAGE TREATMENT PLANTS IN COUNTRIES
OF THE CARIBBEAN REGION ^{1/}

City	Primary	Secondary	Oxydation Pond	Total
Barbados	0	11	2	13
Colombia	3	5	3	11
Costa Rica	0	0	5	5
Cuba	0	0	385	385
Guyana	0	1	0	1
Honduras	0	1	0	1
Jamaica	1	70	1	72
Mexico	15	23	51	89
Panama	1	1	5	7
Dominican Republic	0	1	1	2
Suriname	0	2	0	2
Trinidad	0	0	1	1
Venezuela	0	2	7	9
El Salvador	3	4	9	16

^{1/} Source: Panorama de la Tecnologia de Tratamiento de Aguas Residuales en la Region (CEPIS, 1978)

With regard to the achievement of the goals providing 50% of the rural population with adequate sanitary measures, considerable effort would be needed to make any headway considering the limited resources allocated for such activities. The situation regarding rural sewage disposal is summarized in Table 6.

During the period 1971-75 the total expenditure reported in rural sanitation for the nine countries listed in Table 6 was 18.10 million dollars ^{1/}. A large number of countries did not report any expenditure on rural sanitation. In a recent survey in the British Commonwealth Caribbean it was found that most rural sanitation programs were inoperative due to lack of funds as soon as the original sponsors of the program withdrew their assistance.

In summary, nothing much is happening in rural sanitation in the area. Greater community involvement is needed in this regard to mobilize resources to improve facilities in rural area. Also, health education programs seem to be badly lacking in existing rural sanitation programs since under-utilization and non-use of sanitary facilities have been reported in many instances.

4. Solid Waste Management

In the Caribbean Region the collection and disposal of solid waste constitutes a growing problem necessitating urgent attention. Beside health and esthetic considerations, problems of air, water and soil pollution may arise from improper disposal of solid wastes. Economic considerations may also be important in tourist and resort areas.

Although detailed and comprehensive information on the regional basis is not available, the analysis of existing data shows that the management of solid waste lags behind all other public services. Studies in several countries confirmed that the administration of the services is generally deficient, collection and disposal unsatisfactory, and most of the personnel untrained.

Although regular collection in most countries served about 75% of the urban population, the final disposal methods and practices could be substantially improved. Urban planners had for a long time ignored solid waste collection and disposal as one of the major aspects of planning. Until recently the approach to improvement in handling solid waste has been done on an ad hoc basis due to lack of technical and financial support. Various cities have made an effort to improve certain aspects of collection and without a comprehensive and unified plan for the overall city or metropolitan area.

The situation is made more complex in some countries due to the fact that the metropolitan area consists of several contiguous cities or parishes each with their own geographical and jurisdictional limits.

^{1/} Source: World Health Statistics, 1976

Table 6
RURAL POPULATION WITH ADEQUATE SEWAGE DISPOSAL

Country	Population Served	Percentage	Reported Investment 1971-75
<u>Sub-Region I</u>			
Belize	-	-	-
Costa Rica	1,184	93	1.0
Guatemala	642	16	0.2
Honduras	245	13	0.1
Mexico	2,992	14	1.8
Nicaragua	295	24	0.1
Panama	634	76	1.0
<u>Sub-Region II</u>			
Colombia	1,300	13	12.8
Guyana	500	94	-
Suriname	-	-	-
Venezuela	-	-	-
<u>Insular Caribbean</u>			
Barbados	134	100	-
Cuba	-	-	-
Dominican Republic	420	16	0.1
Jamaica	1,300	91	0.7
Trinidad & Tobago	720	97	-

For other islands, sewage disposal data reported only on island-wide basis.

Recent studies in the Commonwealth Caribbean indicated that solid waste operating agencies are often left out of early discussion due to lack of planning and referral procedures. The consequence is that solid waste problems are handled on a case by case basis which translates generally into poor equipment capability and poor selection of disposal sites. The report also indicated that solid waste management suffers from a low priority in competition with other national needs.^{1/}

It has been observed that the total production of solid waste increases at a faster rate than the rate of increase in population. Improvement in economic conditions generates additional amount of waste that has to be disposed of. The situation may become somewhat critical in the region if one considers the current low per capita generation in Latin America, approximately 0.7 kg per capita per day compared to 2.7 kg in the United States.

The available data indicate that from all solid waste collected in the region--commercial and residential--only 70% are removed by regular collection of cleansing services. The estimated situation with regard to final disposal is as follows:

60%	deposited in open dump
2%	by incineration
5%	sanitary landfill
3%	processed for recovery
30%	deposited on roadways, rivers, canal, beaches

The expenditures and investments on solid waste collection and disposal for municipalities vary with the level of development of the countries and the size of the municipalities; expenditures as low as \$0.44 per person per year have been reported. No fees are generally collected on a user's pay basis but rather from municipal revenues. This practice may be in part responsible for the lack of long term financing for solid waste operations. It has only been recently that external credit agencies have shown some limited interest in the financing equipment for solid waste operations. The effort and money required in terms of investment are considerable in the long term.

In general, solid waste employees receive marginal salaries and benefits and have to work in hazardous conditions resulting in very high accident rate. Any attempts to resolve problems of working conditions usually result in conflicts which often means accumulation of garbage on the streets for days. Solid waste management has become a specialization in which not too many are yet qualified.

Among the constraints reported in the sector is the lack of interest and participation of communities in matter related to public cleaning. It has been noted that the only interest the general public take in garbage collection and disposal is only to have it done at minimum cost, collected at convenient hours and disposed far out of sight.

^{1/} Report on Solid Waste Disposal (Duane Butler, PAHO/CARICOM EH Strategy 1978)

The solid waste problem is accentuated by the rapid urbanization of most metropolitan areas of the Caribbean coupled with a lack of advance planning which manifest itself throughout the region in open dump disposal sites and garbage accumulation in streets and open spaces.

Furthermore, the institutional arrangement for solid waste services are ususally far less developed than these of water services. In some cases the responsibility lies with the Ministry of Health which is not usually well equipped to perform the operating functions of collection and disposal.

5. Working Evironment

The process of industrialization in both industry and agriculture has taken place in the Caribbean Region without the corresponding improvement of the work environment. This has resulted in a high prevalence of industrial accidents and occupational diseases much higher than in the developed countries.

The available data in this field are not sufficient to define adequately the magnitude of the problem in the region. In each of the countries there exist institutions in charge of the protection of the working environment. Unfortunately, the information collected by these agencies are not published or sufficiently divulged. The 1975 Annual Statistics of the International Labor Organization includes only information on fatal accidents for only 9 countries of the continent including Guadalupe, Guatemala, Guyana, Jamaica, Martinique, Panama, Suriname, Trinidad and Tobago, and Barbados.

In 1964, at the First Latin American Seminar on Occupational Health which took place in Sao Paulo, among nations represented were Colombia, Mexico and Venezuela. The data on work accident include the following for Colombia:^{1/}

	<u>Frequency</u>	<u>Gravity</u>
Petrol industry	14.1	1271
Mine	78	1066
Manufacturing	49.6	458
Transport (maritime & river)	77.1	706
Public service	44.6	1871

The index of frequency indicates the number of accidents per 1 million man/hours of work ^{2/} and the index of gravity the number of working days lost per milion of man/hours of work. An index of frequency of 20 and gravity 1000 are considered high.

^{1/} Source: Seguridad e Higiene Ocupacionales en America Latina y El Caribe (CEPIS, 1978)

^{2/} A million man-hours is approximately equivalent to the work of 400 persons in a year

More recent information indicate that the situation has not improved in the region. For instance, in Costa Rica the National Institute of Security remitted in 1975 more than 5 million dollars for 72,536 industrial accidents incurred by 230,000 workers indicating statistically that almost one third of the labor force suffered in that year of compensatable accidents. In El Salvador in 1975, 20,721 work accidents occurred among 173,948 insured workers.

Fatal Accidents Reported per 1000 Persons Employed ^{1/}

Accidents	1973	1974
<u>Mining & Quarrying</u>		
Jamaica	0.02	-
<u>Manufacturing</u>		
Barbados	0.00	0.11
Guadaloupe	0.25	0.23
Trinidad	0.02	0.04
<u>Construction</u>		
Guadaloupe	0.35	0.45
French Guyana	1.00	2.00
Trinidad	0.03	0.06

^{1/} Source: Labor Statistics, ILO, Geneva, 1977

Statistics on occupational diseases are more difficult to obtain than on accidents. Their symptoms can also be confused with those of other diseases particularly in the absence of specialized medical personnel and with the lack of appropriate laboratories and diagnostic facilities prevalent in the area. From the data of the First Seminar on Occupational Health the following diseases were reported:

Country	Problems	No. Persons examined	Sick or Suspect %
Colombia	Pneumoconiosis	926	25.2
Mexico	Arsenic poisoning	*	95.0
Colombia	Abestosis	292	18.4
Mexico	Affectation to chrome	*	50.0
Colombia	Lead poisoning	238	13.7
Mexico	Lead poisoning	-	11.4
Colombia	Silicosis	999	22.5
Mexico	Silicosis	20,537	24.7

* Not indicated

In the Regional Seminar on Silicosis the data presented indicated a high prevalence of silicosis in the region. In Colombia 13.6% of the mine population is affected by silicosis. Among the industrial worker a rate of 5.2% for silicosis, 23% for asbestosis and 10.3% for lead poisoning is reported.

With regard to pesticides intoxication in countries of the region, the following figures were reported from 1971-1976.

Notification of Pesticides Intoxications 1971-1976 ^{1/}

	71	72	73	74	75	76	Total
Costa Rica	196	235	259	326	216	*	1,232
Guatemala	1,134	2,313	1,721	1,010	1,044	1,144	8,266
Honduras	-	30	48	37	-	-	115
Nicaragua	-	537	243	-	-	-	800

* Not available

It is estimated that in the region as a whole (South America included) 10 million occupational health accidents with 50,000 fatal cases occur yearly.

6. Chemical Pollution

The control of environmental pollution stemming from industrial and urban activities is gradually becoming an important health problem in the region. Most countries are experiencing rapid population growth, industrialization and urbanization with consequent pollution of air, water, soil and food resources, technological changes and related problems for human health. Until now the construction of treatment facilities and of other means to combat water pollution has been minimal. Air pollution is increasing in the large metropolitan areas while control programs have not kept pace. The increasing use of chemical products, including pesticides, herbicides and others, to augment agricultural production in the countries of the region, contribute to soil pollution and sometimes also to water and air pollution. As a consequence of increased industrialization, it can be expected that the pollution problems will increase considerably in the years to come if early measures for their control are not accelerated.

In general, the extent of pollution due to the discharge of domestic and industrial waste has not been quantified in the region. Following is a summary of the major environmental issues in some of the countries in the Caribbean Area.

^{1/} Source: Seguridad e Higiene Ocupacionales en America Latina y El Caribe (VI Conferencia Interamericana de Ministros de Trabajo, CEPIS, 1972)

Mexico - Rapid industrial and urban growth over the past 30 years have brought serious water pollution problems. Over 50,000 industries in the State of Mexico contribute to the pollution of rivers and lakes particularly the Lerma River.

Because most of the metropolitan area of Mexico City is in a basin, temperature inversion aggravated by the exhaust of motor vehicles have produced occasionally excessive amount of smog. Level of suspended particles and sulfur dioxide are also reported as very high.

Guatemala - Untreated sewage are discharge into the Caribbean sea via inland waterways, mainly the Motagua River. Also on the Pacific side sewage and other wastes threatens residential and tourist area around Lake Huatitlan.

The prevailing northeasterly wind carries airborne industrial waste particularly from the cement factory over Guatemala City. The use of pesticides on cotton grown on Guatemala fertile south coast has been brought to light as major health problems for workers and residents of the area.

Colombia - The metropolitan area of Bogota located within the watershed of the Bogota River largely depends on the river for water supply. At the same time 47 municipalities located within the watershed and Bogota itself are using the river and its tributaries for sewage disposal, industrial effluent. A 1970 study indicated that by 1980 the population of the area (5.4 million) will require over 1 million cubic meters of water daily which at present level will contain 325,000 kg of suspended solids and 292,000 kg of BOD. Because of the high degree of pollution in the river the metropolitan area must draw its water from Tibito some 30 km away.

Panama - The pollution of fresh and coastal water in Panama is widely recognized, caused by inadequately treated sewage and industrial waste discharge. The first part of the studies on pollution in Panama Bay has been concluded in an attempt to ascertain the gravity of the situation.

Venezuela - The need for treating sewage has only been recognized recently in Venezuela. There are a few small treatment plants and municipal wastes are usually discharged without treatment to streams. Outside Caracas the pollution of the beaches used during the summer presents a problem. The pollution of Lake Maracaibo and many of the rivers located near the municipality is recognized and has been th subject of intensive studies.

Commonwealth Caribbean - A report on industrial waste discharge in the Commonwealth Caribbean describe the situation as follows.^{1/}

^{1/} Report on Industrial Wastes by M. Gajraj and P. Nandlal
(PAHO/CARICOM EH Strategy, 1978)

As a result of their historical development all of the CARICOM countries are affected by pollution from the sugar industries and distilleries which is characterized by high BOD, suspended solids, caustic in the liquid effluent. No quantitative figures are available but visual evidence indicates that most of the streams receiving effluent from these industries are putrified due to the resulting anaerobic conditions. The problem is compounded by the fact that sugar crop is harvested and processed during the dry season when river flows are at their lowest.

Trinidad and Tobago produce 6 million barrels of crude oil monthly and experience some air and water pollution problems. The main effluent from the refinery empties into the Guaranara River which is reported dead after 40 years of constant pollution.

In the mining sector, the bauxite industries are associated with two major problems: severe dust which has been reported in Guyana, even though it has not been quantified; the disposal of red mud at some of the plants in Jamaica is polluting the groundwater resources of the island by increasing the level of sodium.

Also in Jamaica the uncontrolled discharge of domestic and industrial waste in Kingston harbor have created serious eutrophication of that body of water.

Oil pollution of beaches in some islands of the Caribbean is becoming a major problem which may adversely affect Tourism. Raw sewage discharged at sea, package sewage treatment plants serving hotels and resorts were also reported causing beach pollution.^{1/}

Cuba It is recognized that the socioeconomic transformation derived from the rapid development of the country is accompanied with intensive use of pesticides and herbicides, enlargement of the capacity of sugar industries and increase in the urban and suburban zones. All this have resulted in a logical consequence in polluted water discharge in the rivers which might create an acute situation in the coming years.

7. Nutrition and Food Contamination in Central America and Panama

Nutritional Situation ^{2/}

As in most developing countries, the high rates of chronic malnutrition are the underlying or associated cause of a high proportion of deaths in children under five.

^{1/} Beach Pollution in the Caribbean - An Environmental Health Assessment, E. Mood, PAHO/CARICOM Strategy, 1978.

^{2/} Nutrition Program (PAHO) INCAP

The most serious of the nutritional problems is protein-calorie malnutrition, the consequences of which are most evident in the retardation of growth of small children. Based on surveys conducted in 1965-1967 by the Institute of Nutrition of Central America and Panama (INCAP) and the Office of International Research (OIR), 24.9% of all children under five were estimated to be suffering from moderate and severe malnutrition (second and third degree, according to the Gomez weight for age classification). The breakdown by country is shown in Table 7 along with updated estimates based on later national nutritional surveys. It is important to point out that the situation has deteriorated in all the countries with the exception of Costa Rica. Moreover, taking into account the simultaneous demographic growth, it is estimated that the total number of children with weight deficits has increased by 66.8% during the 1965-1975 decade.

Another set of nutritional problems is related to deficiencies of specific nutrients. The INCAP-OIR surveys indicated that the percentage of the population in each country with low blood serum levels of vitamin A are as follows: Guatemala 13%, El Salvador 23%, Honduras 21%, Costa Rica 16%, Nicaragua 12% and Panama 9%. Fortunately, this situation is being confronted in several countries which have instituted programs of fortification of sugar with vitamin A. With the enactment of iodization laws in the last decade in all the countries, endemic goiter was reduced significantly. However, recent partial studies suggest that, because of poor control and supervision, the situation is once again deteriorating. A high prevalence of iron deficiency anemias is due to low levels of absorbable iron in the diets and is exacerbated by the loss of blood due to intestinal parasites, particularly uncinaria.

The principal cause of malnutrition is an overall low level of ingestion of nutrients which is limited by the meager income of the deprived majority of the population of Central America. Unless all the countries are able to launch more comprehensive development programs it is unlikely that the situation will improve in the foreseeable future.

Food Contamination Situation ^{1/}

A better food control carried out in recent years has demonstrated that food contamination is a matter for concern in the Central American countries.

Pesticides

High levels of pesticide residues have been found in meat and other food products, especially in the cotton-growing countries. It has been estimated that 85% of the pesticide consumption is being used on cotton. Great quantities of chlorinated pesticides are still being used in the area. Guatemala has reported the highest values in the world of DDT contamination in human milk.

^{1/} Source: Institute of Nutrition of Central America and Panama (INCAP)

Table 7
ENERGY-PROTEIN MALNUTRITION IN LATIN AMERICA AND
THE CARIBBEAN AMONG CHILDREN UNDER 5 YEARS OF AGE

Country or other political unit	Year	Total No. examined	% normal	% Malnourished 1/		
				degree I (%)	degree II (%)	degree III (%)
Antigua 1975	1975	535	56.9	35.5	6.8	0.8
Bahamas	1974	321	46.4	14.6	0.6	0.9
Barbados	1969	248	48.8	39.0	11.0	1.2
Belize	1973	3,546 ^{2/}	40.8	40.0	18.0	1.2
Bolivia	1966-1969	968	60.1	29.0	10.2	0.7
Brazil	1968	569	31.7	48.4	17.2	2.7
Chile	1975	881,517	82.2	13.7	3.2	0.9
Colombia	1966	3,378	33.4	45.6	19.3	1.7
Costa Rica ^{3/}	1966	-	42.6	43.7	12.2	1.5
Dominica	1970	117	71.8	19.7	5.1	3.4
Dominican Republic	1969	1,100	25.0	49.0	23.0	4.0
Ecuador	1965-1969	9,000	60.3	28.9	9.6	1.2
El Salvador ^{3/}	1965	-	25.5	48.5	22.9	3.1
Guatemala ^{3/}	1965	-	18.6	49.0	26.5	5.9
Guyana	1971	964	39.3	43.0	16.0	1.7
Haiti	1975	1,542	17.8	28.9	35.6	17.4
Honduras ^{3/}	1966	-	27.5	43.0	27.2	2.3
Jamaica	1970	-	-	39.0	9.4	1.4
Montserrat	1971	372	63.1	28.0	3.5	0.0
Nicaragua ^{3/}	1966	-	43.2	41.8	13.2	1.8
Panama ^{3/}	1967	632	39.3	48.8	10.8	1.1
Paraguay	1973	41,750	92.2	4.9	2.2	0.7
Peru	1965-1971	83,165	56.0	32.8	10.9	0.8
St. Kitts-Nevis & Anguilla	1974	1,209	61.2	33.3	5.4	0.1
St. Lucia	1974	363	56.1	33.0	9.0	1.9
St. Vincent	1967	2,490	37.5	47.0	14.0	1.5
Venezuela ^{4/}	1974	23,271	51.1	35.3	12.2	1.4
Virgin Islands (UK)	-	-	-	-	← 5.0 →	-

Sources: PAHO Four-Year Health Projections, 1971-1975;
MCH Profiles, English-speaking Caribbean, 1975;
National nutrition surveys, and other sources

- Data not available

1/ According to the Gómez Classification

2/ Includes children up to 5-1/2 years of age

3/ Estimates based on 1965 population

4/ Includes children 0-6 years of age

Aflatoxins

Several countries have reported high level of aflatoxin contamination in grains, especially corn, of local as well as of foreign origin. This is important as corn is a staple food in many countries.

Heavy Metals

A area of concern is lead and cadmium contamination of canned fruit products. The problem is probably due to the use of cans without resin protection and to faulty seams. High levels of lead have also been found in cereals. Mercury contamination in fish has been shown to be of less concern.

Insects

It has been found that in flour contamination with insects, insect eggs and larvae represents a problem.

Microbiological Contamination

This is probably the major contamination problem, one that merits very strict control and the introduction of better prophylactic measures.

Various

It has been demonstrated that antibiotic residues in meat can be found and a closer control should be carried out of residues of antibiotic in meat, milk and eggs. Various other problems should be investigated, such as vinyl chloride from PVC packings, contamination from paper cartons, methyl alcohol in liquors, etc.

Nutrition in the Commonwealth Caribbean ^{1/}

Table 8 sets out highlights of the most recent available information on nutritional status in the Commonwealth Caribbean countries (March 1975).

1. The average Commonwealth Caribbean infant mortality rate is almost twice that of North America and the toddler mortality rate (1-4 years) is five times as high. This latter is generally accepted as an index of malnutrition.
2. 1.4 in every 100 under five-year old is very severely underweight (in Gomez grade III) and in imminent danger of death. A further 12% are very definitely underweight (Gomez grade II) and a further 40% are in a borderline condition (Gomez grade I).

1/ Source: Caribbean Food and Nutrition Institute (CFNI)

Table 8
 DATA ON NUTRITION RELATED MORTALITY, NUTRITIONAL STATUS, DIETARY
 INTAKE IN THE COMMONWEALTH CARIBBEAN AND SURINAME (JULY 1977)

Country	Population in 1000s 1975 estimates	Mortality			Nutritional Status						Dietary Food Intake				
		Infant mortality rate per 1,000 live births	1-4 yrs. mortality rate per 1,000 in age group	Percentages of children under 5 years old in 3 grades of low weight according to Gomez scale			Percentages of children under 5 years old in 3 grades of anaemia			Per caput nutri- ent availability (from food balance sheets)		% households not meeting requirements (from food consumption survey)		% of nutrient from imported foods (from food balance sheets)	
				1	2	3	Hb <8.0	Hb 8.0- 9.9	Hb 10.0- 10.9	Energy (kcal)	Protein (gm)	Energy	Protein	Energy	Protein
Jamaica	2,043	26	4.6	39	9	1.4				2,528	68			46	62
Trinidad & Tobago	1,060	34	2.1	37	11	1.4				2,431	58	40	31	49	71
Guyana	760	40	5.8	44	17	1.4	1	9	31	2,819	63	75	64	34	42
Suriname	419	30	-	-	-	-				2,787	65	-	-	-	-
Barbados	244	38	1.3	36	3	0.2	8	←20→	32	2,927	75	58	42	58	76
Bahamas	193	35	1.7												
Belize	140	34	4.1	40	18	1.2									
St. Lucia	111	30	2.3	33	9	1.9	0	8.6	5.7	2,271	54	72	30	65	67
Grenada	108	24	1.4	29	9	1.6		←38→							
St. Vincent	100	64	4.3	47	14	1.5									
Antigua	74	19	0.4	36	7	0.8									
Dominica	74	45	5.9												
St. Kitts-Nevis	48	43	3.6	7	0.3										
Montserrat	13	42	2.9	20	2	0.2									
Cayman Islands	13	18	1.0	14	2	0.0									
Turks & Caicos Islands	6	47	-					←39 (<10.5G%)							
Commonwealth Caribbean & Suriname	5,406	32	3.8	39	11	1.3				2,592	65	56	44	46	62
North America		18	0.8	16	0	0.0									
South America		60	4.2	-	-	-									

Note: The Commonwealth Caribbean and Suriname figures are means weighted by the population of each country for which data are available.

3. Anemia is widespread in under 5 year old children and in adult women.
4. Average daily per caput nutrient requirements in Caribbean countries are around 2,250 kilocalories (9.4 MJ) and 43 gm protein. These figures are derived from FAO/WHO recommendations and, at least for energy, are not overestimates. They have recently been adopted unaltered by a local committee appointed to look into nutritional requirements of the area. The national food energy supplies vary from being about equal to requirements to providing an "oversupply" of about 30%. Protein supplies are well above requirements.
5. Distribution of the available nutrients is however inequitable. High proportions of households, often well over 50% do not get adequate supplies of food energy. This picture is reflected, but without the same brilliance, by inadequate protein intakes. All the evidence goes to show that the protein gap is a mirage in the desert of total energy deficiency. There is no specific protein deficiency. There is no need to increase the proportion of protein in most diets in the area.
6. The maldistribution of nutrients has been found to be significantly associated with the maldistribution of wealth and of family dependents, the poor and the large families being the most underfed.
7. On a country-by-country basis the dependence on imported food as major sources of nutrients is striking. A high proportion of these imported nutrients comes from outside the Commonwealth Caribbean.

Other Countries of the Caribbean

A similar situation appears for most other countries considered here as part of the Caribbean, as indicated in Table 9. Cuba must however, be noted as an exception with an infant mortality rate less than double that of the United States, and a nearly comparable 1-4 year old mortality rate.

Table 9
 DATA ON NUTRITION-RELATED MORTALITY, NUTRITIONAL STATUS AND NUTRIENT
 AVAILABILITY IN COLOMBIA, CUBA, DOMINICAN REPUBLIC, HAITI AND MEXICO ^{1/}

Country	Population in 1000s (1976 Estimates) (2)	Mortality		Nutritional Status			Nutrient Availability	
		Infant 1-4 Year		Percentage of Children Under			Per Capita Availability	
		Mortality Rate Per 1000 Live Births (2)	Mortality Rate Per 1000 in Age Group (2)	5 Years Old in Three Grades of Low Weight According to Gómez Scale			from Food Balance Sheets	
				1	2	3	Energy K Cal.	Protein Gms.
Colombia	24,333	52.5	4.9	45.6	19.3	1.7	2160	48.1
Cuba	9,464	27.3	1.0	-	-	-	2688	63.1
Dominican Republic	4,835	43.6	4.8	49.0	23.0	4.0	2143	48.5
Haiti	4,668	-	-	28.9	35.6	17.4	2113	47.1 ^{3/}
Mexico	62,329	49.7	4.6	-	-	-	2660	67.1

^{1/} PAHO Scientific Publication No. 328, Políticas Nacionales de Alimentación y Nutrición.

^{2/} PAHO Scientific Publication No. 364, Health Conditions in the Americas, 1973-1976.

^{3/} BUNAFPAN-DIFPAN. Diagnostique Préliminaire de la Situation Alimentaire et Nutritionnelle de la Population Haitienne, April 1978.

PART II
STATUS OF ENTERIC AND OTHER PARASITIC DISEASES

This section of the report reviews the relevant statistics including the morbidity and mortality patterns attributable to environment related diseases. These diseases include mainly enteric infections in which water and food contamination may play a major role. The general situation regarding parasitic diseases is also briefly reviewed.

A. Enteric Infections ^{1/}

1. Diarrheal Diseases

Diarrheal diseases constitute a clinical syndrome of various etiology which include specific infectious diseases such as shigellosis, salmonellosis, amebiasis and other diseases caused by bacilli, protozoa, viruses and helminth. In most countries of the Caribbean particularly in rural areas, clinical and laboratory services are not adequate to identify the infectious agents, therefore, a large number of deaths and cases are reported as unspecified diarrheal diseases.

Available information indicate that diarrheal diseases are a major health problem in the Caribbean Area particularly among children under 5 years of age. Around 1975 enteritis and other diarrheal diseases stood among the five leading causes of death in almost all the countries for which information was available among those under 5 years of age (see Table 10).

The mortality rates for enteritis and other diarrheal diseases vary considerably. In 1975, very high rate per 100,000 were reported in Guatemala (979.1), Nicaragua (678.2) which represented respectively 26.0 and 33.9% of total number of deaths for these countries. At the other extreme Barbados 29.7, Cuba 44.0 and Puerto Rico 22.1 showed the lowest rate per 100,000 in the region.

The interaction between diarrheal diseases and nutrition is well known and is evident in the age group 1-4 years. For this age group mortality rate per 100,000 recorded in 1975 were as follows: Guatemala (726.0), Honduras (251.6). If mortality in this group is to be reduced the nutritional status of children must be improved.

2. Typhoid Fever

Table 11 presents the number of reported cases of typhoid fever with rate per 100,000 population by country in the region for 1973-76. The information shows a very high average annual typhoid fever rate for Haiti (56.7), Colombia (32.4), Honduras (24.1), Dominican Republic (19.0), and Dominica (21.7).

^{1/} Source: Health Conditions in the Americas, 1973-76 (PAHO)

Table 10
 NUMBER AND PERCENTAGE OF DEATHS FROM ENTERITIS UNDER 1/
 5 YEARS OF AGE WITH RATE PER 100,000
 1968 AND 1975

Country	1 9 6 8			1 9 7 5		
	No.	Rate Per 100,000	%	No.	Rate Per 100,000	%
<u>Sub-Region I</u>						
Belize	45	210.0	14.7	69	274.0	26.3
Costa Rica	1,311	429.2	29.2	481	174.1	18.2
Guatemala	10,427	1158.0	25.5	9,984	979.0	26.0
Honduras	806	173.7	10.2	2,034	398.0	24.8
Mexico	44,938	551.7	24.6	38,564	352.5	24.2
Nicaragua	2,159	678.2	33.3	1,741	497.4	39.7
Panama	458	194.6	13.3	312	120.0	11.9
<u>Sub-Region II</u>						
Colombia	16,630	489.1	22.5	10,275	251.4	20.3
Guyana	-	-	-	-	-	-
Suriname	-	-	-	-	-	-
Venezuela	4,063	230.4	16.6	3,880	195.5	15.3
<u>Sub-Region III</u>						
Barbados	13	44.2	4.4	8	29.7	4.9
Trinidad & Tobago	205	145.6	17.1	254	198.6	30.4
<u>Other Islands</u>						
Cuba	1,352	108.8	12.1	511	44.0	8.1
Dominican Republic	3,270	468.2	23.2	1,843	233.1	18.3
Haiti	-	-	-	-	-	-
Puerto Rico	192	52.2	8.5	79	22.1	4.9

1/ Source: Health Conditions in the Americas (1973-76)

Table 11
 REPORTED CASES FROM TYPHOID FEVER WITH RATE PER
 100,000 POPULATION BY COUNTRY ^{1/}

Country	Reported Cases of Typhoid				Rate per 100,000 Population			
	73	74	75	76	73	74	75	76
<u>Sub-Region I</u>								
Belize	5	4	7	5	3.8	2.9	5.0	3.5
Costa Rica	42	45	27	50	2.2	2.3	1.4	2.5
Guatemala	1,127	928	1,484	1,397	19.6	15.7	24.4	22.3
Honduras	379	539	740	933	14.6	20.1	28.7	33.0
Mexico	3,672	2,152	2,122	2,380	6.5	3.7	3.5	3.8
Nicaragua	211	529	640	725	10.5	25.4	29.7	32.5
Panama	18	10	7	30	1.1	0.6	0.4	1.7
<u>Sub-Region II</u>								
Colombia	7,534	7,877	9,218	6,429	33.7	34.3	34.8	26.4
Guyana	182	123	157	101	24.0	15.9	19.8	12.9
Suriname	14	-	18	-	3.5	-	4.3	-
Venezuela	178	227	159	83	2.0	2.5	1.7	0.7
<u>Sub-Region III</u>								
<u>Insular Caribbean</u>								
<u>British West Indies</u>								
Antigua	1	-	-	-	1.4	-	-	-
Barbados	4	2	4	9	1.6	0.8	1.6	3.6
Dominica	14	10	18	23	19.2	13.5	24.0	30.3
Grenada	-	-	6	2	-	-	5.7	2.1
Jamaica	66	90	91	69	3.3	4.5	4.5	3.3
Martinique	31	38	16	20	9.0	10.6	4.4	5.4
Montserrat	-	-	-	-	-	-	-	-
Netherlands Antilles	-	-	-	-	-	-	-	-
St. Kitts-Nevis	-	2	-	-	-	3.1	-	-
St. Lucia	36	25	22	16	34.3	23.4	20.4	14.5
St. Vincent	1	1	-	-	1.0	1.0	-	-
Trinidad	12	27	13	29	1.1	2.5	1.2	2.6
<u>Other Islands</u>								
Cuba	315	345	374	409	3.5	3.8	4.0	4.3
Dominican Republic	640	688	769	144	14.4	15.1	16.4	30.2
Haiti	1,851	2,910	2,391	3,196	41.7	64.5	52.2	68.5
Puerto Rico	7	5	20	8	0.2	0.2	0.6	0.2

^{1/} Source: Health Conditions in the Americas (1973-76)

B. Other Communicable Diseases

1. Malaria

Malaria is reported to have disappeared or never existed in the following countries or territories: Antigua, Barbados, Barbuda, St. Kitts, Nevis and Anguila, St. Vincent, Turks and Caicos, British Virgin Islands. In addition, out of 12 territories in the Hemisphere with originally malarious areas and where malaria has been eradicated 10 countries belong to the Caribbean Area. They are: Cuba, Jamaica, Dominica, Grenada, Puerto Rico, Guadeloupe, Martinique, St. Lucia, Trinidad and Tobago and the Virgin Islands (US). In the remaining territories eradication programs are still in progress.

Of the countries with malaria mortality available for the period 1973-76 the largest numbers were reported in Colombia 1,040 (1974) and Guatemala 1,295 (1975). Highest morbidity rates per 100,000 population were reported in the following countries for 1976: Honduras 1723.9, Nicaragua 1174.6, Haiti 323.2. A resurgence of malaria occurred in 1974-75 in Guyana where the number of cases increased fifteenfold. This is mainly due to the Government's attempt to develop the interior of the country.

2. Schistosomiasis

The review of health conditions in the Americas 1973-76 made no mention of schistosomiasis indicating the relative low level of incidence of this disease in the region. Among the countries with an active history of schistosomiasis are Puerto Rico, St. Lucia and Suriname in the region. All these countries have active programs to bring the disease under control. A recent report by CAREC summarized the situation in the Eastern Caribbean among the islands with a history of schistosomiasis.^{1/}

St. Kitts has a good host but few habitants with hardly any human contact and there is little risk of resurgence of the disease. Antigua is in a similar position but there is potentially more human contact and it is possible that transmission continues at low level. In St. Lucia the disease is in the process of being controlled but the potential remains high and there is considerable traffic with Martinique where the disease is endemic. Montserrat has all the factors for transmission to occur and there is moderate risk of it escalating if the rise in population outpaces improvement in hygiene and water supplies.

3. Infectious Hepatitis

Reported cases of infectious hepatitis for the period 1973-76 were relatively high in the Caribbean region. Highest rate 217 per 100,000 population was observed in Cuba in 1975. Annual rate over 100 per 100,000 were observed in Costa Rica and between 50 and 100 in Belize and Panama.

^{1/} Caribbean Epidemiological Center Surveillance Report (CAREC) 1978

Cases of hepatitis were consistently reported at high level during the five year period 1972-76 as indicated by average annual rates of 74.9 per 100,000 population in Costa Rica and 167.8 in Cuba. However, mortality data indicate that death rate from infectious hepatitis was low, below 1 per 100,000 in almost all the countries, with the exception of Belize which reported 2.3 (1973), 3.7 (1974), Costa Rica 1.0 (1973), Mexico 1.0 (1973) and Suriname 1.9 (1975).

4. Dengue and Yellow Fever ^{1/}

Epidemic of dengue have occurred in the Caribbean region in different periods of this century. They continue to occur, principally in the Caribbean, where many areas are still infested with the *Aedes aegypti* mosquito, the dengue vector.

A major dengue pandemic broke out in the Caribbean in 1977. Usually large numbers of cases were reported over an extensive area. Previously, dengue serotypes 2 and 3 had been widespread in the Caribbean, but during the pandemic the first recorded introduction of dengue virus type 1 in the Western Hemisphere was documented. Major outbreaks of dengue 1 in 1977 occurred in Jamaica, where it was first isolated in March; Dominica in July; the Bahamas and the Turks and Caicos Islands in August; Antigua, Cuba, Haiti and St. Vincent in September; Grenada and Guyana in October; St. Kitts in November; Puerto Rico, Suriname, and Trinidad and Tobago in December; and, most recently, in Barbados and French Guiana in February and March 1978, respectively. Type 1 infections were also reported in the Dominican Republic, Martinique, and the Netherlands Antilles. Imported cases were occasionally reported in 1977 from Barbados, Trinidad and Tobago, and the United States, without secondary spread.

In 1977 dengue type 2 outbreaks occurred in French Guiana and the U.S. Virgin Islands with sporadic cases also reported in Dominica and Trinidad. Dengue type 3, thought to be endemic in the Dominican Republic and Haiti, was identified in cases reported from Haiti and Puerto Rico in 1977.

In Puerto Rico dengue epidemics occurred in 1963, 1969, 1973, 1975, and 1977. In September 1975 dengue-2, which had been endemic, became widespread and during a major outbreak the first three cases of dengue hemorrhagic fever in the Americas were confirmed. Another large outbreak of dengue type 2 occurred in 1977.

Despite the widespread upsurge of dengue in 1977, no cases of dengue hemorrhagic fever or dengue shock syndrome were confirmed.

^{1/} Source: Health Conditions in the Americas, 1973-76 (PAHO).

Outbreaks of Jungle yellow fever have occurred in recent years in Colombia, Panama, Guyana, Suriname and Venezuela where the disease is endemic in monkeys living in forested areas. Available data seem to indicate a gradual shift of the disease toward the north and northeastern part of Colombia a wider geographic spread of the disease over the Continent. Also in 1979 a few cases occurred in Trinidad and Tobago where none was reported over the last decade.

Aedes aegypti eradication campaigns are ongoing in most countries, however, progress has been slow.

PART III
ENVIRONMENTAL HEALTH GOALS AND RESOLUTIONS

Most environmental health problems in the region have been discussed in various special meetings and seminars attended by senior government officials. Out of these meetings have arisen a large number of resolutions and goals reflecting the desire of the respective governments to improve existing conditions.

This part of the overview recalls the goals and strategies in the environmental health area which have been agreed to in various international and regional meetings. This list is by no means complete but closely indicates the need for action oriented programs and financial commitments to implement the resolutions of these meetings.

Water Supply and Sanitation

1. HABITAT, UN Conference on Human Settlement, Vancouver, Canada, 1976, recommended that Governments of the countries adopt programmes with realistic standards to provide water for all urban and rural population by 1990 if possible. The Conference also recommended the acceleration of programmes for sanitary disposal of excreta and wastewater in urban and rural areas.
2. UN Conference, Mar del Plata, 1977, reaffirmed recommendations of HABITAT setting global target to provide safe water supply and sanitation service for all people by 1990.
3. World Health Assembly, WHA30.33, referring to UN Water Conference urged Member States to appraise situation of water supply and sanitation and formulate national policies and plans for improving and extending sanitation services to all by 1990.
4. Central America and Caribbean Conference on Drinking Water Supply, Trinidad, 1976, recognized the urgent need to improve water quality and recommended to the Ministers a set of immediate actions to be carried out in order to achieve this goal.
5. Second Conference of Ministers Responsible for Health, Resolution 11, Montserrat, 1976 (CARICOM), recognized that the greatest hazard to human health in the Caribbean are related to environmental factors, requested the Secretary General (CARICOM) to seek PAHO, the Commonwealth Fund for Technical Cooperation, UNEP, to prepare a strategy for improvement of environmental health.

6. Ten-Year Health Plan for the Americas, Official Document No. 118, January 1973, PAHO, recommended the following:

- Provide water supply through house connections to 80% of the urban population or as a minimum reduce that population currently without service by 50%.
- Provide water supply to 50% of the rural population or as a minimum reduce the population without service by 30%.
- Provide sewerage service to 10% of the urban population or as a minimum reduce that population without service by 30%.
- Provide sewerage service or other sanitary means of excreta disposal to 50% of the rural population or as a minimum reduce that population without service by 30%.

7. XX Meeting of Ministers of Health for Central America and XXII Meeting of Ministers of Health for Central America, Resolution III:

- Resolve to promote plans and programs of water and rural sanitation and provide for these the necessary financing, the actions of sanitary education, as well as organized and active participation of the community.
- Ensure that these programs are realized together with the effort of extension of coverage of health service to improve the welfare of rural community.

Solid Waste

Ten-Year Health Plan for the Americas, Official Document No. 118, January 1973, PAHO, recommended that satisfactory and suitable system for the collection, transportation, processing and disposal of solid waste in at least 70% of the cities with more than 20,000 inhabitants be established.

Environmental Pollution

1. Ten-Year Health Plan for the Americas, Official Document No. 118, January 1973, PAHO, recommended the following:

- Establish policies and enact legislation for improving, preserving and controlling the quality of water, air and soil resources.
- Formulate and execute programs for water pollution control in river basins, coastal waters and other bodies where industrial development, urbanization and other consideration indicate the need for such measures.

2. Resolution XXXIV of the XVIII Pan American Sanitary Conference resolves that the Organization intensify its program of assistance to Governments in developing new and more effective approaches and techniques for controlling environmental hazards.

3. HABITAT Conference recommended the prevention of pollution by minimizing the generation of waste. Waste which cannot be avoided should be effectively managed and whenever possible turned into a resource. The Conference also recommended the adoption of pollution control measures including incentive and disincentives for location of waste generating enterprise and better use of technology to reduce the volume of waste generated.

Occupational Health

1. Resolution XXXII of the XVIII Pan American Sanitary Conference urged Governments to establish national occupational health programs and that countries with existing programs expand them through programs carried out in individual industries with Government collaboration.

2. Ten-Year Health Plan for the Americas - Official Document No. 118 Final Report of the III Special Meeting of Ministers of Health of the Americas (1972) made the following recommendations:

1. Protect by 1975 at least 40% of the working population exposed to risks and 70% by 1980 in the countries with occupational health programs already in operation.
2. Protect by 1975 at least 25% of the working population exposed to risks and 50% by 1980 in the countries now ready to start occupational health programs.

Resolution No. 13 of the IV Meeting of Ministers Responsible for Health in the Caribbean, St. Lucia, July 1978, requests the Secretary General of CARICOM to seek the cooperation of PAHO to make a precise definition of the occupational needs of the Caribbean Community, prepare a regional plan of work and training program and examine laws and the need for legislative reform.

Nutrition

1. CD23.31 - September-October 1975, recommends Member Governments to intensify efforts for the formulation and implementation of multisectorial national food and nutrition policies and plans; to Ministries of Health, the strengthening of technical nutrition units at central level and the extension of nutrition services at local and intermediate level of the health structure.

Requests PASB continuous cooperation with countries in:

- a. Strengthening nutrition activities in primary health services for the extension of coverage;
- b. Establishment of nutritional surveillance systems and evaluation of nutrition programs;
- c. Training of human resources in nutrition.

2. EB49.R.30 - January 1972, recommends that WHO strengthen activities in nutrition:

- a. At international level
- b. Nutrition surveillance
- c. Advise and take measures against PCM, xerophthalmia and nutritional anemias
- d. Coordination with other international organizations and especially the Protein Advisory Group (PAG)

3. EB55.R.69 - January 1975, requests that WHO strengthen activities in those areas recommended by the World Food Conference Program:

- a. Review and expand WHO nutrition program
- b. Seek additional financial assistance for the nutrition program
- c. Review experiences on food aid in supporting health promotion
- d. Continue collaboration with all UN agencies and other interested agencies.

4. WHA 30.51 - May 1977, on "The Role of the Health Sector in the Development of National and International Food and Nutrition Policies and Plans", urges governments:

- a. To give higher priority to food and nutrition problems within their health programs.
- b. To further develop multi-sectoral programs specifically oriented to improve the nutritional situation of the population, and to improve the quality of food.
- c. To consider the food and nutritional implications of their development policies and plans.
- d. To give to these actions greater political, technical and financial support than heretofore.
- e. To pay attention to both qualitative and quantitative aspects of nutrition.

Also requests WHO to strengthen its nutrition program and play other "legitimate role" for the development and implementation of national and international food and nutrition policies and plans.

5. World Food Conference, 1974 - Resolution 5, paragraph 9, states that WHO should assist in meeting the nutrient deficiencies and help establish programs to reduce nutritional deficiencies such as Vitamin A, iodine, iron/folate, Vitamin D, riboflavin and thiamine, nutrition surveillance, national food and nutrition policies.

PART IV
REVIEW OF MAJOR NATIONAL AND/OR INTERNATIONAL PROGRAMS

Water Supply and Sewage Disposal

In the early 1960's there evolved in the region a growing awareness of the need for improving the water supply situation in the various countries. Available data then indicated that less than 35% of the population had access to potable water supply. This awakening was translated in the goals of the Charter of Punta del Este which promised to supply water to at least 70% of the urban population and 50% of the rural area during the decade. The commitment for improvement of water supply in the region has been further strengthened by the declaration of the Third Special Meeting of the Ministers of Health of the Americas in Santiago, Chile in 1972 for a second decade.

Considerable progress have been made since through the efforts of the countries, the financing agencies, the international agencies and professional group of the region. Today, all countries without exception have an active ongoing water improvement program.

Water programs of the 1960's concentrated their efforts in the metropolitan areas but in the 1970's even though the major thrust still remains in urban water supply, considerable emphasis has been put on providing rural community with small towns with adequate water supply. Increasing resources are being committed to this objective.

Various programs have been designed to assist the Governments to define national and local policies, integrate water supply in the economic development plan, develop master plan for water supply service, finance studies and construction of facilities, streamline water supply management and develop human resources.

Finance

Data on financing of water supplies were provided in the section dealing with investment in water supply including both national and international funds the latter representing on an overall basis about 14% of the investment in the sector. Foreign costs vary depending on stage of development of the country and the nature of the project. The bulk of external financing has been provided in the form of suppliers credits, bilateral and international loans for pipes, pumps, treatment plants and civil works. The principal multilateral sources of funds have been the Inter-American Development Bank (IDB), the World Bank, and the bilateral sources the Canadian International Development Agency (CIDA) and U.S. Agency for International Development (USAID). Subregional development banks in the region which contribute to the financing of programs in the sector included the Central American Bank for Economic Integration and the Caribbean Development Bank. Data on credits and grants made by the World Bank and other agencies to various countries of the region appear in Annex I.

The process of lending money which included project preparation study of technical alternative by the governments and appraisal by the lending agencies to the sector has contributed considerably to the improvement in administration in the sector as many water utilities were poorly organized not observing the basic principles of water utilities management. Many of the water utilities did not have enough accountability and authority to manage their operations adequately.

Currently, the concept of a centralized authority for water supplies has become an acceptable practice in the region.

Institutional Development

In order to improve capacity to make best use of external and local capital for water supply development PAHO has carried out a program of institutional development. The objective of the program has been to improve the operating and managerial capability and financial management of the agencies responsible for water and sewerage.

Program emphasis has been placed on management assistance to those projects where lending agencies have expressed interest. Technical assistance have been provided for diagnosing the administrative problems, developing appropriate systems and procedures, improving operation and maintenance of facilities, and training of personnel.

Contributions from the national and international agencies have been used to finance this extensive operation. During the period 1974-1977 institutional development projects were implemented in various countries including Barbados, Colombia, Costa Rica, Dominican Republic, Guatemala, Haiti, Honduras, Jamaica, Mexico, Trinidad and Tobago, and various territories of the Commonwealth Caribbean.^{1/} Other technical assistance provided by PAHO include preparation of master plan, preliminary engineering, loans and other financial requests, training of technical and management personnel.

Additional technical assistance has been provided by PAHO through sanitary engineers stationed in various countries assisting the governments in the planning and design of water programs and training of personnel. The Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS) also provide valuable assistance in that respect.

In general the impact of PAHO activities in the water and sanitation sector has been:

- A strengthening of the management and the improvement in coordination between various agencies and entities in the water sector and creation of central authorities in the sector.

^{1/} Source: Report of the Director, Cuadrennial 1974-77, PAHO

- The introduction of simpler methods for planning, preliminary engineering and design of facilities based on standardized approach of designs and construction.
- A better integration of water supplies in the overall development of the country.
- A greater awareness of the need for involvement of community in the planning and operation of water facilities.

The United Nations Development Program (UNDP) has also assisted many countries in the preparation of preinvestment studies for water supplies. Based on five-year program cycle the UNDP approved projects included in the respective Country Program. Under the system a review of the country situation is made and priorities established by the government for projects to be financed by UNDP. During the decade UNDP has provided funds for financing technical assistance and preinvestment studies in various countries of the region. This information is summarized in Annex II for all projects executed by PAHO

Water Supply and Sanitation Programs

Following are brief summaries of some of the new or ongoing water and sanitation programs in the countries.

Colombia

About 250,000 residents of Cali and nearby Yumbo will benefit directly from a new water supply and sewerage project aiming at improving sanitary conditions by moving the discharge of raw sewage downstream from the city main water intake. A water distribution network for low income households will be constructed. The total cost of the project is estimated at 42.9 million dollars of which 13.8 million are being financed by the World Bank.^{1/}

Haiti

Design is being carried out for the rehabilitation and expansion of the water supply systems in seven provincial towns with population of about 155,000 population. The cost of this project is estimated at 8 million dollars, 6.6 million being financed by the International Development Association. Three additional towns water supplies will be financed by the Capital Development Fund.

1/ Source: World Bank Annual Report 1978

Nicaragua

Expansion of the water supply production and the construction of transmission and distribution facilities of Managua will be carried out to meet the 1945 water demand for that city at a cost of 13.8 million dollars. About 175,000 people living in dispersed villages will also benefit from a project designed to provide basic sanitation and health related services to the lowest income population. The project includes construction of low cost water supply systems, improvement in sanitary conditions and vaccination against diseases, and is estimated to cost 6.3 million dollars. Both projects are being assisted by the World Bank.

Guatemala

Guatemala City with over 1 million population is expected to reach 2.8 million by year 2000. IDB is helping to finance the construction of the aqueduct of Xaya Pixaya which supplies water to the city with also 10 million dollars to improve the sewerage system. In 1977 IDB financed a loan of 35.5 million to improve water and sewerage projects in low income housing areas for better water distribution, improvement in water pressure, provision of continuous service to customers and fire protection. The sewerage project consists in the construction of a combined sanitary and storm water sewer in the north section of the city.^{1/}

Honduras

In 1977 a loan of 4.5 million dollars was approved to assist in the improvement of water system in the poor areas of Tegucigalpa and study water supply for the city until 1990. The project included the replacement of 25 kilometers of mains which were deteriorated in two zones of the city where 140,000 people or 46% of the population of Tegucigalpa live.

Dominican Republic

The second phase of the National Plan for Rural Water Supplies was completed in 1977. In this project water services were installed to benefit a population of 350,000 in 158 rural communities of the 17 provinces of the Dominican Republic. The project was realized with a loan of 4.1 million dollars.^{1/}

Trinidad and Tobago

At the end of 1977 the first phase of the Caroni River Water Supply project was completed. The project which was realized with the support of a loan from IDB totalling 7.5 million dollars has increased the supply of water by 17 million gallons per day. When the second phase which

^{1/} Source: IDB Annual Report, 1977

is in progress will be completed the total water supply will be increased by 33 million gal/day which will allow extension of domiciliary services to some 150,000 additional consumers.^{1/}

Costa Rica

A National Plan for improving water and sanitation services in the country has been developed and various projects have been implemented which include the construction by SNAAC of the second stage of the metropolitan water supply system and facilities for 14 other cities under a project financed with the help of loans from the United Kingdom, and the Central American Bank for Economic Integration. Another project financed by a loan of 6.3 million dollars from IDB will construct a sewer system which will benefit some 22,000 houses and 122,000 people by 1981 and 475,000 by the year 2000.^{2/}

Honduras

The National Water and Sewerage Service (SANAA) received loans from the Central American Bank for Economic Integration, IDB, and with contribution from the Government carried out the construction of the Los Laureles dam for the Tegucigalpa water supply system. Another loan by IDB will assist in improving the water systems of Puerto Cortes, La Ceiba, and El Progreso which were damaged by floods.

A Rural Penetration Division was established in the Ministry of Health to provide support to rural sanitation programs including the manufacture of latrines slabs and seats.

Jamaica

The National Water Authority (NWA) has carried out an extensive water program to supply urban and rural population in Jamaica. More recent projects included the Montego Bay Falmouth Water Supply which consist of water sources development, transmission and distribution to accommodate some 86,000 consumers and some 10,000 hotel rooms. The total cost of the project is 14 million dollars with a loan of 7.7 million from IDB. The water supply for Mandeville is under consideration. A rural water supply plan is also being developed.

Mexico

In Mexico, more than 500 new water systems has been completed and a large number of existing waterworks improved in 1974 at a cost of 24.8 million dollars. The water supply of the city of Monterrey has been improved with a loan of IDB (\$12.5 million) to increase the number of domiciliary connections by 70,000. The capacity of the sewerage system has

1/ Source: IDB Annual Report, 1977

2/ PAHO Annual Report

also been increased by 25%. A new loan will allow extension of water and sewerage services to some 575,000 people in the metropolitan area of Monterrey.^{1/}

Nicaragua

The National Water and Sewerage Department (DENACAL) is carrying out the improvement of the water systems in the cities of Corinto, Juigalpa, Ocotal and Rivas and other 47 smaller localities as well as constructing the sewerage system of Corinto and San Juan del Sur assisted by a loan of \$16.8 million for a total project cost of 23.8 million dollars. This project will benefit particularly the lower income groups of the population.

Solid Waste Disposal

The countries are beginning to take action to solve the chronic problems of solid waste disposal. Recognizing the value of planning some have initiated the development of country-wide or regional plans for solid waste disposal. A Regional Symposium on Solid Waste Management took place in 1978 in the Dominican Republic was successful in bringing together experts from all over the world to discuss with nationals of the region the problems of solid waste and logical approach for their solutions. Following is a summary of actions being taken by various countries in solid waste disposal.^{2/}

1. Guatemala - Improvement of cleansing services in 15 systems serving 31 cities with a total population of 350,000 inhabitants. Appropriate cost 1 million Quetzales. All cities in Earthquake Area Study planned for 1979.
2. Panama - Improvement of cleansing services and sanitary landfill of Panama City and Colón (PAHO assistance).
3. Colombia - National program of urban cleansing services (PRONASU) in 85 cities of 20,000 inhabitants or more. Total program 12 million inhabitants; cost 50 million dollars.
4. Venezuela - Improvement in final waste disposal in 65 cities of 20,000 inhabitants or more. Total inhabitants 6.5 million. Study to be carried out in 1979-80.
5. Nicaragua - National program of solid waste for 18 cities with 850,000 inhabitants with a loan of 18000 million Córdoba. Pre-investment study to be executed in 1979-82. Cost of study 3.2 million Córdoba.

^{1/} Source: PAHO Annual Report

^{2/} Source: PAHO Solid Waste Management Program

6. Trinidad and Tobago - Trinidad and Tobago is developing a National Solid Waste Management Plan and is upgrading the existing disposal sites.
7. Jamaica - Jamaica is developing a plan for Solid Waste Management for the metropolitan area of Kingston and is considering the extension of the plan to a national level.

Occupational Health

The Third Special Meeting of the Ministers of Health of the Americas approved the goals of providing protection of 70% of workers exposed to occupational risks in the countries that presently have programs and 50% in other country where programs are not well developed. Even though this target will not be reached some progress have been made among which the following can be noted:

1. In 1977 the Member Countries of the Cartagena Agreement including Colombia and Venezuela approved the Andean Program of Occupational Health (PASO) providing a coordination of activities in this field, homogeneity of norms and standards, legislation and regulations in the Member Countries, and the expansion of control and prevention activities.
2. The institutes of Social Security of Colombia, Costa Rica, Guatemala, and Mexico among others are increasing the coverage of their preventive activities and compensation of accidents and occupational diseases.^{1/}
3. In Costa Rica the Ministry of Health has completed recently a survey of risks affecting the labor force and is starting the development of a specialized laboratory.
4. In Cuba a decentralized program has been developed integrated in the network of health establishments which allow to extend its benefits to larger percentage of workers including those in rural areas. The system has been recently the subject of a report which brings out the accomplishments.
5. Panama is increasing their activities to improve the control of the problems created by an accelerated industrialization.
6. Trinidad and Tobago has recently solicited collaboration for an extended program of prevention and control. A workshop on occupational health is also being planned in that country for the Caribbean countries organized by CARICOM with the collaboration of ILO and PAHO. This workshop will assist in better defining the problems in the CARICOM countries.

^{1/} Source: Seguridad e Higiene Ocupacionales en America Latina y El Caribe VI Conferencia Interamericana de Ministro del Trabajo (1978)

7. Jamaica has carried out a survey of industrial problems and is planning to develop a specialized section in occupational health with the Division of Environmental Control.

This review which by no means is complete give a broad idea of the interest and activities of Health, Labor and Social Security.

In recent years, a few ILO sponsored missions dealing with occupational health and safety took place in Barbados, Guyana, St. Lucia and Trinidad and Tobago.

An International Program for Better Working Conditions and Environment (PIACT) was established by ILO in 1976, and is under way with objectives which, to a certain extent, agree with those of the proposed Caribbean Environment Project. Within the technical content of the project are included, for instance:^{1/}

- the development of policies for prevention of occupational accidents and diseases at all levels;
- the proper enforcement of regulations in which responsibilities for accident prevention and for application of sanctions are clearly defined;
- organization of occupational health and safety within enterprises, including workers' participation in decisions taking in matters of health, safety and welfare;
- study of particular risks such as dust, ionizing and non-ionizing radiation;
- adjustment of work stress to thermal and other aspects of the physical environment, and to the biometric characteristics of the workers.

Preparations are under way for a Regional Workshop to be held in December 1979 to discuss the problems associated with the health workers in the Commonwealth Caribbean. The Workshop will be sponsored by CARICOM, ILO and PAHO and will include representatives of all the countries in the CARICOM area.

Nutrition

Examples of current nutrition oriented projects and programs in the region include the following:^{2/}

^{1/} Source: ILO, 1978

^{2/} Source: PAHO Nutrition Program

1. Colombia: a national food and nutrition program is underway since 1974. Main components of this program are: production and distribution of high protein vegetable mixes for use in the supplementary feeding program for mothers and children (infant, pre-school and school age groups) by means of direct food distribution and food coupons. Nutrition education through health centers, school and mass media communication. Local food product as a component of the Integrated Rural Development program. In this national program the World Bank has granted a loan that represents about 20% of the total expenditure.
2. Costa Rica: establishment of national nutrition information system; applied nutrition research and food technology; nutrition training for field staff for expanded community health program; mass education on nutrition, sanitation and health practices; extension of potable water systems; evaluation of nutrition improvement projects, particularly those based in agricultural practices.
3. Cuba: the World Food Program is assisting the government of Cuba in an expanded supplementary feeding program for children by distributing reconstituted milk. UNICEF is assisting the development of programs of community nutrition education.
4. Haiti: integration of nutrition into regionalized health services; training of auxiliaries in nutrition and of health personnel including community level; promotion of local production of a vegetable mix (ACAMIL) suitable for weaning and nutritional recuperation; support of mothercraft centers; preparation of nutrition education material; distribution of Vitamin A supplements; feasibility study for the industrial production of vegetable mixes (ACAMIL) is underway with support from the Interamerican Development Bank; support of national nutrition planning activities.
5. Honduras: support for national nutrition planning activities, including pilot testing of selected program components; nutritional surveillance pilot project.
6. Nicaragua: studies on impact of public nutrition education programs.
7. Panama: development of community gardens and small animal farms; improvement of rural health through extension of health care, potable water, environmental sanitation, and nutrition improvement projects.
8. INCAP: relationship between maternal malnutrition and infant mortality/morbidity; field trials of iron-fortified sugar; comparative impact of calories plus protein on child health and development in rural communities; assist in establishment of nutrition planning groups in Member Countries.

9. CFNI: assist Member Countries to develop and implement national food and nutrition policies and programs; assess manpower needs among member Countries; train personnel for conduct of nutrition programs; and develop, test, and produce nutrition education materials.

Chemical Pollution

Venezuela

In 1974 Venezuela began to take a rational approach to solve the problems created by environmental pollution and initiated programs to meet this objectives.

A main initiative in the field of investigation was the creation in the same year of the Division of Investigations on Environmental Contamination (DISCA) in the Ministry of Health and Social Assistance. The initiative of the Government resulted in an important center of investigation which employed 34 professionals and 32 technicians at the end of 1975. The administration of DISCA was transferred to the newly created Ministry of the Environment and Renewable Resource (MARNR) in 1977 to give more emphasis to the control of the environment. From 1974 the following studies have been carried out by DISCA under a program of cooperation with UNDP/PAHO:^{1/}

- Study on the Contamination of Lake Maracaibo and its influents.
- Study of Atmospheric Contamination of the Caracas Valley and the Cities Francisco Fajardo and Diego de Losada.
- Study of the Collection, Treatment and Disposal on Solid Waste on the Island of Margarita.
- Study to Evaluate the Environmental Hazards of the Petro-Chemical Industries.
- Study on the Behavior of Waste Stabilization Ponds.
- Ecological Study on the Behavior of "Larvofagos" Fish.

Cuba

In 1977 the Government of Cuba presented to UNDP a draft project for Technical Cooperation in Marine Pollution Control in Havana Bay and the coastal zones. A mission with representatives from various UN technical agencies visited Cuba and assisted the Government in reviewing the basic elements of the project. During the period of initial discussion of the

^{1/} Source: Estudio Sobre la Contaminación del Lago Maracaibo y sus Afluentes, DISCA, 1977

project the Government established the National Commission for the Protection of Environment and Conservation of the Natural Resources. The project is under consideration for financing by UNEP.

Colombia

The Government of Colombia has taken special interest in the pollution of the Cartagena Bay and has developed a project to carry out investigations of water pollution in the Bay and the water bodies which influence it. This study will help defining the technical and economic alternative for control of the water quality in the Cartagena Bay.

PART V
GAPS AND SHORTCOMINGS IN THE ENVIRONMENTAL HEALTH SECTOR

Water Supply and Sanitation

Recognizing the achievement of the countries in water supply and sanitation it is, however, necessary to note certain aspects that need to be strengthened in order to obtain maximum benefits of the investments.

Operation and Maintenance

The necessity to improve operation and maintenance of the water services should receive a high priority. After the establishment of expensive and sophisticated systems they are subject to frequent interruption in services. The breakdown of pumps paralyzes communities for days and weeks, and chlorinators are most of the time out of service.

The two fundamental aspects are that the design of the system must take into account the local capability to operate and maintain it. The other aspect is institutional and refer to the provision of support services at the local level for operation and maintenance not relying only on the centralized authority to provide all services of operation and maintenance. The essential actions needed are as follows:

- Design and construct system that can be operated efficiently at local level.
- Prepare and rely on the personnel of the community for operation and maintenance of the supplies.

This poses a particular challenge and requires a series of activities including training and manpower development at various levels, the mobilization of training resources at community level, institutional back-up and development of procedures for interaction between community and centralized levels of government.

Water Quality

The Conference for the Improvement of Water Quality held in Trinidad in 1976 was emphatic in its conclusion that water quality in the region was far from satisfactory and that there was an urgent need to improve quality of water through better utilization of currently available knowledge and techniques. As a mean of obtaining this goal the participants recommended inter alia to the Ministers of Health in the region to provide greater financial and human resources for water quality and the development of legal basis for a water quality improvement program. They also recommended that high priority be given to the frequent monitoring of water quality, preventive maintenance, continuous disinfection, periodic sanitary survey and active leakage detection program.

Finance

A review of the pattern of financing water supplies in the region would indicate a substantial increase in investments in the last few years particularly in the amount of national funds indicating an increase of interest and effort of the countries. Also an increase in the resources of international financing agencies earmarked for water and basic sanitation and participation of newly created subregional institutions such as the Central American Bank for Economic Integration and the Caribbean Development Bank in the field of basic sanitation is also noted. Also of recent year, international agencies like the World Bank considerably increased their level of investment in the water sector in addition to the fund provided by the Interamerican Development Bank.

However, in many countries, particularly in the Insular Caribbean, internal financing is a great constraint to water supplies and sanitation programs development. This is accentuated as the size of the community become smaller and the program directed to villages and dispersed populations. Greater community involvement and participation may assist in solving some of these problems. However, the financing of sewerage systems still remains a problem due to the high cost of the facilities. Better economic criteria are needed for the development of a sustained sewerage program for major urban areas in the region. The application of intermediate and low cost/low energy technologies needs to be properly assessed and explored to the maximum in the region.

Rapid Assessment of Water Supplies and Sanitation

The complex process of providing water and sanitation services to urban and rural areas entails a series of actions at various levels including planning, resource studies and assessment, design construction and operations. Depending of the degree of development of the program in the respective countries, gaps in information, knowledge, and action will vary accordingly. The Rapid Assessment of Community Water Supplies and Sanitation carried out in several countries in relation to the Water Decade gave an idea of the main shortcomings in existing programs in those countries and required actions to accelerate development in the sector. A summary of these countries' reports appear in Annex III.^{1/}

Considerable assistance is still needed particularly in rural water supplies and the improvement or urban sewerage and rural sanitation.

Solid Waste Disposal

Even though the experience in solid waste program is not as extensive as in water supplies, it has been demonstrated that one of the shortcomings in solid waste program is the fragmentation of the management

^{1/} Sources: PAHO Rapid Assessment Reports
World Water 1979

system. Solid waste management is more or less at the same point where water supplies was 15 years ago. There is still need in many countries for a national policy for solid waste management which should be integrated in national and/or regional land use policy.

Another major constraint is the unavailability of capital for improvement of solid waste services. Solid waste utilities need to develop sound financial management that will in the long term make them viable and self sustaining operations.

Many solid waste material can be recycled; however, there is a gap of information on potential markets and a need for more action by the governments in this respect. Only a small proportion of all waste appears to be viable energy sources. Some more studies may be needed to define the potential contribution to the region energy requirements in view of the increasing cost of oil.

Constraints on the management of solid waste have been posed by certain types of urban development which could be avoided by better consultation between planning and solid waste services.

Even with very sophisticated system and equipment for solid waste collection and disposal, solid waste programs have very little chance to succeed without the goodwill and participation of the communities. Most solid waste services are not equipped to enhance community education and participation in their program.

In seeking to deal with the above issues the governments need to set up an agency to legislate the powers of agencies and coordinate activities in solid waste management. This has not been implemented in many countries in the Caribbean region.

Pollution Control

The risks produced by pollution has to be evaluated in relation to the social and economic consequences and the present and future usefulness of the resources. Of primary consideration is the risks to health produced by pathogenic and toxic agents. The evaluation of pollution requires complex methodologies and sophisticated laboratory equipment. Most countries do not have the human resources and equipment to carry out investigations on their own and must rely on international technical assistance.

Considering that pollution assessment can be made, the implementation of pollution control measures from land-based sources requires extensive financing and resources in competition with other sectors of the economy. The World Bank has only recently established a section to deal with pollution control and is presently considering loan applications for pollution control measures.

The other constraints in the sector are the lack of policy definition by various governments with regard to pollution control and the need for an infrastructure that integrate environmental consideration at the earliest planning stage of development projects.

The available information on the status of pollution in respective countries is not sufficient to evaluate the impact of pollution on a regional basis.

Working Environment

The First Seminar on Occupational Health concluded its evaluation of the programs and activities indicating the following:

- The statistical information is insufficient in occupational health to demonstrate the size of the problem and the impact of development activities. They also indicated great difference in the criteria in the collection and interpretation of data. Information available were in general the result of limited survey which make generalization somewhat difficult.
- The programs of occupational health are still limited in scope even though they are being improved in the field.

Nutrition^{1/}

Programs for the improvement of the nutritional status of the population and the amelioration of malnutrition have to overcome several inherent operational problems in order to be effective.

The factors governing the availability, consumption, and biological utilization of foodstuffs, which determine the presence or absence of nutritional diseases, belong to different areas of a country's development. Although the health sector receives more directly the impact of such problems and carries out specific activities for its amelioration, they cannot by themselves effectively solve them. Simultaneously, with nutritional and health education activities, it becomes necessary to carry out supplementary feeding of the most vulnerable groups (mothers and children), environmental health, immunization, etc., and other programs to raise educational and economic levels among the population so as to generate effective demand and consumption of foodstuffs. At the same time, agricultural and fishery production and food marketing programs should be implemented in order to obtain a supply sufficient in quality and quantity to meet the nutritional requirements of the population.

^{1/} PAHO Nutrition Program

A point worth stressing is the need to bring about changes in economic structures and systems of land tenure in order to obtain significant modifications in the structure of demand for services. These changes will need to be accompanied by action to increase the available food supply. All these measures combined can ensure an improvement in the nutritional status of the population.

In the region, practically none of the countries have formulated and implemented a comprehensive national food and nutrition policy aimed at fulfilling the nutritional needs of all population groups.

A few countries have established adequate planning, management, and evaluation systems for nutritional activities which are an integral part of the health programs. Others present great weaknesses in their administrative processes, in particular with respect to the establishment and observance of technical standards for the provision of nutrition services. Very few have incorporated nutrition activities in maternal and child health services.

Some countries are carrying out programs to produce high nutritious mixes which are acceptable to the population and yet economical (Incaparina, Colombi-harina, Duryea). However, these programs still provide little coverage.

Although a few countries are currently implementing supplementary feeding programs for vulnerable groups (mothers and children), in the majority of them those programs have limited coverage and inadequate technical and administrative management.

No country has a clearly defined system that makes it possible to carry out the nutritional surveillance of its population.

All countries of the region present shortages of well trained personnel in the fields of nutrition and food technology. The teaching of nutrition in schools of health sciences (medical, nursing and dentistry) needs substantial improvement and strengthening and possibly reorientation.

PART VI
RECOMMENDATIONS FOR ENVIRONMENTAL HEALTH IMPROVEMENTS

Policy and Institutional Mechanisms

In order to improve environmental Health conditions in the regions and meet the goals established for various aspects of the sector it is recommended that more interaction and better coordination take place at subregional and regional levels on matter related to Environmental Health. Certain mechanisms have been suggested that could fulfill these functions to various extent:

1. The establishment or strengthening of subregional centers or institutions as focal points for the concentration of information and technical resources for planning and developing environmental health projects and provide technical assistance for management and operations of facilities.
2. The complementation of country human resources through technical cooperation between countries in a coordinated fashion as exemplified in the Caribbean Basin Water Management Project. This may be coupled with the development of subregional training programs for environmental health.
3. The development of a network of collaborating centers which will complement country resources by developing specialization in specific areas and providing services in environmental health.
4. The development of subregional strategies should be encouraged as the Caribbean Environmental Health Strategy for CARICOM Countries which inter alia recommended the establishment of a coordinating Working Group in Environmental Health to improve environmental health management.

It is, therefore, recommended that programs be established at subregional and regional levels to explore the full potential of the above mechanisms.

A. Water Supply and Sanitation

Considering the extent of the resolutions in the sector, all efforts should be made by the countries with the assistance of the international and financing agencies to meet these goals. It is recommended that the goals established at the Mar del Plata Conference be internalized by the individual countries. In order to attain the goals of safe water supplies and sanitation for all, it is required that the following actions be taken at national level:

a) A national commitment to the goals should be established particularly of supplying water to poor urban and rural areas.

b) Development priorities should be reoriented wherever possible to allocate more funds for investment in water supply and sanitation.

e) Financial policies in the sector should be revised to enable expansion of services, more generation of funds and strengthening of institutions.

d) Technology should be adopted to reduce cost of facilities and better design in line with local operation and maintenance capabilities.

The following sub-programs should be strengthened at national level.

1a) National plans should be developed with particular emphasis on rural water supplies. Plans must be made as realistic as possible and integrated with economic development plans

2a) Education programs for manpower development in the sector must be intensified using all educational resources available within countries.

3a) Preparation of preinvestment studies must be done to compile information needed for domestic and foreign financing. Adequate rate policies should be adopted and where subsidies are justified they should be clearly identified. A major objective should be to continue strengthening institutional capability.

4a) Country programs should adopt appropriate technologies in design and construction of facilities. National engineering capabilities should be developed to a maximum. Effort should be made to control leakage and develop operation and maintenance.

On a subregional level:

1b) Harmonization of planning policies and technologies should be encouraged through periodic meetings of planners to bring into focus difficulties of planning water supplies and sanitation programs. Implementation of subregional strategies such as the Environmental Health Strategy for the CARICOM Countries should also be considered for other areas.

2b) Subregional training project such as the Caribbean Basin Water Management Program should be emulated in other areas as it maximizes sub-regional human resources and institutional capabilities. A similar program is recommended for the countries of Central America. Subregional training programs should be developed in collaboration with institutions such as the University of the West Indies. International and financing agencies should be encouraged to support such programs particularly in the field of operations and maintenance training.

3b) Subregional development Banks such as the Central American Bank for Economic Integration and the Caribbean Development Bank should receive increased support from regional Banks, bilateral and international agencies to allow them to fulfill stronger role in financing and assisting technically in project development and implementation within their jurisdiction.

Subregional activities such as training in project preparation, analysis and management should be developed. Subregional seminar on management development for water utilities should be carried out.

4b) Exchange of information and experience on engineering and technological application in water and sanitation should be intensified on a subregional level. Efforts such as the annual meeting of the Caribbean Water Engineers should be encouraged; similar exchanges should be facilitated in other subregion or between countries. Special consideration should be given to the simplification in engineering and technology in the planning, design and construction of water and sanitation facilities.

Regional support to the above program should include:

1c) Improvement of planning techniques, water resources planning and management through technical cooperation and financial assistance. Assistance in the development of National Water and Sanitation Plan. These national plans are expected to be prepared for consideration by ECOSOC in 1980.

2c) Carry out studies in subregional and regional level to obtain a data base to formulate policies and programs for human resources development at national, subregional and regional levels.

Develop programs for improvement of the quality of education for the sector. Strengthen regional and subregional training institutions.

3c) Increase commitments of regional financing institutions to water and sanitation programs. Present economic justification criteria for financing of sewerage systems in the region seems to discourage the expansion of services. International financing agencies should also support the strengthening of subregional financing institutions so they can provide service more responsive to their respective area of jurisdiction.

4c) Regional support for developing data base and information systems for water and sanitation appropriate technology, leak detection, models for operation and maintenance of facilities; financing of engineering research programs by agencies, and organization of regional seminar workshop dealing with the above subjects. Development of pilot and demonstration projects in low cost and appropriate technologies.

B. Solid Waste Disposal

In order to improve the situation in solid waste management and realize the objectives recommended in the sector, the following is recommended:

a) The establishment of an organization at national level exclusively for solid waste disposal for the metropolitan areas and major cities and development of national plans for solid waste management.

b) Training of the personnel necessary to execute plans and objectives of the program by means of intensive or regular courses and adapt appropriate technologies to planning and design economical of systems.

c) Carry out feasibility studies and develop information necessary for the preparation of request for internal or external financing.

d) Organize programs of health education to obtain the participation of the public.

e) In addition, it is imperative that operation and maintenance of solid waste equipment and facilities be improved. It is, therefore, recommended that specific programs be established at national and subregional levels for that purpose.

f) In view of the lack of organization and professionals in the sector, it is recommended that a strong support be established at the regional level for country programs in the realization of the tasks listed above.

g) It is also recommended that at the regional level specific studies be carried out and guidelines developed for resources recovery of solid waste and energy generation considering the increase in cost of oil.

h) It is recommended that subregional and regional financing institutions play a more active part in the financing of solid waste disposal.

C. Occupational Health

It is recommended that a regional program be established that will carry out detailed assessment of specific existing problems such as effects of lead, chrome, mercury, pesticide, dust and other airborne pollutants, small industries problems, and rural workers health problems. In this regard, the effort of CARICOM to develop a workshop on occupational health must be supported. The regional program should include but not be limited to the following:

a) Revision of the legislations dealing with occupational health and safety in the region.

b) Training of occupational health and safety persons in government and private institutions.

c) Special training for management groups involved in the control of work related diseases.

d) Establishment of systems for reporting and analysis of accidents with a common methodology and rigid guidelines.

e) Development of research on etiology and prevention of occupational accidents and diseases prevalent in the region, particularly in relation to accidents in rural areas, protection of machinery, effect of vegetable dust upon the health of workers.

f) Accidents in transportation of workers and related technological transfer and migration from rural to urban setting.

g) Special assistance and training in carrying out investigations of problems.

h) Carrying out an assessment of the situation with regard to the established goals to protect 70% of the working population exposed to risks in the countries with programs by 1980, and as a minimum 50% in the countries where programs will be established.

D. Chemical Pollution

For the improvement of pollution control it is recommended that at the national level:

a) Existing national institutions be strengthened so they can provide information on environmental pollution required for national development planning and public information programs to be carried out. Simultaneously a review of existing legislation and interim strengthening can be made until such time as subregional, regional, national human and institutional resources for policies and enforcement can be trained and mobilized.

b) National surveillance systems be established for water, air pollution, including the improvement of existing monitoring programs so that data collected can be reliable. Common methodologies and intercalibration to allow subregional and regional comparative analysis are required.

c) Extent of pollution problems be determined and baseline studies developed to serve as basis for actions oriented programs.

d) Existing legislation be improved to deal with pollution from sewage, industrial waste, air, water, soil pollution and pesticides.

At the subregional level it is recommended that compilation of selected existing legislation be undertaken and prototype legislation developed to be used by the countries. Harmonization of legislation on a subregional basis so that uniform standards can be approved should be considered. Other assistance needed on subregional basis are:

a) Support to country programs in identifying and quantifying pollution problems, establishment of common methodology and provision of technical equipment and personnel to support and carry out the programs.

b) Financing by subregional and regional institutions of programs of pollution control.

c) Establishment of subregional and regional networks of information dealing with environmental pollution.

d) Training of personnel to develop and operate programs of pollution control and surveillance.

At the regional level it is recommended that detailed assessment of pollution and investigation of sources of pollution be carried out to study the long term effect on the environment and human health in the region. Advice on the social and economic impact of pollution as well as engineering and technological means to solve problems will be required by the countries in planning program of control.

Following the regional assessment of pollution, it is recommended that a regional symposium be held by 1981 to evaluate the trend of pollution in the countries and renew control efforts.

E. Nutrition

In coordination and in collaboration with FAO, UNICEF, UNESCO, ECLA, WFP and other interested agencies, PAHO has recommended the following strategies for technical cooperation to improve nutrition service:

1. Establish permanent nutritional surveillance systems as a basis for planning and programming nutrition oriented interventions and for their evaluation as well as for the early detection and prevention of nutritional deterioration. This will include the identification of "at risk groups" and the responsible factors of malnutrition as a basis for implementing the necessary corrective action.

2. Define principles and develop methods for the formulation and implementation of food and nutrition policies. Analysis preceding the implementation of national programs and the subsequent evaluation of nutrition interventions. Particular attention will be given to the health sector responsibility in the promotion, formulation and implementation of such policies and programs.

3. Define and implement all those activities that within the national health system can contribute to the promotion of good nutrition, the early detection and prevention of all forms of malnutrition, and to the treatment and rehabilitation of malnourished patients. Special attention will be given to the activities needed at primary health care level and to those addressed to the most vulnerable groups of the population, mainly mothers,

infants and preschool children. All this should lead to the strengthening of technical nutrition units at different levels of the health structure.

4. Select, adapt and implement available measures for the control of specific nutritional deficiencies of public health significance, such as endemic goiter, nutritional anemias and vitamin A deficiency. Promote the production of highly nutritious food mixes, especially for weaning children, using locally produced food items such as soybean or cotton seed flour, etc.

5. Contribute to the assessment of human resource needs in nutrition; the definition of content and methodology for the training in nutrition of health personnel and for the training of nutrition specialists at pre and post graduate level, including programs for continuing education.

6. Support and coordinate research in more practical methods for the assessment of nutrition status of the population and particularly to explore and test indicators for nutritional surveillance; developing and evaluating interventions for the early diagnosis, prevention, treatment and rehabilitation of malnutrition, and the promotion of good nutrition through the health services; developing or adapting and testing appropriate technology for the prevention and control of vitamin A deficiency and nutritional anemias.

7. Through workshops, seminars, conferences and publications, contribute to the analysis, interpretation and dissemination of new knowledge in nutrition and related fields, particularly as it applies to a better understanding and to the solution of nutritional problems of public health significance in the region.

ANNEX I

WORLD BANK LOANS FOR WATER AND SEWERAGE PROJECTS

Country	Location	Type	Total Project Cost	Loan IBRD
<u>1970</u>				
Colombia	Cali	WS	37.5	18.5
<u>1971</u>				
Colombia	Palmira	WS	3.8	2.0
Colombia	Bogota	W	118.0	88.0
<u>1972</u>				
Nicaragua	Managua	W	10.0	6.9
<u>1973</u>				
Colombia	Medium Cities	W	15.9	9.1
Mexico	Mexico City	W	194.0	90.0
<u>1975</u>				
Colombia	Multi City	W	52.9	27.0
Jamaica	Kingston	WS	33.0	15.0
<u>1976</u>				
Mexico	Medium Cities	WS	100.0	40.0
Panama	Panama City	WS	17.9	12.0
<u>1977</u>				
Bahamas	New Providence	WS	32.0	10.0
<u>1978</u>				
Colombia	Cali	S	25.7	13.8

W = Water
S = Sewerage

ANNEX II

UNDP PROJECTS IN THE CARIBBEAN REGION
DEALING WITH ENVIRONMENTAL HEALTH PROJECTS

- WEST INDIES-2106 (79/WT/TCA/2106), Development of Water Supply and Environmental Sanitation Services (Turks and Caicos Islands SES/003).
Awaiting UNDP approval \$150,000
- BARBADOS-2200, Solid Waste Management BAR/74/015 (UNDP)
Approved: 02/75
Estimated completion date: 07/77 \$83,854
- BARBADOS-2001, Public Health Engineering (BAR/74/013)
Approved: 10/74
Estimated completion date: 10/76 \$77,955
- DOMINICA-2100, Water Supplies (DMI/68/004)
Approved: 11/68
Estimated completion date: 04/75 \$52,336
- HAITI-2101, Provision or Improvement of Water Service in Ten Medium-Size Cities (HAI/75/003/I (UNDP)
Approved: 07/75
Estimated completion date: 04/77 \$228,241
- JAMAICA-2000, Rural Water Supplies (JAM/68/009)
Approved: 11/68
Estimated completion date: 10/75 \$124,334
- MEXICO-2301, Improvement of the Environment (MEX/73/002)
Approved: 08/73
Estimated completion date: 01/78 \$2,113,826
- NICARAGUA-2000, Environmental Sanitation During the Period of Rehabilitation (NIC/73/006)
Approved: 10/74
Estimated expiration date: 01/77 \$84,976
- TRINIDAD AND TOBAGO-2100, Strengthening the Training Unit of Water and Sewerage Authority (TRI/74/003)
Approved: 10/74
Estimated expiration date: 05/78 \$210,300
- SURINAME-2100, Water Supplies and Sewerage (SUR/70/504)
Approved: 01/70
Estimated expiration date 01/77 \$270,303

- VENEZUELA-2300, Environmental Pollution Research Center
(VEN/78/015/A) (Phase III)
Approved: 03/71
Estimated completion date: 31/12/79 \$500,000

- WEST INDIES-2101, Water Utility Management and Training
(CAR/74/003)
Approved: 11/74
Estimated completion date: 01/78 \$314,824

ANNEX III

SUMMARY OF COUNTRIES' REPORTS

Barbados ^{1/} - Total land area 166 sq miles, estimated 1977 pop. 250,000 (44% urban), one of the five most densely populated country of the world, per capita income \$1,500 mainly from tourism and sugar cane.

The entire population have access to water supply with 76% house connections. Action required consist of implementing recommendations for water resources development studies and proceed with sewerage system in Bridgetown. Improve institutions to administer jointly water and sewerage. Accelerate staff development and training.

Cayman Islands ^{1/} - Consist of three islands in the Western Caribbean. The principal island, Grand Cayman, has a land area of 76.4 sq miles and Little Cayman and Cayman Brae less than 15 sq miles. Average rainfall is 60 in. per year. Population of Grand Cayman is estimated at 15,000 people. There are no public water systems; a high percentage 70% derive their water from individual rainwater catchments. About 77% have wells and 55% both. Private water companies sell desalinated water at 16 CI \$ to 20 for 1000 gallons.

A comprehensive ground water resources and quality studies is recommended to locate existing fresh water lenses and their yield. Implementation of the following schemes for which external assistance is needed should be encouraged: (1) water supply development phase for Grand Cayman (\$4.8 CI); (2) sewerage for West Bay and Georgetown (\$ 5.3 CI).

Colombia ^{1/} - Pop. 25.3M (37% rural); GNP (1976) \$630 per capita; safe water - urban 73%, rural 46%.

Colombia has been falling behind target in recent years in relation to previously established water supply and sanitation goals. A decreasing allocation of the public spending budget has meant that investment has not kept up with population increases. "Very considerable increases in capital investments" will be needed to achieve the Water Decade goals.

About 60% of the urban population has sewer connections, but only 14% of rural dwellers have adequate means of excreta disposal. Few sewerage systems provide any form of treatment, causing increasing pollution of surface waters.

1/ Sector Digest and Rapid Assessment PAHO

2/ Rapid Assessment and World Water 1978

Priority areas for attention, which will require external cooperation are: study and evaluation of stream pollution; guidelines for the degree of industrial and domestic sewage treatment based on technical and economic alternatives; water quality norms; and design and operation of effluent treatment plants.

Costa Rica - Pop. 2.1M (55% rural); GNP (1976) \$1,040 per capita; safe water - urban 95%, rural 62%.

A progressive increase in national spending on water supply and sanitation, from 4.3% of the total public spending in 1971-74 to a projected 8.6% in 1979-80, has enabled Costa Rica to make good progress towards some ambitious targets. Water supply goals will be achieved by 1980, though a target of 70% urban sanitary sewer connections by the same date (present coverage is 43%) is unlikely to be met.

There is a shortage of sanitary engineers, and training is an important element in all projects. External technical assistance is needed for preinvestment studies, project design, and operations and maintenance programmes, and project construction costs will require financial aid.

Dominica - Total land area 442 sq km, 1977 population 80,000 (29% urban, 71% rural) per capita income \$315 (1976), 77% of rural population have access to drinking water with 20% through house connections.

To meet objectives of the Water Decade Dominica will need to continue giving priority to the extension of water supply and sanitation services, accelerate staff training already started under the Caribbean Basin Water Management, strengthen Central Water Authority administrative and financial posture by way of government commitment to live with the terms of the Water Ordinance.

Guatemala - Pop. 6.5M (65% rural); GNP (1976) \$630 per capita; safe water - urban 87%, rural 14%.

To achieve its planned goals, Guatemala will need to double the current investment rate in urban areas and increase rural spending six-fold. That means a total investment of \$25M a year until 1985. The goals, originally set for 1980, include 50% urban and 33% rural coverage with satisfactory sewerage or sanitation (currently 40% and 17% respectively). New targets for the Water Decade have still to be developed.

External aid amounting to about 10% of planned investment, is expected to be spent mainly on specialized consultants and training. Preinvestment studies are needed urgently, and a national programme for rural water supply and sanitation has to be compiled.

Haiti - Pop. 4.8M (77% rural); GNP (1976) \$130 per capita; safe water - urban 38%, rural 7%.

Numerous multilateral and bilateral organizations are willing to provide financial assistance once the government has prepared development programmes. Haiti has a very high infant mortality (149 per 1,000 births) and a severe need for improved public water supplies. There are no sanitary sewerage systems except for Port-au-Prince and Cap-Haitien, which have embryonic storm-drainage systems also used for sewage.

Areas requiring external aid are: water resources studies; training; engineering studies and project construction; system operation and maintenance; improvements to existing systems; community development; and study of low-cost technology for rural and marginal urban waste disposal.

Honduras - Pop. 3.4M (66% rural); GNP (1976) \$390 per capita; safe water - urban 82%, rural 27%.

Current targets for water supply and sanitation fall well short of Water Decade goals, and in urban areas barely keep pace with increasing population. The present planning cycle extends to 1983, and the UN team sees a need for an early firm governmental decision to generate the necessary momentum and resources for meeting the Decade objectives.

The World Bank and the European Economic Community are currently studying two projects, which could provide impetus for new programmes.

Jamaica - Total land area 4,411 sq miles, population 2.1 million, capital Kingston 600,000.

In order to meet the Water Decade objectives the following actions are required. Consolidation of water resources management programs and a rationalization in the sector. The creation of a single body for water production and distribution for which enabling legislation is pending. Continued emphasis on provision of basic sanitation for urban poor and rural areas. Provision of sewerage schemes in areas where individual systems are adversely affecting ground water. Enlarge technicians and operators training programs and development of appropriate rate structures.

Nicaragua - Pop. 2.4M (45% rural); GNP (1976) \$750 per capita; safe water - urban 100%, rural 34%.

Water supply and sanitation has a high priority in a country in which 16.6% of deaths are due to enteritis and other diarrheal diseases. About 32% of the urban population is connected to public sewerage, and 32% of the rural population has some means of excreta disposal.

Most institutions have enough manpower, though expansion of a programme of specialization may be needed for the Water Decade. Existing development plans include 100% water supply and sanitation coverage, and the World Bank and USAID have provided credits for specific projects. IDB and other external funding sources are being investigated for financing of the national plan for the decade.

Panama - Pop. 1.8M (48% rural); GNP (1976) \$1,310 per capita; safe water - urban 93%, rural 63%.

A recent downturn in the economy has meant that development towards water supply and sanitation goals established in 1976 has been controlled more by availability of funds than by actual requirements. Most of the urban population have some form of sewage disposal facilities, 72% through sewerage systems and 25% by septic tanks and pit privies. About 73% of the rural population have adequate means of excreta disposal.

Opportunities for international cooperation arise in: staff training and institution development, preparation of engineering and feasibility studies for medium-size and smaller cities, and development of model projects for different sized communities based on low cost and simplified technology; assessment of water resources and groundwater explorations; development of national sector policies and plans and improvement in system operation and maintenance and water quality and pollution control.

Turks and Caicos Islands ^{1/} - This group of islands has a total land area of 166 sq miles. Grand Turk has a present population of 3,000, South Caicos 1,200, Salt Cays 400, North Caicos 1,400, Providenciales 700, and Middle Caicos 500. There is no public piped water system and the main source of supplies is rainwater catchment. Average annual rainfall is 23 inches falling mainly in November and December. In Grand Turk and South Caicos public rainwater catchment/storage systems provide a yearly average of less than 2 gallons per person/day. In North and Middle Caicos and Providenciales preliminary studies show that ground water is available. Water supply for Grand Turk could be increased if the two large natural existing rainwater catchments at North and South Wells are protected and adequately used as storage reservoir. It is however necessary that the area around the catchment be declared protected area. Another source of water supply will possibly come from the proper guttering of individual houses.

^{1/} Community Water Supply and Sanitation Rapid Assessment, 1978.

ANNEX IV

RELATIONSHIP BETWEEN COVERAGE OF WATER SUPPLY IN THE
CARIBBEAN AREA AND GNP/CAP FOR SELECTED COUNTRIES

Country	GNP at Market Price (1976) Per Capita \$US	% Population With Access To Water Supply
Mexico	1,090	59
Cuba	860	60
Guatemala	630	40
Dominican Republic	780	57
Haiti	200	10
Honduras	390	42
Nicaragua	750	74
Jamaica	1,070	82
Costa Rica	1,040	80
Panama	1,310	82
Trinidad & Tobago	2,240	89
Barbados	1,550	100
Bahamas	3,310	98
Grenada	420	88
Colombia	630	64
Venezuela	2,570	81
Guyana	540	98

* World Bank Atlas 1977/PAHO 17 October 1977, Water
Supply and Sanitation.

REPORT OF WORKING GROUP II^{1/}

ENVIRONMENTAL HEALTH

Revised Terms of Reference

1. Statement of the problem as it affects the region:

a) Review the main climatic and geographical considerations affecting environmental health conditions in the Region (WHO);

b) Review main environmental health factors, giving as available statistical information:

- i) Water Supply
- ii) Sanitation
- iii) Solid waste management
- iv) Chemical pollution
- v) Undernourishment, malnutrition and food contamination
- vi) Working environment (ILO)

c) Review principal relevant health statistics, including mortality and morbidity patterns attributable to environment related diseases, with special reference to the following:

- i) Enteric diseases
- ii) Parasitic diseases (malaria, schistosomiasis, etc.)
- iii) Mortality under 5 years
- iv) Diseases prevalent in special groups

2. Recall goals and strategies in the environmental health area, as agreed in international or regional fora (United Nations General Assembly, UNCHE, HABITAT Conference, United Nations Water Conference, WHA, ILO, UNEP Government Council, OAS, CARICOM, etc.)

3. Review existing major national or international environmental health programmes and projects in the Region.

4. Identify gaps and shortcomings in knowledge and action.

1/ CCA, PAHO/WHO, OAS, IIED, and ILO

5. Recommendations for action:

- a) Detailed assessment of selected problems
- b) Strengthening the ability of identified public and private institutions to deal with environmental health problems through:
 - i) Improved management practices
 - ii) Setting and enforcement of standards
 - iii) Education, training, information and community participation

6. Identify areas for international cooperation.

ANNEX VI

ESTIMATES OF THE EXTENT OF SECOND AND THIRD DEGREE
MALNUTRITION IN CHILDREN UNDER 5 IN
CENTRAL AMERICA AND PANAMA

Country	1965-1967		1974-1976		Increase and % Change in the Number of Malnourished children 1965-1975	
	%	(1000)	%	(1000)	(1000)	%
Guatemala	32.4	281	38.1	421	141	50.1
El Salvador	26.0	148	38.0	277	129	87.0
Honduras	29.5	124	38.0	224	99	79.9
Nicaragua	15.0	50	22.6	102	52	105.2
Costa Rica	13.7	38	12.3	33	-5	-13.2
Panama	11.9	27	21.5	57	31	116.2
TOTAL	24.9	668	32.9	1,114	446	66.8