UNITED NATIONS
ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA

Distr.
GENERAL
E/ESCWA/ECU/85/9
12 December 1985
Original: ENGLISH

ENVIRONMENT CO-ORDINATION UNIT

URBANIZATION IN WESTERN ASIA
ENVIRONMENTAL CONSEQUENCES

January 1986

E/ESCWA/ECU/85/9

85-1423

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I. INTRODUCTION

ESCWA countries have embarked on programmes aimed at accelerating socio-economic development at a feverish pace. Development brings about problems: some of them are intrinsically linked up with urbanization and growth of metropolitan centres. These include the problems of mass migration into urban areas, the unbalanced urban-rural development with the urban centres tending to develop at the expense of rural areas, creation of slum areas on the periphery of the metropolitan centres where basic amenities are not adequately provided, and the appreciable overloading of the existing infrastructure of public services such as water distribution, sewerage, transport and education.

Environmental problems of metropolitan centres in the region stem, by and large, from the rapid rate of population growth in areas that are not prepared to accept the sudden influx of new inhabitants. This influx also causes severe social and cultural stresses in these urban areas.

It is important to recognize the relationship between development, urbanization and the environment. Population explosion in many metropolitan agglomerations has caused considerable strains on all types of environmental services and in turn posed real threats to public health and the environment. In our overcrowded cities, refuse collection systems are often only able to serve less than half of the urban population. While coverage with water in urban areas is 84 per cent, coverage with sewerage networks is only 56 per cent, which leads to grossly inadequate sanitation in the squatter areas. The impact of the unhygienic conditions has been reflected in the infant mortality rate, which averages 110 per thousand in the region compared to the World Health Organization (WHO) target of 50 per thousand(1).

Substantial increases in the number of cars and traffic congestion coupled with uncontrolled emissions from industrial sources contributed to the acute problems of air pollution. Overcrowding, noise, air pollution and inadequate housing create dissatisfaction and psychological stresses among the urban poor living in the metropolitan centres.

Effective solutions to the emerging urban environmental problems cannot be achieved through provision of financial resources alone. On the contrary, resources may be wasted or misdirected if programmes are not based on the knowledge, practical experience and the real needs of the community. This is particularly true in the less developed countries of the region which can ill afford to waste their meagre financial and manpower resources, nor can they afford the luxury of adopting schemes which have failed to produce effective results in dealing with similar environmental problems elsewhere.

The emphasis of governments and local institutions in the past has been directed for the most part to development and sound use of resources rather than promotion of environmental quality. It was not until the last decade that governments began to express serious concern for environmental protection. Most recently, public concern has begun to move from short-term pollution problems to the broader issue of the environmental impacts of population growth and economic development.

Another new task is being assigned to the battery of existing local governments' functions: environmental protection. While the programmes vary from area-wide planning and implementation of integrated environmental programmes to management of limited activities such as monitoring emissions and issuing permits to industry, they all seem to be moving in the general direction of linking development to environmental quality.

The recent proliferation of new programmes for pollution control and environmental enhancement made it essential for policy and programme co-ordination in the environmental area. As tougher environmental standards are gradually enacted, and as local governments become increasingly concerned about the overlapping and unco-ordinated environmental programmes, the complex interrelationships and the need to streamline these programmes become apparent. This realization has sparked the recent interest in creating an effective administrative mechanism for management of environment in the ESCWA metropolitan centres.

II. STATUS AND TRENDS OF URBANIZATION IN THE ESCWA REGION

During the second half of the twentieth century the world population is projected to grow by about 160 per cent, while urban population will grow at an enormous 375 per cent. Accordingly, urbanization is expected to play a crucial role in absorbing a considerable share of the population; urbanization is also expected to dominate the developing world, with Asia alone having about 45 per cent of the world urban population by the year 2000[2]. Urban population projections in the region are presented in table 1. The rate of urban growth in the member States is currently about twice that of the developed countries and is expected to be three times as high by the year 2000.

The concentration of the urban population in a few cities (primacy) is a typical phenomenon in the region. The extent of primacy for selected countries in the region and elsewhere is shown in table 2. The measure used is the population of the largest city to the total urban population of the country. There is a pronounced trend in the region towards concentration of population in primate cities. In all member States, the largest city is the capital, which in some instances expanded its role to such an extent that the capital city is in effect the country (Kuwait, Bahrain, Qatar). Even in populated countries like Egypt, the capital exercises an extraordinary degree of dominance over life in the country. The concentration of administrative functions in Cairo has deprived other regions of a balanced share of basic services. Major urban centres of the ESCWA region are depicted in Figure 1.

Concentration of urbanization in the primate cities, especially in the developing countries of the ESCWA region, causes acute environmental problems. Large-scale industrialization, massive migration of the rural population to the primate cities, the inadequacy of shelter and the accompanying infrastructure of water and sewerage, as well as the inefficiency of transport and other public services, have created serious social and environmental problems in the marginal settlements of the metropolitan areas.

Most local governments have begun to accept marginal settlements as an inescapable part of the urbanization process and consequently initiate on-site renovation programmes rather than clearance. In Cairo, Damascus and Amman comprehensive on-site renovation were begun recently with the aim of providing adequate urban infrastructure and public services while retaining or improving most of the existing housing stock in the marginal settlements. While relocation is inevitable for some prime locations in the metropolitan centres, on-site renovations seem appropriate in most cases as they are less expensive and result in minimal socio-economic impact on the community.

Comprehensive plans for improvement of marginal settlements should encompass integrated planning and management of a broad range of physical, environmental and socio-economic development components. Owing to the diversity of the social, economic, political, legal and environmental characteristics of the marginal settlements in the region, tailor-made programmes should be developed with the widest possible community participation. Mobilizing community participation requires informing the public of the programme concepts, identifying their priorities, overcoming

Figure I. Major Urban Centres of ESCWA Region

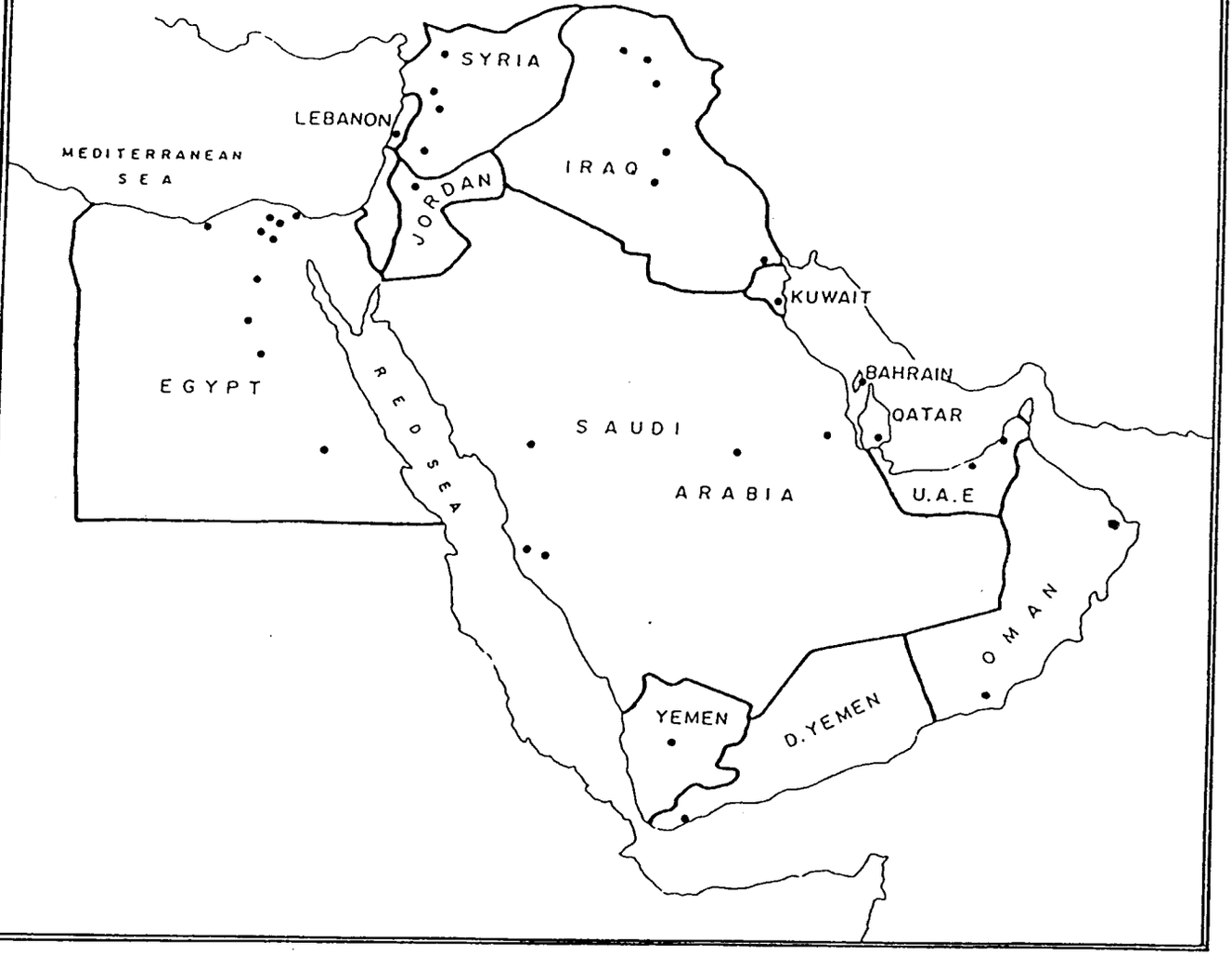


Table 1. Urban and city population in the ESCWA region
(1000)

	1980	1990	2000
BAHRAIN			
Manama	112	149	206
DEMOCRATIC YEMEN			
Aden	358	500	800
EGYPT			
Alexandria	2722	3633	4821
Aswan	194	265	368
Asyut	233	319	441
Cairo/Giza/Imbaba	7464	9991	13058
Damanhur	222	303	419
El Mahalla et Kubra	341	465	639
Faiyum	203	277	385
Ismailia	190	247	339
Mansura	290	396	546
Minya	171	234	326
Port Said	285	333	447
Subra-El Khema	262	358	494
Suez	199	209	276
Tanta	348	474	652
Zagazig	229	313	434
GAZA	638	935	1279
IRAQ			
Arbil	368	667	964
Baghdad	5138	8203	11123
Basra	903	1440	2006
Hilla	375	638	911
Kerbala	136	181	251
Kirkuk	264	329	447
Mosul	514	713	978
Najaf	276	392	544
Sulaimaniya	209	320	453
JORDAN			
Amman	655	1029	1487
Irbid	138	230	343
Zarga	213	321	468
KUWAIT			
Hawalli	185	284	408
Kuwait City	404	635	907
Salmuja	211	445	675
LEBANON			
Beirut	2003	3116	4183
Tripoli	240	318	429

Table 1. (Cont'd)

	1980	1990	2000
OMAN			
Muscat	-	-	189
QATAR			
Doha	-	132	180
SAUDI ARABIA			
Dammam	239	411	585
Huful	179	291	413
Jeddah	1044	1772	2462
Mecca	559	775	1048
Medina	325	488	675
Riyadh	1259	2164	3005
Ta'if	383	658	930
SYRIAN ARAB REPUBLIC			
Aleppo	935	1405	2031
Damascus	1406	2156	3109
Hama	170	237	346
Homs	330	513	758
Lattakia	221	373	563
UNITED ARAB EMIRATES			
Dubai	187	286	398
YEMEN			
Sana'a	199	380	689

Source: "Patterns of Urban and Rural Growth".

United Nations, Department of International Economic and Social Affairs. Population Studies, ST/ESA/SERA.68.

Table 2. Degree of urban concentration in the ESCWA region
The primacy index

Country	Index (1980)	Index (1990)	Country	Index (1975)
Bahrain	100	100	Algeria	14
Democratic Republic of Yemen	50	40	Brazil	15
Egypt	39	38	Canada	17
Iraq	54	57	China	6
Jordan	37	37	India	6
Kuwait	100	100	Indonesia	21
Lebanon	78	79	Netherlands	10
Oman	...	76	Turkey	19
Qatar	100	100	United States	10
Saudi Arabia	20	20	USSR	5
Syria	33	32		
United Arab Emirates	100	100		
Yemen Arab Republic	25	22		

Note: The primacy index is the ratio of the population of the largest city to the total urban population.

Source: Indigenous information and UN demographic data.

initial scepticism and promoting indigenous activities. Activities should be co-ordinated as to location and time among concerned government agencies to maximize benefits and avoid negative impacts and wastage of resources; long-term integration of the marginal settlement with the larger urban community required implementation of improvement programmes through existing administrative and non-governmental institutions.

A high-level political commitment is crucial for development of an effective urbanization strategy. The commitment on the part of the governors and other city officials is likely to bring greater convergence between regional development plans and urbanization strategies. The present "stop-and-go" strategies of urbanization in most member States weaken the growth potential of the metropolitan centres and aggravate the existing

management problems. Legislative authority should act in a flexible manner either to discourage or encourage growth with the aim of expanding or limiting the resource base of the city. It should be noted that current trends to stop population growth in primate cities of ESCWA cannot substitute strategies that directly address the problems of congestion, pollution, inadequate shelters and deteriorated environment. To ease the problems of primate cities, intermediate urban centres must pursue policies to attract industry and deflect rural-urban and city-to-city migrants from the capital and primate cities.

In practically all member States, industrial estates have been advocated as a means of attracting new manufacturing plants to new sites with adequate services. These estates, however, are neither necessary nor sufficient to attract industry to provincial locations; they may represent a burden on the community if they are too large or premature. Evidence from experience in Saudi Arabia, Egypt and Jordan indicates that successful industrial estates are either export-processing or free-trade zones in the capital region or in major harbours.

In seeking solutions to existing environmental problems induced by unplanned urbanization in the region, the following long-term objectives should guide future actions in that regard: devolution of power and decentralization of decision-making; new settlements based on agricultural development; new settlements away from capital and primate cities; development and restructuring of major metropolitan centres; river basin development; and development of depressed regions. Decentralization in countries like Egypt, Syria, Saudia Arabia and Iraq is needed as concentration of power and allocation of public expenditures by the central governments has paralyzed local governments and weakened community initiatives. It is obvious that projects to restructure major metropolitan centres will be quite different, depending on whether they deal with a high concentration of population in the city states like Kuwait, Qatar and Bahrain or with problems of metropolitan agglomerates in the context of large countries with vast hinterlands like Iraq and Egypt.

III. ENVIRONMENTAL PROBLEMS OF URBANIZATION IN THE ESCWA REGION

There is overwhelming evidence which indicates that provision of adequate environmental services, high literacy and economic prosperity are prerequisites for the maintenance of good health in the region. The data shown in table 3 indicate a distinct decline of infant mortality as coverage with water and sewage disposal services increases. A similar trend is evident as literacy rates increase, especially for females in view of their vital role in the care of infants(3). Wealthier countries of the region, mainly the Gulf States, are more able to provide a full range of social services than are the less affluent countries. However rural services continue to lag behind urban services in all member States which emphasizes the need to intensify efforts to improve services of both urban and rural dwellers. The scarcity of financial resources and lack of experience in many countries of the region requires intensive efforts on the part of the United Nations and other international co-operation agencies to help member States in acquiring information and adopting appropriate schemes of environmental services wherever needed. To that effect, ESCWA, the United Nations Environment Programme (UNEP) and WHO are promoting the development of environmental information systems for collection and dissemination of information on health and environmental effects, pollution control technologies and monitoring of emission sources.

Mental disorders account for up to 30 per cent of illness brought to the attention of physicians in the region; according to a WHO study, the problems are linked with the stressful impact of abrupt social change in the area. The traumatic encounter of the younger generations with urban values and the maladjustment of rural peoples to city ways and industrial environment are features of growing concern to psychiatrists as one child in 10 shows symptoms of psychiatric disturbance(4). Drug addiction is widespread in the metropolitan centres, leading addicts to toxic psychosis; in Egypt alone about 50,000 urban dwellers are addicted to opium and chemical drugs. Anxiety and depression are common in the region. Organic psychosis, psychosomatic states and schizophrenia are among mental disorders frequently diagnosed in countries like Kuwait and Lebanon, where they account for 40 to 70 per cent of psychiatric disorders. Growing attention is being given to psychotherapeutic treatment of juvenile delinquents. Bahrain has provided care of delinquents within the penal system while Egypt and Syria have given this responsibility to the Ministries of Social Affairs.

Occupational hazards predominate in almost all industrial complexes in the region. As more petrochemical complexes, power plants, textile mills, phosphate mines and steel plants spring up in order close to metropolitan centres, they bring about new work-related hazards(4). Noise pollution is reaching critical levels in weaving factories, steel mills and mechanical industries throughout the region, leading to widespread problems of impaired hearing. Offshore drillers in the oil-producing countries are exposed to skin diseases, chemical intoxication and heat exhaustion. In many urban areas, scores of small establishments such as food processors, car maintenance workshops, small textile finishing mills, and handi-craft factories are employing both young and very old workers who work long hours in an

Table 3. Basic indices of the ESCWA region

Country	Population (Millions) (1982)	Population (Millions) (2000)	Per cent Urban (1982)	G.N.P.	Adult Literacy (per cent) T	Adult Literacy (per cent) M	Adult Literacy (per cent) F	Services (per cent coverage) Water U	Services (per cent coverage) Water T	Services (per cent coverage) Sewerage U	Services (per cent coverage) Sewerage T	Infant Mortality per 1000 Birth T
Bahrain	0.371	0.688	81	5138	73	79	64	100	100	100	100	34.6
Democratic Yemen	2.093	3.309	36	460	31	48	16	77	44	-	33	152
Egypt	44.673	65.200	44	650	47	56	28	100	75	95	69	80
Iraq	14.160	24.926	64	2410	43	63	23	92	74	30	-	82
Jordan	3.130	6.400	60	1997	67	81	52	100	89	94	76	65
Kuwait	1.570	2.969	91	20900	71	76	64	100	100	100	100	22.8
Lebanon	2.640	3.617	65	1200	77	85	68	95	92	-	-	48
Oman	1.500	-	15	4134	30	47	12	70	15	60	-	111
Qatar	0.270	0.469	74	31600	-	-	-	98	95	-	35	30
Saudi Arabia	10.000	18.864	-	12600	25	35	12	92	91	-	76	103
Syria	9.300	18.102	48	1446	60	78	53	77	71	58	45	57
United Arab Emirates	1.130	1.916	74	24660	68	70	63	100	100	-	75	23.8
Yemen	7.145	9.859	11	460	9	18	2	95	30	-	12	174

T = Total; M = Male; F = Female; U = Urban.

Source: Towards Health for all by 2000 WHO/EMRO (1984).

unfavourable environment. As to heavy industries, they are being operated with known and unknown hazardous emissions which have detrimental effects on the workers' health. The massive influx of migrant labourers is placing a staggering burden on health services of the Gulf States, especially in Qatar, Bahrain and the United Arab Emirates, as these workers are subject to, and a source of, potential serious health problems. In the agrarian countries, farm workers are increasingly exposed to chemical poisoning from pesticides, the chronic threat of water-borne diseases and accidents caused by agricultural machinery(4).

Car traffic is rapidly increasing in urban areas and in most cases appears to be most significant pollution source in primate cities. The population of Greater Cairo will grow from its current level of about 10 million to 13.5 million by the year 2000. Over the last 10 years the number of private cars and taxis increased from 100,000 to 750,000 (22 per cent per annum). Publicly owned transport is operated with meager efficiency at a considerable loss and the passenger demand far exceeds the supply of services(5).

Stationary turbines for electricity production are used extensively in the region. The reason for operating power plants with gas rather than steam is the steep rise in electricity demand and the immediate availability of natural gas. Industrial processes contribute appreciable loads of particulates mainly from cement and urea plants, SO_2 mainly from natural gas and petroleum desulfurization, as well as hydrocarbons, carbon oxides, nitrogen oxides and hydrogen fluoride. Since a multitude of industrial activities based on utilization of natural gas have been commissioned in some countries (Saudi Arabia, United Arab Emirates, Egypt and Iraq) significant air pollution problems will be created if gas desulfurization is not provided. Sprawling urban communities in the member States are expected to be increasingly exposed to respiratory diseases such as asthma, bronchitis and emphysema since noxious doses of industrial wastes, car exhaust gases and other harmful pollutants continue to be emitted at an alarming level.

Provision of adequate shelter to the deprived masses of urban communities continues to be the prime problem of major cities in the region. Inadequacy of housing finance, a lack of political will, the low return on investment and the extreme shortage of building materials contributed to lower production of public housing units, and private contributions have been discouraged by the relative unproductivity of investment in housing due to rent restrictions. Governments continue to be less than aware of the role of housing as a key element for socio-economic development and a tool for environmental enhancement(6).

The concept of public servicing ahead of land use does not seem to have been implemented in most ESCWA countries, which aggravates existing congestion problems within city limits and hinders natural expansion in peripheral areas which lack essential services. The share of the family income spent on shelter varies considerably from one country to the other. However, low-income families in all ESCWA urban centres find it increasingly difficult - even impossible in some instances - to acquire any accommodation let alone an adequate one. Government action is needed to secure land and housing from speculative forces. Successful long-term planning for low-income housing is

dependent on availability of land, provision of reasonably priced building materials and encouraging development of the local labour force for the housing industry.

The leading experiment of the Amman Municipality for promoting "self-reliance" should be highlighted as it provides a realistic solution to the squatters and reduces capital investment of the housing schemes. The project is based on a "sites and basic services" approach whereby house lots are provided with basic infrastructure such as sewerage, water and electricity and sold as such to low-income families. The purchaser then completes his household according to his needs and as his income allows. Construction of two-storey frames with floors and one or two rooms completed served as the basis for an effective "core house" project for slum clearance in Amman. Such participating policy should be expedited by Governments in the region for low-income housing in slum areas(7).

Luxurious housing for upper income groups involves a wasteful use of scarce building materials and adversily affects housing activities in the member States. Governments should curb such a trend by modifying building codes so as to promote economical use of materials. In few countries of the region, national building research and development institutes are endeavouring to substitute indigenous building materials, drawup practical codes, and standardize building techniques. Successful practices and adoptive methods should be shared with other countries in the region. To ease housing problems, industry should integrate housing in new enterprises, and reforms should be instituted to revitalize and strengthen housing co-operatives in ESCWA urban centres.

Some of the important priorities of the region lie in the areas of safe water supply, sanitation and community health. Environmental health problems, especially in the marginal settlements, are intensive in nature and extensive in impact, presenting a complex situation that demands immediate attention. Urbanization in the past was motivated by rapid financial returns, and the pursuit of economic development without due regard to community needs which has led to the current distortions. Environmental services like water supply and excreta and wastewater disposal require huge investments with no direct return which could prove their economic worth. Development plans clearly demonstrate the fallacy of planning for better economic productivity without concurrent environmental protection; as a result, the gap between economic growth and environmental deficiencies has continued to increase in urban settlements of the region.

Increased industrial activities coupled with inadequate control of wastes in major metropolitan centres has resulted in steady decline of the quality of surface waters (Cairo, Alexandria, Baghdad, Amman, Damascus), and withdrawal of underground waters at a rate greater than that of recharge (Bahrain and Qatar) rendered underground supplies unfit for domestic uses. Discharge of raw or partially treated domestic wastes into surface waters has impaired the assimilative capacities of streams and led to a deterioration of natural water bodies.

Most urban water supply systems are exceeding their serviceable life and exhibit serious leakage. Service connections are frequently worn-out or inappropriately installed which causes enormous wastage and potential cross - pollution. Surveillance of the water quality in the networks and at household level is nominal; in a few instances, urban areas' water supplies are virtually unmonitored. Water rates, by and large, are unrealistically low, which encourages considerable wastage. Most of the metropolitan water treatment plants were installed by international firms using traditional technologies with little or no on-site experimentation, which often results in ineffective operation and excessive use of chemicals. Maintenance of distribution systems has been marginal in most cities; corrosion, insufficient replacement of damaged lines and faulty installation has led to tremendous "unaccounted for water" which makes up as much as 40 per cent of the total supply (Cairo and Alexandria). Obviously, leakage control and efficient network maintenance can lead to the upgrading of water quality besides adding an extra source for the increased urban population in the future.

Sewerage and sewage treatment works are among the priority problems in the urban communities. The emphasis on provision of water supply as a first priority of municipalities has undoubtedly accentuated problems of sewage management. The increasing incidence of water-borne diseases, mosquito infestation and pollution of streams by sewage attest to the urgency of the problem. Most industries discharge their effluents into the sewerage networks or directly into the streams without adequate treatment. The associated water pollution - a negative index of industrial development in the region - is assuming large proportions in almost all metropolitan areas of the member States. The public health consequences of continued population growth in non-sewered areas, coupled with the increased discharge of untreated sewage, has an adverse impact on the welfare and environment of urban areas.

Most municipalities are unable to mange an efficient solid waste management system; this is attributed in part to the relegation of waste handling and disposal to the lowest level of responsibility. Street-sweeping is normally manual except in a very few countries. More than 80 per cent of urban solid wastes and refuese is disposed of by open dumping in an unhygienic way although sanitary landfilling or controlled tipping is being practised in some areas. Composting is receiving increasing attention in a number of member States since it yields a compost fertilizer of suitable quality. Plans in some major cities (Kuwait, Doha, Abu Dhabi, Alexandria, etc.) exist for increasing portions of the refuse to be composted. Incineration is still practised in some areas despite objections on account of atmospheric pollution. Labour-intensive recycling operates on a vast scale in Egypt, where almost all saleable items are salvaged. At present, urban centres are facing the following solid waste management problems: air pollution from burning of refuse, rodent and insect vectors in open communal storage, health hazards to workers exposed to an unhygienic environment, delayed and inefficient refuse collection, lack of suitable and accessible landfill sites and shortages of motor vehicles and equipment(8).

Most municipalities are not equipped with pollution-monitoring laboratories, although local agencies are bieng setup for the enforcement of standards for domestic as well as industrial emissions. Most enacted

standards are not realistic in view of available technology and resources; this is in addition to the ineffectiveness of monitoring schemes, has led to widespread non-compliance with the emission standards and gross disregard for local environmental protection regulations.

Environmental services, particularly sewage treatment works, encounter serious operational problems in most member States. Quite commonly, projects receive the benefit of high technology and are equipped with sophisticated facilities which require highly skilled technicians. Design and construction is often assigned to an agency independent of the agency in charge of operation which hampers essential adjustments during early phases of operation of treatment works. Other problems which impede proper operation of environmental services include: shortage of manpower needed for management and operation of the services, ineffectiveness of preventive maintenance, lack of accountability, systematic overloading of treatment units, frequent bypassing or erratic operation of waste control systems, laxity in management especially in handling urban solid wastes, and apparant lack of consumer vigilance and public interest.

Evidence indicates that the marine environment is being contaminated by microbes and bacteria which affect the public health; it is polluted with synthetic compounds such as pesticides which accumulate in aquatic organisms; in addtion, there is a gradual build-up of toxic metals such as cadmium and mercury the toxicity of which is magnified as they rise through the food chain, with man as the ultimate consumer. Most countries in the region are committed to protections of the marine environment through prohibitions on dumping of hazardous materials in the seas and the institution of national plans of action for combating massive oil spills. Sources of marine pollution which originate from major metropolitan centres in the region and are dischareged into the Mediterranean, the Gulf and the Red Sea are the target of action plans jointly supported by UNEP, WHO, UNESCO and the member States(4).

Participation of ESCWA countries in the action plans is illustrated in Figure 2. While the pace of abatement measures still lags behind pollution emissions in ESCWA countries, more sewage treatment works and industrial waste control facilities are being operated and new measures are being implemented to curb the flow of hazardous matter to the marine environment.

The Gulf coastline is dotted with about 20 urban settlements which host various industrial activities such as oil refining, ship-repair, petrochemicals, steel and cement. Over 100 freighters enter the waterway daily through the Strait of Hormuz to load at one of 26 terminals; frequent accidental oil spills from tanker collistions or groundings represents a serious problem for the coastal cities of the region. Oil shipments sailing through the Gulf of Aden and the Red Sea also contribute to marine pollution and ecological damage of these waterways.

Although information on land based sources of pollution from ESCWA coastal cities is limited, the following examples indicate the extent of the problem:

(a) The concentration of labour-intensive industries in densely populated Greater Alexandria has led to notable ecological imbalance and deterioration of environmental quality. Polluted industrial effluents are discharged from industries in Alexandria to the Mediterranean at a rate of 330

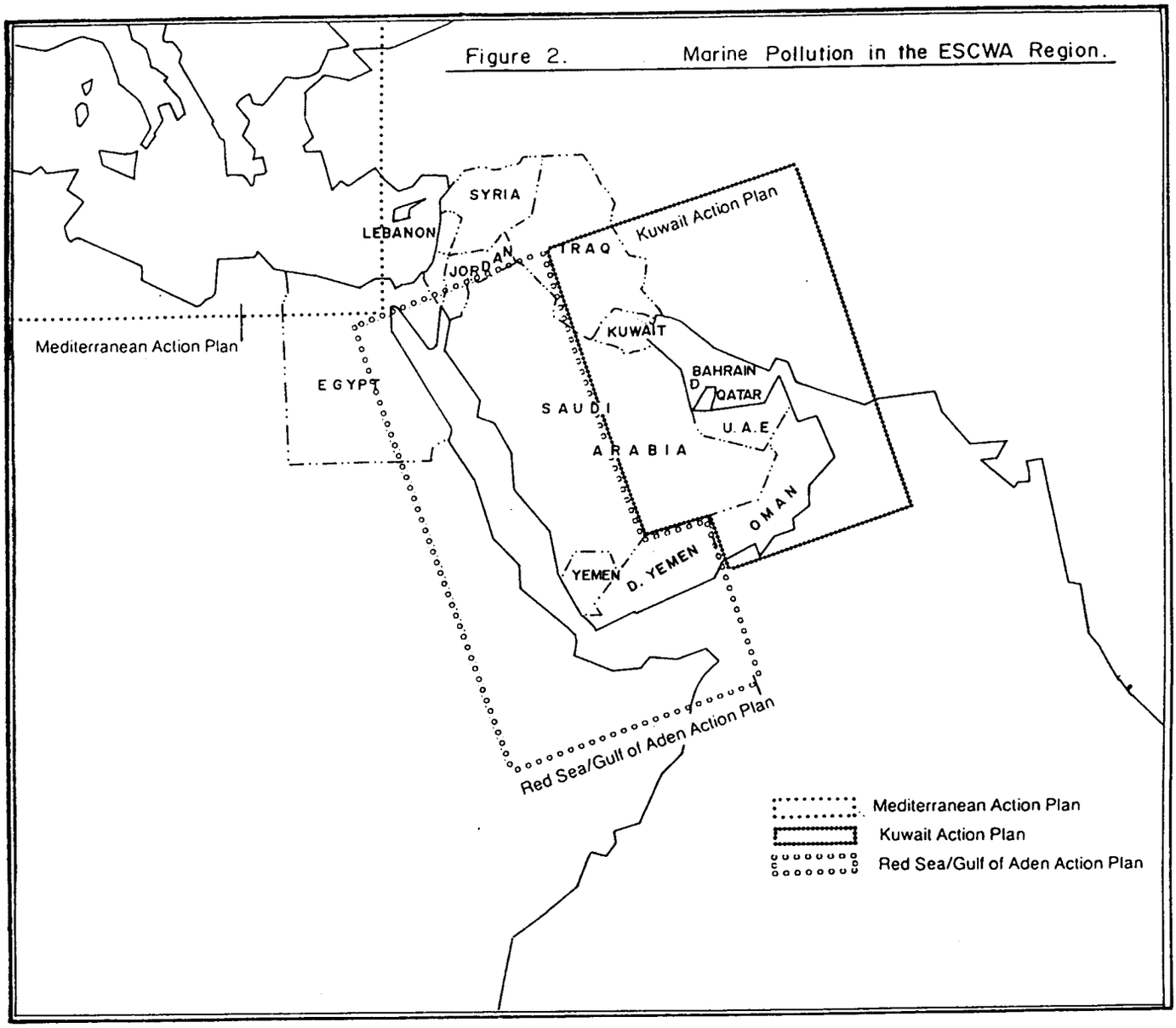


Figure 2. Marine Pollution in the ESCWA Region.
SYRIA
LEBANON
JORDAN
IRAQ
Kuwait Action Plan
KUWAIT
BAHRAIN
QATAR
U.A.E
SAUDI
ARABIA
OMAN
YEMEN
D. YEMEN
EGYPT
Mediterranean Action Plan
Red Sea/Gulf of Aden Action Plan
Mediterranean Action Plan
Kuwait Action Plan
Red Sea/Gulf of Aden Action Plan

million cubic metres per annum, and contain the following waste loads: biochemical oxygen demand 60,000 ton/year (t/y), oil 10,000 t/y; suspended matter 80,000 t/y; mercury 14 t/y; and chromium 27 t/y(9);

(b) The presence of three oil terminals and a large oil refinery, added to the risks of spillages from ships using the prots of Lattakia and Tartous, is posing a potential threat to the coastal areas in Syria;

(c) Although the coastal cities of the Gulf have vertually ceased discharge of raw sewage to the sea, industrial pollutants are being discharged from Bahrain, Kuwait, Qatar, and the United Arab Emirates through short sea outfalls. The estimated waste loads are: biochemical oxygen demand: 25,500 t/y; oil: 57,000 t/y; Nitrogen: 17,200 t/y; and phenol: 164 t/y(10).

For urban dwellers in the ESCWA region, environmental decay has become a personal problem - the acrid smell of air emissions from industry and traffic, the unpleasant taste of water and unwieldy problems of waste disposal; the rumble of workshops piercing the allowable decibel level and the rising food-poisoning incidences. Most cities in the area are growing at an average rate of 4 per cent a year - much higher than the overall regional growth rate of 2.5 per cent. In larger metropolitan centres like Cairo the population is soaring at a staggering rate of over 8 per cent. At the present rate of urbanization, the demand for environmental services is so high that the provision of adequate services has become an overriding challenge to planners and city managers.

Just as economic development is imperative for the progress of the region, measures to control urbanization and improve environmental services in the major metropolitan centres are urgently required. Priority actions comprise the following:

(a) Autonomous agencies responsible for construction and operation of services should be established;

(b) Indigenous consultancy services and development of local manpower to reduce reliance on foreign help should be promoted;

(c) Heavy dependence on government subsidies for environmental services should be gradually decreased. This demands the levying of reasonable chareges on domestic water supplies, sewerage and refuse collection. Industries should be charged the real cost if they elect to benefit from such public services;

(d) Composting does not seem to work effectively in most countries of the region; therefore, efforts should concentrate on effective recycling of reusable materials and proper operation of sanitary landfills;

(e) The siting of new industries should be directed away from primate cities with intelligent exploitation of the environment's assimiltive capacity;

(f) Public involvement is essential to generate internal fund for new projects and to guard, possibly through voluntary organizations, the proper performance of public services.

IV. INSTITUTIONAL ORGANIZATION AND ENVIRONMENTAL SERVICES IN ESCWA METROPOLITAN CENTRES

The rapid growth of ESCWA's population will certainly create unprecedented pressure on public services, particularly sanitation, by the year 2000. To maintain even the existing inadequate services, governments have to invest heavily for expansion of services and infrastructures of major cities and intermediate urban centres. Existing trends indicate that the problems of environmental degradation can worsen. The hazards of sewage pollution of waterways has already reached an alarming level in some major cities of the region. Growing population coupled with haphazard development in member States poses a real threat of empidemics. Urban environmental problems in the region are by no menas confined to the less developed countries; growth in the more affluent States also creates severe problems such as traffic emissions, improper management of refuse and inadequate handling of hazardous wastes from industrial sources. The lack of orderly expansion of service to meet growing demands for transportation, education, housing, communication, power, etc. has drastically affected the quality of services. Public services are suffering from frequent breakdowns, costly repairs and loss of time and efficiency, which has led to a state of chaos in some metropolitan centres.

Although most governments have formulated policies and master plans for public services, the consequent environmental impacts are rarely incorporated in the planning process. It is conceivable that failure to recognize adverse environmental effects may obstruct long-term socio-economic goals. The most rapid urban growth of ESCWA metropolitan centres occurs in the uncontrolled settlements and shanty-towns where sanitation and other public services are virtually nonexistent. Regional planers should guide development in an orderly manner by reconciling economic growth and environmental quality requirements; this could be achieved through maintaining balanced urban-rural relation-ships for all facets of developments, and by creating new centres of attraction for rural-urban migration through judicious location of new industries and the development of supporting human settlements in a more rational pattern.

Co-ordination among environmental services in metropolitan centres is beset with difficulties stemming from the absence of an institutional set-up for environmental management in major cities. The problem of co-ordination has been further exacerbated due to absence of long-term regional environmental planning, vagueness of the communication channels among key city managers and decision-makers and by the multiplicity of single-purpose public service agencies within the executive branch of local governments. There is distinct need for greater integration and co-ordination among environmental and environmentally related programmes in the urban centres of the region. From a political perspective, closer integration and co-ordination is perceived as a means for achieving more effective environmental advocacy. Consolidation and co-operation among programme managers could lead to avoiding divisive conflicts and overlapping of activities, better scheduling and execution of interrelated projects, and may eventually result in creation of an administrative focal point for the development and articulation of long-term environmental goals within local governments.

Traditionally strong links are well established between central agencies and their provincial branches, which has seriously undermined the ability of Governors and local legislative bodies to exercise effective policy control or supervision of local public service programmes. Strengthening integration and co-ordination would undoubtedly lead to more rational organizational structure, increased efficiency, better accountability to the community and resolution of local-central administrative conflicts and controversies.

Environmental problems in several ESCWA metropolitan centres are more acute than these of the industrialized countries since corrective actions are more difficult to implement and public services cannot keep pace with the population explosion, not to speak of catching up with past neglect. In the economically stressed communities, local governments are forced to limit their expenditures on sanitation projects to the level essential for elimination of outright threat of deaths and epidemics emanating from environmental pollution and to invest the rest of their scarce financial resources in economic development projects. Municipalities of the affluent communities tend to select sophisticated environmental technologies which require special skills for operation and maintenance; these communiteis are relying by and large on foreigners for management and operation of their environmental services as development of indigenous capabilities in these fields continues to receive lower priority. Climatic conditions in several areas, especially in the Gulf, aid environmental deterioration as hot and humid conditions accelerate natural biochemical processes resulting in the intensification of pollution through putrefaction, bacteriological growth and blooming of harmful aquatic vegetation. Atmospheric pollution also affects ESCWA urban centres to various degrees. Inorganic particulates are brought into the air of the Gulf cities from sandstorms generated locally, salt particles from the highly saline water of the Gulf and the upper winds from the neighbouring countries. Gaseous contaminates also emanate from industry, transportation, burning of refuse and flaring of natural gas. Progressive deterioration of the atmospheric quality is evident from the environmental statistics, which showed an increase in the number of days with visibilities less than 5 km in Kuwait from 100 to 230 days during the past 20 years(11).

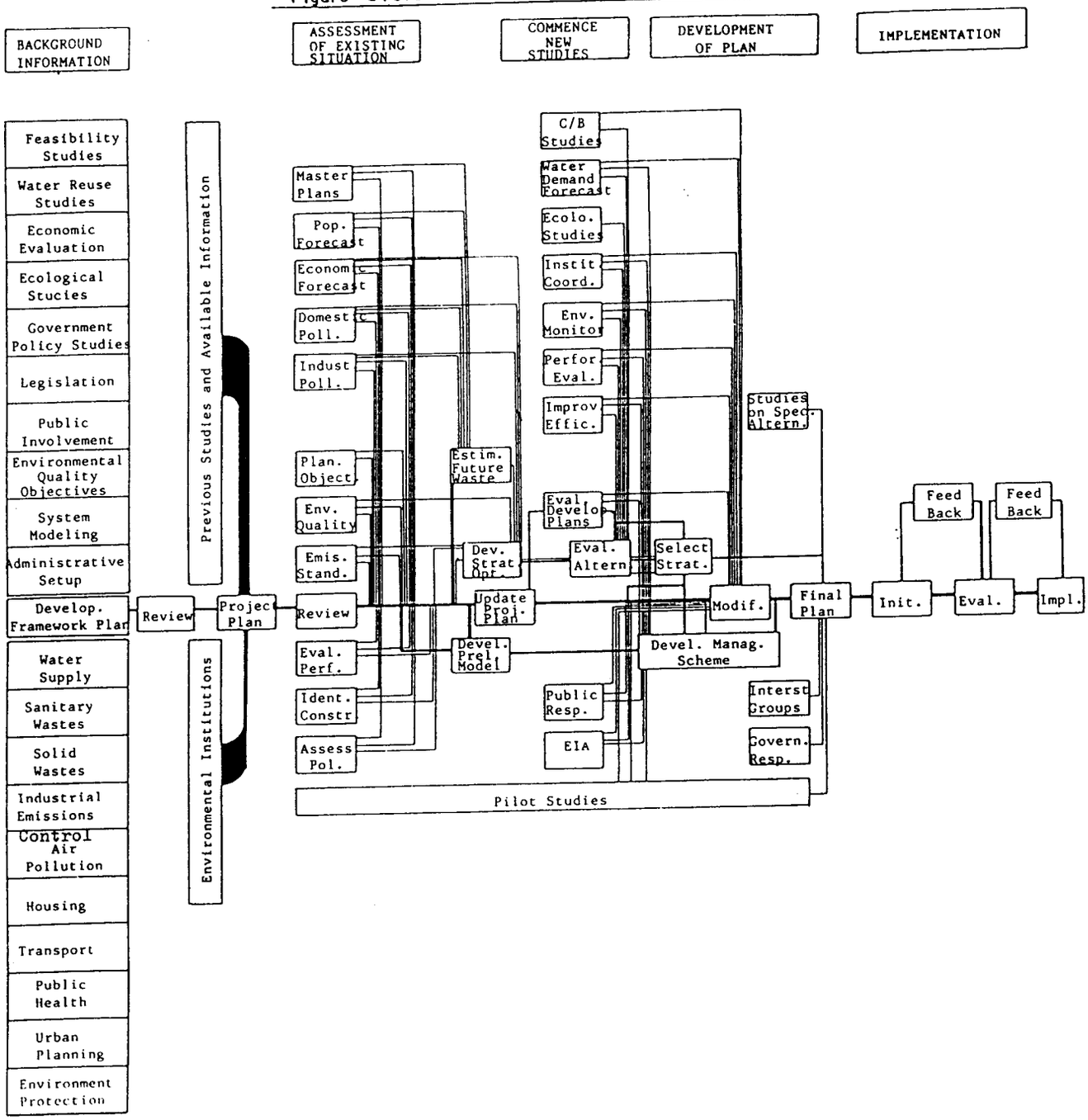
Urban environmental management is an essential undertaking for achieving local development goals; it is therefore inconceivable for any progressive metropolitan administration to fail to develop a coherent plan for management of the environment to promote public health, to conserve natural resources and to ensure sustained urban development on an environmentally-sound basis. Familarity with and recognition of the unique local organizational, financial, legislative and socio-economic features are indispensable for implementation of an adequate scheme for environmental management in ESCWA metropolitan centres. A proposed scheme for urban environmental planning is shown in Figure 3.

The existing environmental services, management constraints and organization set-up of major metropolitan centres are highlighted below.

A. Bahrain

The capital Manama has been rapidly developing in recent years as it assumed a leading role as a prime commercial centre for the Gulf region. This

Figure 3. Urban Environmental planning Scheme



accelerated development has placed considerable pressure on the services, infrastructure. The phased implementation of a comprehensive water and sewerage scheme is nearing completion. Parts of the water distribution network which have exceeded the design age are being replaced. The Bahraini Government has set the goals of providing services to areas of immediate need, control coastal pollution, provide a sewerage network for future development and promote safe reuse of treated wastewater. Water demands will increase from the current level of 207,000 cubic metres/day (m^3/d) to 391,000 m^3/d in the year 2000(12). The future demand will be met through use of desalinated water blended with groundwater with a maximum total dissolved solids of 500mg/l. This will be met through expansion of the desalination plants, building ground-level reservoirs, pumping stations and water towers and preventing leakage from the distribution system. The first phase of the Tubli sewage treatment work was commissioned in 1984 to serve 200,000 inhabitants: phas II (1994) and pahse III (2000) will serve 300,000 and 600,000 people respectively; most of the treated effluent will be reused for irrigation and landscaping purposes. Industrial air emissions emanate from the refinery (BAPCO), the aluminium plant (ALBA), and iron pelletizing and concrete manufacturing plants which are all located outside the city limits. Demostic refuse is generated at the rate of 380 kg/cpaita/year (kg/cpy) which is far higher than the average generation rates of the European countries. The operation of the El Bahrain tip is unsatisfactory, which affects the nearby residential areas. The municipality will build twin pulverizing plants in Tubli; metals and paper will be separated from refuse and the latter mixed with the dried sludge from the sewage works for manufacture of compost.

The main agencies responsible for environmental services are: the Ministry of Works, Power and Water (desalinated water, sewerage and power); the Ministry of Agriculture (ground-water development); the Ministry of Health (monitoring of water quality, air emissions, food hygiene and occupational health); the Central Municipal Council (sanitation); and the Technical Secretariat of the Environmental Protection Committee EPC (industrial emissions). It is anticipated that EPC will integrate and co-ordinate the fragmented efforts for urban environmental management in Manama as well as promote manpower development and long-term development strategy for water and other environmental services(13).

B. Democratic Republic of Yemen

While environmental services steadily increased in Aden over the past 10 years, a significant number of the city residents still do not have access to safe water supplies and basic sanitary services. Without basic hygiene facilities Aden faces the reality of rampant infectious disease. Recent WHO statistics rank the People Democratic Republic of Yemen as the second highest ESCWA country in terms of infant mortality rate(14).

The water-supply relies mainly on ground-water resources. A total of 33 urban water supply projects are to be implemented during the period 1981-1985. Jt is estimated that per capita consumption has been increased from 39 to 111 litres per day during the period 1979 to 1983. About 50 per cent of Aden's residents are served by the sewerage system. Another 25 per

cent discharge their sewage through open channels to the sewrage netowrk and the rest of the population are served by soak pits. The raw sewage is disposed of in the inner harbour and along the seashore[12].

Plans are under way for the establishment of central organization in the General Directorate for Local Governments to be responsible for planning, implementation and operation of sewerage system and water networks in the country. Environemntal services' projects encounter long delays due to the scarcity of financial resources as foreign bilateral aid from socialist countries is insufficient; other constraints include absence of environmental management structure, poor accessibility of many localities within major cities, and extreme shortage of manpower, equipment and other supporting facilities. The worsning environmental conditions in Aden justify the need to establish an administrative mechanism responsible for the consolidation of the present fragmented environmental activities in the capital city. Functions of the new body should encompass monitoring of pollution sources, co-ordination of environmental services, development of long-term environemntal protection plans, establishing environmental standards, development of manpower and promotion of public awareness.

C. Egypt

Greater Cairo is served by seven major water treatment plants which are grossly overloaded. Losses in the distribution system are significant (40 per cent) and incidences of pipe bursts are quite common. About 80 per cent of the population is served by house connections and the rest by public standposts. In provincial Egypt, excluding Cairo, Alexandria and the canal cities, 11 regional water supply systems, 115 municipal and about 1,250 rural systems serve about 85 per cent of the provincial population. Out of more than 160 cities in Egypt, only 19 have sewerage systems with only 60 per cent coverage[12]. From the sewage collected from this minor fraction of urban population, about one fifth receives primary treatment only, while the remaining flows are disposed of in a raw state to the drainage canals, lakes and seas through short outfalls. The situation regarding industrial waste is still worse and there is rarely any treatment before disposal of liquid effluents (estimated at 4.74 billion cubic metres in 1986). Investment needed for primary treatment of industrial effluents to render them suitable for irrigation is about 1.5 billion Egyptian pounds.

Industrial solid wastes generated in or close to urban centres in Egypt amount to 3 million t/y. At present, glass, paper, textiles, tyres and similar recyclable byproducts are recovered for reprocessing; however, non-resaleable hazardous sludges are being dumped in open sites close to populated areas or disposed of into sewerage systems, an illegal practice which causes frequent disruption of the sewage treatment works. The amount of solid wastes generated from urban areas in Egypt is approximately 6 million t/y. A house-to-house refuse collection service is provided for about 30 per cent of the population through private collectors. This indigenous service helped in the past to ease the burden placed on the municipalities; however, private collection is gradually diminishing in many areas due to lack of manpower and the low charge paid by the householders. Most of the generated

refuse - especially in low-income and slum areas - is dumped into the streets or refuse container boxes. Refuse is then sorted for separation of recyclable materials and the remaining residues are trucked for dumping in open pits, reclamation sites or utilized as feed in hog farms. Since most municipalities lack infrastructure and manpower for handling solid wastes, piles of refuse in the streets, at sorting sites or in the dumping areas are becoming breeding areas for flies and contribute to environmental degration in residential areas. In 1983, the General Authority for Cairo Cleanliness and Beautification was established and assigned the responsibilities of handling urban solid wastes, sanitation, gardening, development of manpower and co-ordination of environmental services with other municipal agencies in Cairo.

Egypt is served by different water and sanitation organizations which are technically administered by the Ministry of Housing and Reconstruction: Cairo and Alexandria are served by separate organizations for water supply and sanitary drainage; water and sanitary drainage in the canal cities are managed through the Suez Authority while provincial Egypt is served by the General Organization for Potable Water and Sanitary Drainage. The Ministry of Health is responsible for checking and controlling the safety of drinking water supplies and sewage disposal and for establishing standards for drinking water quality. The Ministry of Irrigation plans, operates and maintains all irrigation schemes, develops master plans for water resources and enforces measures for controlling pollutants discharged into fresh-water bodies. The Governors share with Ministries and regional authorities decision-making powers on the planning, construction and operation of water and sewerage schemes. Dual accountability to local and central administrations as well as unclear demarcation of responsibility hinder effective management of regional public works organizations.

The national strategy for water focuses mainly on increasing drinking water production to cope with the demands of the growing population (the consumption rates projected for 2000 for Cairo, Alexandria, and provincial cities are 400, 370 and 240 litres per capita per day, respectively) and proportionally increasing sewerage works and extending services to all cities by the year 2000. During the period 1985-2000 the Government will invest about 6 billion Egyptian pounds on water and sewerage projects in the major Egyptian cities[12].

Urban environmental management in Egypt is hampered, financially, managerially, materially and by shortage of manpower (Annex I). Other constraints include:

(a) Rapid population growth and the increased migration to large cities;

(b) Lack of investment in public works projects;

(c) Shortage of manpower for mangement and opertion;

(d) Low performance of treatment facilities and inadequate provision of services;

(f) Extreme difficulties in setting prices and tariffs to absorb rising costs of services;

(f) Fragmentation of responsibilities, lack of co-ordination, inadequate information and backfeed systems and unsatisfactory administrative set-ups for management and implementation;

(h) Inadequacy of national standards and codes for equipment, construction, design criteria and performance evaluation.

D. Iraq

Economic growth and industrialization are the key development priorities in Iraq; however, environmental protection is yet to receive concomitant attention. Stream pollution is appreciable in several reaches of the Tigris and Euphrates due to uncontrolled discharges of domestic and industrial wastewaters, surface run-off, irrigation returns and agricultural residue emissions. The accelerated deterioration of streams rendered water unfit for domestic uses, particularly in areas of the southern region. Concentration of industry and population in Baghdad, Basrah and Mosul has led to ecological imbalance and noticeable deterioration of environmental quality.

The drinking water production capacity has increased during the last decade from 1 to 3 million m^3/d. The urban population is served mostly through house connections. Baghdad has a separate network for raw surface water pumped from the Tigris for irrigation and gardening.

The only operating sewage treatment works are Rustomiyah and Kerkh in Baghdad and Basrah and Nasiriyah in provincial Iraq. Three other plants in Amarah, Tikrit and Najaf will be commissioned soon. The estimated population served in Baghdad is 1 million or 35 per cent of the inhabitants. The coverage will be extended to 58 per cent by 1995. Mosul has neither sewerage nor sewage treatment work. Most non-sanitary flow from households is channeled through an open system while domestic waste flows to a separate system and all effluents are ultimately discharged into the Tigris through several outfalls which create severe health and environmental problems(15).

Labour-intensive industries and trade activities are currently concentrated in the northern (Mosul) central (Greater Baghdad) and the southern (Basrah) areas. Concentration of industrial activities in these metropolitan centres has placed a significant burden on the environmental quality in these major cities. In Baghdad alone more than 23 industreis discharge their effluents directly in the Tigris. These industries include oil refineries, tanning, dairies, edible oil, soap, plastics, textiles, wool finishing, food processing and two major power plants. The estimated population equivalent of non-sanitary wastes measured as biochemical oxygen demand in Baghdad and Mosul are 1 million and 600,000 respectively. The Greater Baghdad area is served by autonomous bodies for water and sewerage while other cities are served by one authority responsible for both services. The Directorate of Preventive and Environmental Services of the Ministry of Health is responsible for monitoring water quality, domestic and industrial emissions, environmental health and air pollution. The Department of Construction and Building Services of the Ministry of Planning co-ordinates the development of environmental services and formulates the five-year plans

for that sector. The Environmental Protecitон Council is responsible for formulating policies concerned with environmental protection in Iraq assessment of environmental impacts of economic and industrial development projects in the country.

The major deficiencies in the implementation of an integrated urban environmental management scheme in Iraq are:(15)

(a) Absence of established administrative body for management of environmental programmes in the major urban centres;

(b) Ineffectiveness of co-ordination between central and capital and provincial public service agencies;

(c) Temorary constraints which affected to various degrees all developmental activities particularly environmentally related programmes in the provincial urban centres;

(d) Extreme shortage of technically competent persons needed for management and operation of environmental services.

E. Jordan

Jordan has adopted the concept of regional planning to promote balanced growth of the various regions based on long-term development plans. Comprehensive development efforts are concentrated in the Jordan Valley, the Amman-Balqa region and Irbid in northern Jordan. In order to achieve sustained economic growth within an integrated framework of development plans, programmes should take into account the exigencies of industrial, urban and human resources development as well as promotion of environmental quality. The Amman region covers an area of 3,900 square kilometres with 22 municipalities in addtion to the municipality of Amman. The Irbid region covers an area of 4,494 square kilomtres with 42 municipalities.

The irregular and haphazard growth of Amman due to rural-urban migration and the influx of refugees constituted most of the management and environmental problems which the municipality strove to improve. The topography of the city with its terraces and steep hills causes many planning and operational problems for environmental services. However, the city which is now inhabited by over a million and a half people has witnessed a significant development in the last few years: a network of new roads and suspension bridges were constructed, tunnels were dug, new water and sewerage systems were commissioned and a series of parks was opened which put Amman at the forefront of the metropolitan centres in the region(7).

The domestic water supply in the urban settlements depends mainly on ground-water resources and supplemented by a large number of springs with the largest at Karak (500 m^3/hr.). The average per capita consumption is projected to increase from its current level of 75 1/d to 120 1/d in the year 2000. A country-wide water resources master plan indicates that the total consumption demand up to the year 2000 can be met from the existing and

potential sources estimated at 1,100 million m^3/y. Sewerage systems and wastewater treatment works exist in Amman and Salt city. Non-sewered areas are served by septic tanks or cesspits(12).

Agencies responsible for environmental protection and public services ecompass the Environmental Department of the Minsitry of Municipal and Rural Affairs and the Environment (environmental impact assessment of major development activities, issuing industrial permits, monitoring environmental quality, proposing environmental criteria and emission standards), the Department of Environmental Health in the Ministry of Health (monitoring drinking water supplies, waste disposal, insect control and occupational health), the Ministry of Planning (environmental planning and regional development), the Jordan Water Authority (water supply and sewage disposal), municipalities (environmental health, and sanitation) and the Natural Resources Authority(13).

The urban area of Amman-Zerga accommodates most of the Jordanian industrial activities. Most industries in this region are disposing of their untreated wastewaters into the Zerga river at a rate of 2.5 million m^3/y which causes extensive pollution in this important waterway besides presenting potential health hazards to the adjacent residental communities. At present, measures to enforce antipollution legislation and to monitor industrial emissions are inadequate, leading to worsening industrial pollution problems in Metropolitan Amman. (Annex II)

The major goals of the Municipal and Environmental Management Programmes in Jordan are:(16)

(a) To reduce disparities of development and achieve balanced population distribution among the various regions;

(b) To provide acceptable level of basic services for urban and rural communities;

(c) To promote reliance of municipalities on their own internal resources for management of public services;

(d) To protect the environment and prevent the deterioration of natural resoruces;

(e) To foster co-ordination and integration among the agencies in charge of planning and operation of services;

(f) To provide incentives to develop new areas with good potential for growth;

(g) To enact legislation and promote public awareness to prevent the deterioration of the environment;

(h) To set the tariff and fees of services within a framework that would ensure an equitable distribution of gains among the various population groups.

Despite the concerted efforts on behalf of the central government and the municipalities, the following significant constraints still hamper the achievement of the above goals:

(a) Lack of co-operation between regional planning agencies and the ministries and departments concerned and limited participation of municipalities in the planning process;

(b) Lack of municpal financial resources;

(c) Overlapping of functions and responsibilities between central and local agencies;

(d) Inadequacy of public services for low-income areas;

(e) Absence of measures to prevent urban encroachment on agricultural lands and outdated legislation pertaining to environmental protection and urban management;

(f) Shortage of trained administrators and skilled technicians in local governments.

F. Kuwait

Accumulation of massive oil revenues in the last two decades stimulated the rapid industrial and economic growth of metropolitan Kuwait. The continued prosperity and the associated urban and industrial development will bring about a proportionate population growth which is projected to reach 3 million in the year 2000, almost double the population of 1980.

Desalinated supplies are the main potable water sources in Kuwait; the 27 operating units have a total capacity of 524,000 m^3/d and 16 more units are under construction with a capacity of 435,000 m^3/d. Most of the existing desalination plants are located close to major industrial complexes and water quality may be affected in the future due to continued accumulation of pollutants in the vicinity of water intakes to the desalination plants(17).

The city of Kuwait has two separate networks for sewage and storm water. Secondary treatment of sewage is provided at four treatment works (Ardiya, Johra, Rikka and Failaka); average treatment capcity is 380,000 m^3/d and most of the tertiary treated effluent is currently utilized in an expanded scheme for irrigated agriculture and environmental forestry(18).

Kuwait Municipality is handling 2,000 t/d of municipal solid wastes which are disposed of in sanitary landfills. Composting has been practised on a pilot scale (100 t/d) since 1969. However, there is a growing interest in more diversified use through waste reclamation to conserve material and energy sources. The municipality has recently embarked on a field study to assess the economic potential of solid waste reclamation.

Heavy industries are located in Shuaba Industrial Complex approximately 35km south-east of the capital city. The complex accommodates 30 major industrial plants and creates appreciable air and liquid pollution problems in the area. Small-size industries (food, paper, metal, workshops, paper converting, etc.) are located within the city limits, mainly in the Shuwaikh and Subhan industrial areas. A sewerage system is not available within both areas and the majority of waste is being trucked for final disposal in the sea. (Annex III)

Air pollutants are mainly emitted from the Shuaiba and Kuwait areas. The most critical pollutant is suspended particulates, 70 per cent which are generated from activities within the capital city. Other pollutants include hydrocarbons and sulphur and nitrogen oxides which are generated at higher rates in Suhaiba; however, 84 per cent of carbon monoxide is generated via vehicle emissions in the capital area(18).

The Enivronemental Protection Council (EPC) is entrusted with setting standards compatible with lifestyles and the industrial and urban environment, proposing measures for pollution abatement, conducting environmental impact assessment studies and promoting applied research in areas related to environmental protection; the Department of Environment in the Ministry of Health is the technical arm of EPC. A model decentralized system for abatement of industrial pollution is being managed by the Shuaiba Area Authority. The Ministry of Electricity and Water is responsible for all water supplies and the Minsitry of Public Works is responsible for all sewerage activities in the country.

Kuwait has achieved reasonable progress regarding environmental protection in the past few years which is basically attributed to the following unique characteristics of the country:

(a) Kuwait is large metropolitan area where the central agencies are in effect assuming the role of lcoal governments;

(b) Government officials and the general public are highly sensitized to environmental pollution problems;

(c) National Planning, Public Health and Environmental Management are at present directed by one minister which permits integration of environmental aspects in all facets of developmental activities in Kuwait;

(d) The relatively healthy economy of Kuwait has enabled implementation of a wide range of environmental protection activities and effective public service programmes.

To strengthen the existing scheme for urban environmental management in Kuwait, it is recommended: that indigenous manpower capabilities for management and operation of services be developed; that intersectoral co-ordination, particularly between agencies responsible for water supply, sewerage and effluent reuse be improved; that measures to reduce water consumption and losses be instituted; that data and information centres and

training activities be improved to such a level that they would become a focal point to serve other countries with less experience in the environmental fields.

G. Lebanon

The socio-economic development of the country, including the modernization and maintenance of the urban infrastructure, was hampered by the continuing civil strife. Under the prevailing security conditions in Lebanon, most of the environmental services have ceased to function while the essential ones are severely strained.

The domestic water supply relies mainly on groundwater, about 75 per cent of which comes from springs and around 25 per cent from wells. Present sources are not adequate to meet the demands and the supply system has resorted to regular cut-offs for rationing purposes. Service continues to deteriorate due to severe damages of the water network, lack of maintenance, theft of equipment and shortages of funds arising from the difficulties of collecting revenue. Unreliable estimates of per capita consumption in Beirut range from 150 to 200 l/d. More than 116 urban communities are served by sewerage systems which represent about 60 per cent coverage nation-wide. The four existing sewage treatment plants in Lebanon are inoperable(12).

Industrial activities in the country are very limited; however, pollution from food processing, tanneries and workshops represents an important source of environmental deterioration in the urban centres. It is not conceivable to initiate any remedial measures under the prevailing unstable conditions. However, as soon as the war ends the following priority actions should be undertaken: (a) appeal for Arab and international financial support to rebuild the severely damaged environmental facilities; (b) strengthening manpower capabilities; (c) combating water wastes; and (d) establishing a medium-term plan for integrating services within a unified urban management scheme.

H. Oman

The country has two major urban areas: Greater Muscat and Salalah. The present water supply for the Muscat area is estimated at 18,000 m^3/d from the desalination plant and 16,000 m^3/d from public and private wells. The five-year plan (1981-1985) emphasizes provision of potable water to urban and rural areas; the total population to be served in northern Oman by 1985 is 100,000. The water consumption in most urban areas has to be kept low (80 l/cpd) owing to lack of an appropriate system for wastewater disposal. Consequently, even though several areas are equipped with house connections, most distribution is still delivered by standposts and tanker services(12).

The only sewerage network and sewage treatment works exist in Muscat (Mutrah area only). The rest of the capital and all other urban communities are served by individual wastewater and excreta disposal facilities (soakaway pits and septic tanks). Small, package waste-treatment units are operated in hospitals, hotels, government institutions and army camps(8).

Oman has comparatively small industrial activities and they are mostly located in the capital city of Muscat (power, dairies, grain mill, soft drinks, poultry processing and canning). A new industrial zone which will house future industrial development projects is located 40 km west to Muscat; on the other hand Salalah has small agro-industries. Effluents are mostly disposed of on land without treatment. A small petroleum refinery and cement and copper-refining plants have been commissioned very recently. The estimated total water demands for urban and industrial uses in Oman in 1985 is 8.1 million m^3/y.

The Council for Environment Conservation and Prevention of Pollution is empowered with wide responsibilities to conserve the environment and control pollution in the country; these responsibilities include formulating and implementing environmental regulations, establishing and administering a central environmental laboratory and meteorological network, implementing programme for manpower development, issuing licences for new projects and acting as focal point for regional and international environmental activities. The technical secretariat of the Council is responsible for the executing, monitoring and inspection of programmes against all sources of pollution as well as the protection of water resources and the marine environment(13).

Dispite the considerable urbanization of Muscat during the past five years, urban environmental activities are hampered by the serious sector fragmentation, overlapping of responsibility between municipal and government institutions, lack of public awareness, the acute shortage of qualified local personnel and the consequent reliance on expatriates for management and operation of environmental services. Urban environmental problems are further complicated due to shortages of water resources and insufficient exploration and development activities, inadequacy of sewerage and refuse disposal systems, inadequate grading and salary scales for sanitation workers, and lack of national environmental standards which leads to disparities in designs, criteria, construction and gross ineffectiveness of pollution-monitoring schemes.

The Government has taken actions lately to ensure incorporation of environmental aspects in all developmental activities, and the prospects for pursuing urbanization in harmony with environmental needs are encouraging. Priority needs for urban environmental management comprise, long-term assistance for development of environmental services, resources development and management, upgrading administrative machinery, strengthening integration and co-ordination among environmental programmes and intensifying efforts for training and education in fields related to operation and maintenance of environmental services.

I. Qatar

The recent expansion of the industrial, agricultural and urban development activities has placed a considereable strain on the existing fresh water resources in the country. The amount of water abstraction from aquifers increased from 6 million m^3/y in 1958 to about 8.5 million m^3/y in 1984.

The present desalination capacity is 44.4 million m^3/y (75 per cent from Ras Abu Fontas plant and 25 per cent from Ras Abu Aboud plant). Smaller desalination units are operated by industry, the largest of which is the Qatar Fertilizer Company Unit with a capacity of 3 million m^3/y. It is ewtimated that the demand for desalinated water during the year 2000 will grow to 175 million m^3/y or about four times its current level.

The sewerage network of Doha serves the central and the new districts of Doha, Khalifa Town, the East Bay and the outlying areas. The population coverage will increase from 40 per cent in 1982 to about 80 per cent in 1985. Current phased expansion projects of the Naijah sewage treatment plant will increase the purification capacity from 42,000 m^3/d in 1985 to 62,000 m^3/d in 1990. The tertiary treated effluent will be gradually utilized for irrigation and landscaping projects(8).

The industrial complex at Umm Said 45 km south of Doha houses steel, petrochemicals, fertilizer, natural gas liquids and refining plants. A large cement plant is located south of Dukhan on the west coast of Qatar, and two power plants operate close to the Doha Airport. The fertilizer and ballast water effluents are the major sources of pollution disposed of in the Gulf. Light industries (soft drinks, dairy, poultry, grain mills, etc.) are mostly located in Doha and their raw effluents are currently discharged to the Najah Sewage Works for combined treatment with domestic wastes. The estimated quantity of refuse generated in Doha is about 100,000 t/y or about 375 kg/cpy (capita per year). About 40,000 t/y refuse along with 8,000 t/y sewage sludge from the Naijah works are composted and work is under way for doubling the capacity of the compost plant(10).

Aware of the impact of development on the environment, Qatar has established a National Environment Protection Committee which is empowered by law to formulate policies relating to the protection and management of the environment, implement preventive and remedial measures for maintenance of environmental quality, co-ordinate activities of the concerned Government agencies, monitor and survey pollution sources, develop manpower and promote environmental education(13).

There is no institution or specialized agency in charge of urban environmental management in Doha. However, several institutions are involved in implementation of programmes related to environment protection: the Technical Centre for Industrial Development (Industrial Pollution); Ministry of Health)environmental and occupational health and food hygiene); Ministry of Municipality Affairs (environmental services in urban areas); Ministry of Industry and Agriculture (monitoring of soil and ground-water quality); and the technical secretariat of the environmental protection committee (monitoring environmental quality, setting standards and formulation of long-term plans for environmental protection).

Plans to cope with the projected urban and industrial growth in Qatar are well-advanced. Water distillation capacity is being expanded steadily to serve the population increases of 334.000 in 1990 and 428,000 in the year 2000. The sewerage network and sewage purification capacity is being expanded in a phased programme to serve new development as well as provision of

services to areas still served by septic tanks. A distribution system of the treated effluent will be constructed along the sides and under the central divider of major highways to allow for direct watering of trees. The rest of the treated effluent will be used for irrigation of up to 1,000 hectares of winter and perennial fodder crops[18].

The constraints of environmental management in Qatar are, by and large, similar to these encountered in the other Gulf States. They include:

- Overwhelming dependence on expatriates for management and operation of environmental services; shortage of local manpower is attributed to the low salary scale and grading in public services compared with that of other government and private activities;

- Absence of a comprehensive environmental protection plan;

- Inefficiency of public administration due to absence of co-ordination, problem of competence, and shortage of local experts for management of services;

- Extensive use of resources and abnormal levels of wastes (refuse, water, energy, etc.);

- Lack of national environmental standards and ineffectiveness of environmental monitoring schemes.

J. Saudi Arabia

The Government has embarked on a comprehensive economic programme with expenditures surging from $160 billion in the 1975-1980 plan to $300 billion in the present development plan of 1981-1985. Aided by sound Government policies, environmental conservation is becoming a major concern in the country. Greater attention has also been given to strengthening environmental services in major urban settlements. By the end of 1983, desalination plants throughout the Kingdom were producing about 2.2 million m^3/d of potable water. The locations of the existing 17 desalination plants were dectated by the existence of population centres and industrial development. It is estimated that water demand for urban and industrial activities will increase from its current level of 823 million m^3/y to 2,279 million m^3/y by the year 2000; the desalination capacity will be increased during the same period to about 2000 million m^3/y; the rest of the fresh-water demand will be met from ground-water resources. The dramatic increase in water desalination may result in negative ecological impacts due to the generation of large volumes of concentrated brine which creates land-disposal problems or disturbance of the ecological balance when disposed of in the sea. Desalination brines could, however, be utilized as a valuable resource for the recovery of minerals such as salt and magnesium.

At present the amount of sulphur dioxide (SO_2) emitted from the desalination plants is estimated at 260,000 tonnes/y; emission of SO_2 has been causing concern, particularly in Jeddah, and work is under way to quantify its impact on the nearby residential areas[19].

Recognizing the potential adverse environmental impacts associated with the logistics of the Hajj, the Meteorology and Environmental Protection Administraion (MEPA) is monitoring various parameters of the Hajj environment. In 1983 these sources included the more than 126,000 motor vehicles used for transport, 80,000 tonnes fuel burned to generate electricity and the incineration of nearly 2 million animals and huge amounts of refuse generated by the pilgrims. Comparison of the SO_2 concentrations with the MEPA air quality standards, measured during the Hajj period, indicated that ambient SO_2 levels were below the standard. However, nitrogen dioxide concentrations during the ritual days of the Hajj were considerably higher in the Muna Valley than in other Hajj areas owing to the topographical and climatological features of the valley and the excessive traffic exhaust.

The Ministry of Pilgrimage and Endowments is taking the necessary measures to improve environmental conditions during the Hajj period through provision of adequate sanitation facilities, medical services, relieving traffic congestion and operation of efficiently controlled incinerators consistent with good air pollution control practices.

Most urban areas in the Kingdom are served by limited sewerage networks and sewage treatment plants. In the metropolitan Damman - Khobar - Dhahran area of the eastern province, the city of Dammam has achieved sewerage coverage of 55 per cent and sewage is treated in stabilization ponds which are being expanded to serve 330,000 people by 2004. The city of Khobar has achieved a coverage of about 65 per cent and the existing stabilization ponds will be expanded to serve 216,000 people by 2004. In Dhahran the coverage is almost 100 per cent and sewage is being treated by an activated sludge system(8).

In Jeddah the per capita water consumption will eventually reach 500 l/d in the year 2000 which amounts to about one million m^3/d of watewater. In order to cope with the projected future increases in domestic wastewater, plans are under way to build a series of wastewater purification plants, each with a capacity to treat 100,000 m^3/d with the potential of providing tertiary treatment for water demineralization to less than 500 mg/l, dissolved solids. This will enable production of high quality water suitable for agricultural as well as industrial uses, thus relieving the demand on the city's potable water supply. Similar plans were developed for extension of sewerage and sewage purification for the cities of Riyadh, Mecca and Medina and the new city of Jubail, which will have a population of 400,000 by 1990(18).

A key feature of the Kingdom's economic development strategy is the construction of two major industrial complexes and their supporting infrastructures at Jubail and Yanbu to ease the burden on existing cities. The size of these complexes can be gauged by looking at Jubail which, at its ultimate development in the year 2000, will house 16 primary hydro-carbon based and energy-inensive industries in addition to 11 secondary and several supporting industries. The environmental section of the Directorate of Jubail Project has prepared comprehensive guidelines for air, water, solids and hazardous emissions. The monitoring plan establishes a long-term programme of pre-construction design review, operational data evaluation, quality assurance

checks and monitoring of ambient environment. A similar activity is planned for the city of Yanbu north of Jeddah. This pioneering experience provides a practical example of sound environmental management for industrial development in the ESCWA region. Existing industries within major metropolitan centres in the Kingdom are causing appreciable environmental impacts. Liquid effluents cause frequent operational troubles for the sewerage network and the municipal purification systems while air emissions, particularly from the cement industry are becoming a major concern to MEPA. The continued urban growth in Riyadh and Jeddah has resulted in previously isolated cement plants now being encroached upon by residences. The plant in Jeddah has ceased operation lately as retrofitting to meet even lenient emission limits was not economically feasible. The Riyadh plant has committed 75 million Saudi Arabian riyals for expenditures on environmental controls for kilns to comply with MEPA requirements(19).

Traffic emissions are by far the largest air pollution source in urban settlements of Saudi Arabia; motor vehicles in the Kingdom have increased from about 150,000 in 1971 to over 3 million in 1983 while the gasoline used contains one of the highest lead levels in the world (0.84 g/l)(19).

The Environmental Protection Committee (EPC) is the highest level body concerned with environemtnal protection in the Kingdom. The functions of EPC include co-ordinating environmental activities of government institutions, review and endorsement of environemtnal protection regulations and MEPA programmes. MEPA is the central focal point for implementing a national programme of environment protection which comprises preparation of environmental standards, assessment of state of environment, monitoring pollution sources and development of manpower. MEPA is yet to be involved directly in development of an integrated urban environmental management mechanism to serve major metropolitan areas in the Kingdom.

Environmental management constraints in Saudi Arabia include scarcity of local manpower for environmental services owing to availability of better-paid jobs for Saudi nationals; the difficulties of integrating environmental aspects into regional administration, co-ordination barriers between government institutions responsible for mangement of environmental activities and lack of adequate information systems for effective planning of environmental services. The vastness of the country and the unique characteristics of the individual urban communities call for decentralization of the management set-up and establishment of autonomous bodies for urban environmental mangement in Jeddah, Riyadh, the Eastern province and other large urban centres in the country.

K. Syria

The proportion of the Syrian population living in urban areas increased from 3.26 million in 1975 to 5.32 million in 1985 and is projected to reach 10.47 million by the year 2000, which represents over a three fold increase during the last quarter of this century(20). The carrying capacity of the major metropolitan centres in the country is being strained as local governments are increasingly incapable of providing the necessary urban

framework for socio-economic development. Continued migration from ural areas aggravates the problem; the lack of opportunities in the agricultural sector and the relative availability of social services and the opportunity for economic betterment push rural people to urban centres. The environmental consequences of this rapid urbanization have been demonstrated in many cities, where the quality of public services is affected; this is coupled with growth of slum areas and deterioration of the environmental quality.

The water supply for urban settlements is drawn from surface water and groundwater in an almost equal proportion. The capital Damascus is supplied with spring water which is chlorinated before distribution. The distribution system is old and in poor conditions in some areas, which results in significant water losses in the network. About half a million refugees living in assigned city districts are served by a separate network supplied from deep wells. The average per capita consumption in urban areas was estimated to be 170 l/d in 1984.

The Governemnt plans to extend water coverage to 94 per cent of the urban population and to 90 per cent of the entire population by the end of 1986. The tariff system will be revised to permit satisfactory services in low-income areas and to discourage wastage in the high-income areas. At present, about 60 per cent of the urban population is served by sewerage system. During 1985, the pre-construction phase for sewerage and sewage treatment plants for six major cities was scheduled to be completed, in addition to commissioning of the sewage treatment works of Damascus(12).

Industrial activities are concentrated close to major urban settlements. Refineries are located in Homs and Baniyas while textile, fertilizer, cement, food processing and mechanical industries are found in Damascus, Homs and Aleppo. Adjacent residential areas are increasingly suffering from environmental impoverishment emanating from industrial liquid, solid and air pollution. A proposed law for abatement of water pollution is yet to be ratified by the Council of Ministries. The newly formed Ministry of Environment is placing emphasis on industrial pollution abatement through instituting emission standards, incorporating environmental impact assessment in licences and permits and offering support for control of pollution at source(21).

Urban environmental management is not the responsibility of a single institution, but rather considered as the collective responsibility of several departments. The Ministry of Housing and Public Utilities is responsible for the design and construction of water and sewerage facilities all over the country except the capital and cities of Aleppo, Homs and Latakia. Operation of the water supply system is assigned to the General Organization for Water Supply while the Ministry of Public Works and Water resources is responsible for the development of water resources. The Ministry of health, Department of Preventive Medicine, monitors water quality and environmental pollution. The State Planning Commission co-ordinates all environmental programmes of the different government agencies within the framework of the five-year plans. Constraints of urban environmental manageent may be listed as follows:

- Lack of sufficient finanial resources for environmental services;
- Rapid rate of urbanization and overloading of existing services;
- Appreciable pollution of water resources due to uncontroleed discharge of pollutants;
- Absence of data-base and adequate information for development of long-term master plans;
- Inadequacy of regulations for control of environmental pollution and occupational health hazards.

L. United Arab Emirates

The current concern with environmental issues in the United Arab Emirates has emerged out of a high level of economic and industrial development. The creation of large urban settlements, the growth of industry and the evolution of complex transportation and other public service systems have attained such a proportions that in major cities in the Emirates they already cause appreciable environmental problems. In the past, in the Emirates as well as other ESCWA member States, there had been a tendency to equate the long-term development goals with the objective of mere economic growth as conceived by the rise in the national income. However, evidence indicates that high rates of economic growth cannot guarantee meeting the basic human and social demands. On the contrary, economic growth triggered by the rise in oil prices that began in 1973 has led in same instances to deterioration of social and cutlural conditions, and appreciable degradation of environmental quality. A new emphasis is thus being placed by the Government on the attainment of environmental protection goals as a part of a more integrated approach to the development objectives. For the last decade the United Arab Emirates has been investing extensively in infrastructural development and related environmental services. For example, the lack of surface water and the limited availability of groundwater has promoted reliance on deslinated water; the total capacity of the 22 operating plants is half a million m^3/d of which 50 per cent is produced in Abu Dhabi; 30 per cent in Dubai and 15 per cent in Sharjah. The projected water demand for industrial and urban uses in 1985 is estimated at 95 million m^3/y; recent WHO statistics indicate 100 per cent water coverage in the Emirates(1).

Sewerage systems and sewage treatment works exist in the cities of Abu Dhabi, Al-Ain, Dubai and Sharjah. Abu Dhabi is served by a modern sewage treatment plant (44,000 m^3/d) and plans have been completed for extension to 77,000 m^3/d in 1990 and 120,000 m^3/d in 1995 to achieve full coverage of existing and future population. Reuse of the treated effluents for watering of public parks and land irrigation has been practised successfully in all major cities in the Emirates for a number of years.

The climatic conditions prevailing in the Emirates make the disposal of air pollutants very inefficient as traffic exhaust cannot be easily diluted in the surrounding environment. Refuse is being generated from Abu Dhabi at an

average rate of 190 t/d, 125 t/d of which is composted and the rest dumped on a tipping sit. The refuse of Al-Ain is being composted in a 150 t/d processing plant. Two compost plants also operate in Dhubai and Sharjah. The collection, transportation and processing of refuse is being adequately managed in the major cities of the Emirates(8).

Industrial activities are located within or close to the major cities; Abu Dhabi (power, refining, food processing and steel); Dubai (refining, power, cement, food); Sharjah (cement, soap, food); Ras Al-Khaimah (cement and steel); and Al-Ain (power, cement). Major industries including refineries, power and steel discharge their effluents directly to the sea while light industries discharge their effluents to sewerage networks or on land. The most important source of industrial solid wastes is the oily and toxic sludges produced by the oil export terminals and the refining operations. About 15,000 t/y sludge settles directly into the sea from bottomless underwater storage vessels which causes an adverse impact on the marine environment(21).

Several institutions are presently involved in public services of major cities. On the federal level, the Ministry of Electricity and Water is responsible for the water supply and the Ministry of Housing and Works for sanitation and sewerage. However, the autonomous power of most of the states has given rise to local municpalities and specialized agencies that are actually responsible for management and operation of environmental services. In specific cases as in Ajman and Fujeriah water supply is under direct control of the Ministry of Electricity. The Higher Environmental Commitee is entrusted with co-ordination of environmental protection activities between the Federal and state government agencies and with issuing guidance for maintenance of environmental quality; its role is mainly advisory as the executive power is concentrated in the state Governments in matters rated to issuing of permits, granting exemptions to violators and enforcement of environmental regulations(13).

Environmental management constraints include the absence of an administrative set-up for environmental management on the national and state levels, grossly inadequate legislation and environmental regulations, shortage of manpower at professional, technical, managerial and operational levels, fragility of the ecosystem coupled with lack of natural resources, extreme fragmentation and inadequate long-term planning of integrated environmental service schemes and difficulties in adopting measures to reduce wastage of resources.

M. Yemen Arab Republic

Yemen is among the least developed countries of the ESCWA region, with the lowest GNP and sanitation coverage and the highest rates of illiteracy and infant mortality(1). Urbanization is very limited in Yemen, and even the capital city Sana'a and the cities of Taiz and Hudaidah are served by inadequate environmental services.

The urban water supply relies mainly on groundwater; supply networks in the major cities are expected to be completed by 1986. The sanitation

facilities are in a very poor condition with faecal matter commonly disposed of through a drop-pipe to the ground level of the buildings; the accumulated sludge is reused as manure after drying. This practice is responsible for the spreading of water-borne disease such as typhoid, dysentery, schistosomiasis, etc., Construction of modern sewerage system is under way in five cities and will be put into operation in 1986[12].

The five major cities (Sana'a, Taiz, Hudaidah, Ibb and Dhamar) are regulated by the National Water and Sewerage Authority which is attached to the Ministry of Municipalities. The Confederation of the Yemeni Development Associations is responsible for improving living conditions in urban areas. The General Directorate of Environmental Health in the Ministry of Municipalities co-ordinate its activities with the Directorate of Public Health in the Ministry of Health for upgrading sanitation services in urban centres and monitoring environmental quality, food hygiene and refuse disposal. The state of urban environment in Yemen is a reflection of the socio-economic conditions in the country and is a consequence of shortage of manpower and financial resources, unplanned urban and economic development and extreme inefficiency of environmental services.

V. DEVELOPMENT OF INSTITUTIONAL SET-UP FOR URBAN ENVIRONMENTAL MANAGEMENT IN THE ESCWA REGION

Urban settlements are likely to continue to sprawl in the ESCWA region. The influx of population coupled with haphazard economic and industrial growth in many metropolitan centres is straining public works and community services. Each, city has its own carrying capacity which should expand in an orderly manner over time. This depends on the unique combination of population, economic resources, infrastructure and development potentials, which are in turn under constant evolution. If the carrying capacity is exceeded in the course of rapid development, environmental degradation is bound to proceed at an accelerated rate. Joint Government-community actions can reverse the city's deterioration, if sufficient resources can be mobilized to incorporate environmental aspects in long-term programmes for urban development.

Urban management today needs first and foremost the primacy of self-reliance and local initiatives within the framework of the development plan. The urban renewal of slum areas is one line of attack. Another approach is urban dispersal, contingent upon planned allocation of new growth poles in conjunction with future industrial and urban development in the region. As most populated countries in the ESCWA region are among the less developed countries, capital-intensive public works and housing renewal schemes, especially ones drawing upon abundant labour and local resources and materials, should be accorded a high priority. Oil-producing countries, on the other hand, may resort to comparitively capital-intensive technologies which require minimum labour. Organized popular participation can play a decisive role in improving environmental quality and enhancing the performance of public services. The present preoccupation with the acute problems of the primate cities often results in a further neglect of the secondary urban settlements, due to excessive concentration of resources on urban expenditures in the capitals and few metropolitan centres. The need, then, is for equitable distribution of services among all regions within the country, integration of environmental concerns in urban development and establishment of new administrative mechanisms, whenever appropriate, within the city management set-up to provide a central point of leadership for co-ordination of activities relevant to environmental management.

The proposed organizational structure will strengthen implementation of effective policies and government's responsiveness. Eventually, the success of this new mechanism depends on the well of administrators and policy-makers, the quality of the officials and technical staff appointed, the level of funding and the scope of legislative authority, all of which are obviously the products of the unique economic and political environment in each area. The body dealing with environmental matters should be part of the local administrative machinery, with clear-cut responsibility for environmental quality and with adequate staff and financial autonomy.

The following is a conceptual action plan for establishment of an administrative mechanism for environmental management in the ESCWA metropolitan centres; however, it is recognized that, within a framework

appropriate to its unique situation each city may ascertain the nature of its environmental problems and introduce modifications as needed to the proposed management set-up.

The plan does not call for centralized management of environmental services but for a co-ordinated approach to those co-operative measures that can be undertaken by existing institutions and the proposed environmental management set-up to permit effective use of the available local resources for sustained development on an environmentally sound basis.

While establishment of an urban environmental management set-up is advocated, consolidation of more activities such as waterworks, sanitation and other public services is certainly not warranted. Such multidisciplinary institutions tend to become more unwieldy, reducing administrative effeciency and manageability and may lead to notable counter-productivity. The opportunity for the emergence of a strong, highly effective anti-pollution organ in government may be lost in multidisciplinary institutions since managers will be compelled to consider competing factors that synthesize operational and environment protection demands. Time that might have been spent on programme implementation may be directed to setting up organizational patterns satisfactory to both pollution and operational components and solving jurisdicational and programme disputes. Separate agencies for environment protection, resource conservation and public works permit better management, greater public advocacy and effective accountability.

The proposed organization of the environmental management set-up is shown in Figure 4. The plan is neither complete nor exhaustive; it is only an invitation to further work and thought.

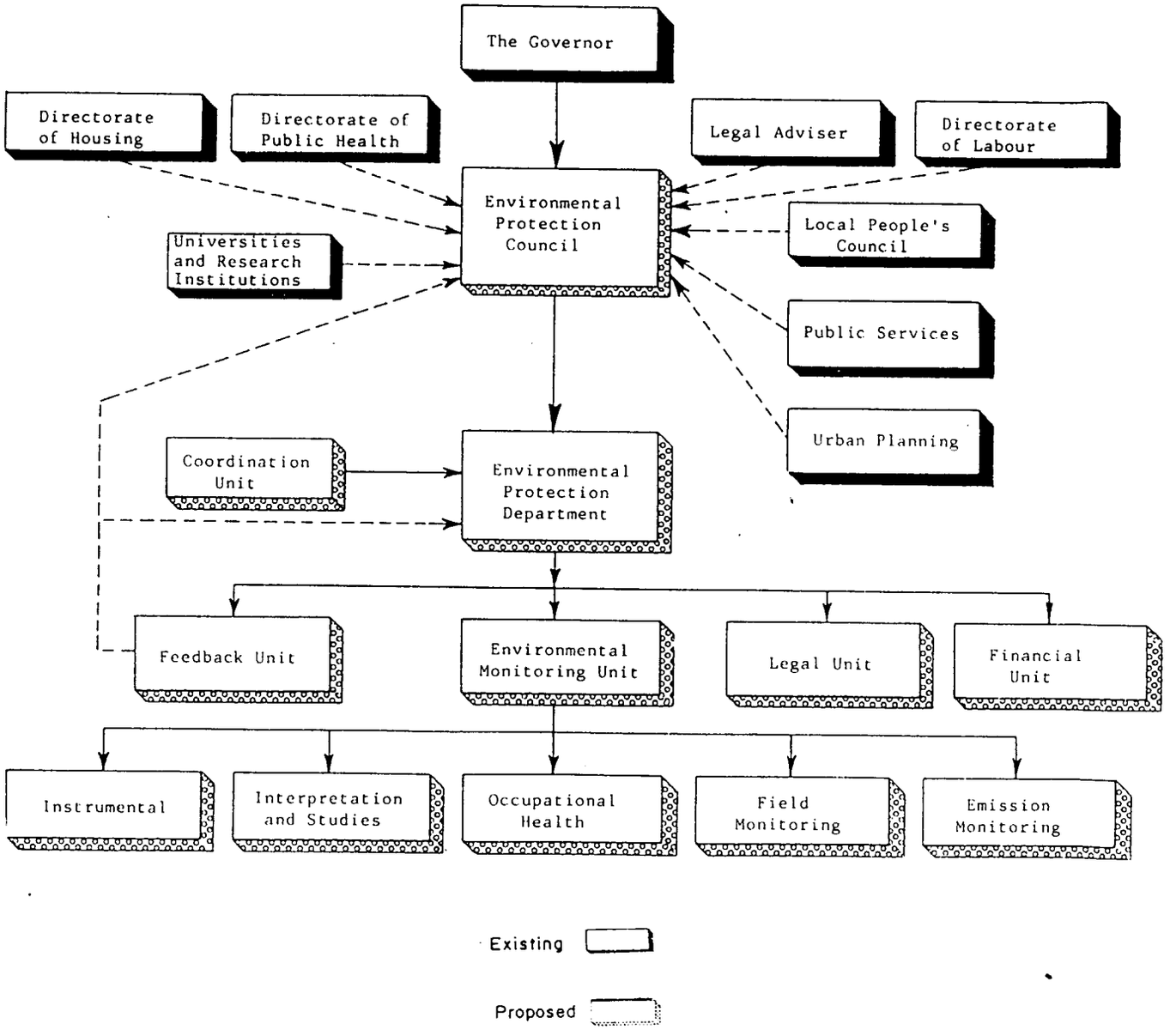
A. Regional Environmental Protection Council (REPC)

The REPC shall be formed and chaired by the Governor or the highest local authority with membership of representatives of the concerned agencies, the rank of which will not be lower than Director or the equivalent. Members would include:

- Secretary General of the Governorate;
- Legal Advisor of the Municipality;
- Department of Public Health;
- Department of Housing;
- Department of Urban Development;
- Department of Manpower;
- Water Authority;
- Sanitary Disposal Authority;
- Public Transport Authority;
- Universities and research institutions;

The REPC shall issue the necessary regulations for the organization and implementation of its activities and will form permanent sub-committees or task-forces, if the need arise, to study subjects within its jursdiction or seek the advice of local and national experts.

Figure 4. Proposed Scheme of Environmental Management Set-up



1. Goals of REPC[22]

It is the responsibility of REPC to use all practicable means consistent with the national environmental policy to co-ordinate and strengthen local plans, functional programmes and resources to achieve the following broad goals:

(i) Secure for all citizens a safe, productive and esthetically and culturally pleasing environment;

(ii) Optimize beneficial uses of the environment without health risks or other undesirable consequences;

(iii) Achieve a balance between people, resources, development and the environment to improve standards of living and amenities;

(iv) Explore to the widest extent possible renewable resources and recycling of depletable resources;

(v) Maintain historic, cultural and natural assets of the region.

2. Functions and duties of REPC

The functions and duties of REPC include, inter alia:

(i) Review and appraisal of the various programmes and activities of the Municipality, public organizations, industry and enterprises in the light of REPC goals set forth for the purpose of determining the extent to which such programmes and activities are contributing to the achievement of the goals and to make necessary recommendations to the concerned agencies in that regard;

(ii) Development and implementation of a comprehensive strategy to foster and promote the environmental quality to meet the local socio-economic, health, conservation and development needs;

(iii) Proposing of investigations, studies, surveys, research and analysis relating to environment and ecosystem;

(iv) Utilization to the fullest extent possible of the existing services, facilities and environmental data of public and private organizations for maximum use of resources to avoid duplication of efforts, and overlapping or conflict with activities authorized by law and executed by existing agencies;

(v) Development and implementation of a collective programme to reduce pollution and minimize its adverse environmental impacts with emphasis on enforcing measures to reflect costs associated with pollutants discharge in the waste-disposal decisions of the pollutors;

(vi) Study, development and description of appropriate alternatives to proposed course of actions for major projects which involve unresolved conflicts concerning alternative uses of available resources;

(vii) Making available to local organizations, institutions and industry advice and information aimed at restoring and enhancing environmental quality;

(viii) Development of plans for environmental education, public awareness and development of manpower;

(ix) Proposal of regulations and orders for environmental protection and follow-up of their enforcement.

B. Environmental Protection Department (EPD)

The REPC will establish an environmental protection department to implement environmental programmes. EPD will discharge its duties under the supervision of a technical director who reports to REPC.

1. EPD functions

(i) Co-ordination of environmental activities of all local organizations and institutions and review present statutory authority, administrative regulations and implementation procedures for the purpose of eliminating inconsistencies and overcoming constraints which prohibit full compliance with the regulations and propose measures as may be necessary to bring their authority and procedures into conformity with the intent of strengthening environmental quality;

(ii) Development and implementation of a system for environmental impact assessment. A detailed statement concerning legislation, government actions and major development projects which may affect the quality of the human environment should be reviewed by EPD. The statement should include information on impacts of the proposed actions, unavoidable adverse environmental effects, alternatives to the proposed action, and irreversible or irretrievable commitments of resources;

(iii) EDP shall take measures, provided that they do not infringe on national legislation and central government regulations, in line with the policy of REPC and shall also implement measures for pollution control which take into account the unique nature and social conditions of the region;

(iv) EPD shall endeavour to disseminate knowledge and information concerning environmental pollution and also make the community more conscious of the need to maintain and enhance the environmental quality, in accordance with the policy guidelines set forth by REPC;

(v) In order to control environmental pollution, EPD shall propose measures with regard to land use and shall, in areas where environmental pollution is serious, also take measures to control the installation of facilities which cause environmental pollution;

(vi) EPD shall establish a comprehensive system for surveillance, monitoring, measurement, examination and inspection in order to ascertain what the situation with regard to source of pollution is, and to ensure enforcement of measures to combat environmental degradation;

(vii) In order that industrial facilities bear all or part of the necessary cost of the works carried out to control pollution arrising from such enterprises, EPD will propose and enforce taxation and incentive measures to encourage the installtion and improvement of facilities for prevention of pollution;

(viii) With regard to environmental quality standards, EPD will establish criteria for the region inline with the national standards to maintain human health and conserve local environment. Due consideration shall be given to local administrative, technical and monitoring capabilities and the socio-economic constraints when establishing the criteria to ensure adequate enforcement.

2. Responsibilities of EPD

The director of EPD will submit to REPC an annual state of the environment report which will include, inter alia:

(i) Current and foreseeble trends in the quality, management and utilization of the environment and the effects of those trends on the social, economic and development activities;

(ii) Review of regulatory, monitoring and enforcement measures to combat pollution with particular reference to their impact on the environment, conservation and development of natural resources;

(iii) Proposed remedial measures for the deficiencies and constraints of present programmes and activities including proposed regulatory actions;

(iv) Appraisal of level of co-ordination among agencies and entities concerned with the environment and proposed measures to enhance co-ordination and environmental management.

3. Financing of Environmental Management Programme

The institution of a system of charges to be levied on pollutors provides local financial resources to supplement those of the central government's budget. These funds would enable investing in and operating of pollution control facilities where no source of finance currently exists. Depending on

the case, pollution can be assessed by direct measurement of loads of heavy polluting industries or imposing a flat-rate approach based on the number of persons working or the volume of manufactured goods produced by small enterprises. Levying charges does not imply the right to pollute since emission standards would remain enforceable; however, the charges provide an "acceptable mechanism" to ensure compliance with the standards. The financial resources generated through the charges enable enforcement of emission standards, as in cases where through lack of money the pollutors are unable to comply with them without this entailing the ceasing of operations.

Water pollution can be expressed in terms of Suspended Solids, Biochemical Oxygen Demand, Nitrogenous Substances, Toxic Substances, etc. By means of weighing coefficients it is possible to determine the higher cost of removing some pollutants or the threat they present for the receptor medium's waste assimilative capacity.

With regard to charge schemes for pollutors, a flat-rate assessment is recommended for small industries and small commercial enterprises. The scales for charges should be drawn in agreement with the trade associations and industries concerned.

4. Information feedback

Feedback is an essential management tool for organization of the diverse activities of EPD. Information from all units should be compiled in standard format for easy retrieval. The proposed sequence of the system is as follows:

(i) Identification of existing and future sources of pollution;

(ii) Proposing corrective course of action;

(iii) Ranking of the problems (minor problems to be tabled until further action is deemed necessary; satisfactory status, subject to annual review; conditional acceptance, subject to quarterly review to check compliance; unsatisfactory environmental impact and reluctance or constraints which hinder compliance, initiating of actions; proposal of control measures and setting "grace period" with monthly or bimonthly follow-up: and hazardous situation involving serious environmental impact and or imminent health hazards should necessitate an environmental impact report by EPD and notification of REPC and other concerned parties.

The system provides the following

(i) Organized flow of information;

(ii) Identification of sequences of action;

(iii) Encouragement of objective decision-making;

(iv) Definition of interdisciplinary responsibilities;

(v) Making possible systematic follow-up of environmental protection measures.

5. Emergency measures

REPC will order the suspension of work in any institution or ban the use of material and equipment if their use involves hazards to the environment or REPC will allow a "grace period" to correct or eliminate the pollution source. Violations by government institutions and public industries will be considered by an expert committee which will propose short and long-term courses of action and follow-up of implementation.

6. Environmental inspectors

The Governor will designate "Environmental Inspectors" required for enforcement and field activities. The inspectors will have the right to enter into any violating institutions, make legal suits, take specimens and conduct studies and measurements to specify the extent of environmental pollution, identify the source of pollution and ensure the application of regulations and conditions regarding environmental protection.

7. Acqusition of environmental information

EPD shall have the right to request any information if may deem necessary from any establishment which is polluting or expected to pollute the environment.

VI. PROPOSED PLAN FOR MONITORING THE ENVIRONMENT IN ESCWA METROPOLITAN CENTRES

A. Overview of existing environmental monitoring activities in the region

The successful planning and implementation of an environmental monitoring plan is a considerable undertaking requiring the integration of a broad range of diverse and complementary resource and skills.

At present the tasks of environmental monitoring in ESCWA'S metropolitan centres are assigned to various organizations. The observed inadequacy of most monitoring schemes is associated with lack of technical knowledge of the levels and sources of pollutants, shortage of skilled analyists and laboratory technicians; and unavailability of analytical and monitoring instruments.

Many of the procedures for environmental monitoring curently executed by public institutions (Water, Sewerge, Public Health, Manpower, etc.) are merely designed to quantitate pollution problems, and monitor operational performance. This type of methodology within the existing institutional set-up has tended to compartmentalize and obscure the larger view of environmental monitoring as it evolves within a comprehensive scheme of urban environmental management.

Owing to lack of co-ordination among concerned institutions, a tendency exists to limit the scope of work to specific routine tasks. To fill these gaps it is necessary to establish a new environmental monitoring unit to serve as a technical arm of EPD.

B. Environmental Monitoring Unit (EMU)

The complexity and importance of environmental monitoring requires formulation and execution of a reactive strategy which entails the establishment of EMU within the administrative system of EPD. The Unit's mandate is to monitor and control environmental quality according to the objectives and criteria set by State laws and local directives.

The scope of activities and performance level of EMU depend on available resources and co-operation among concerned agencies. A tentative strategy to be implemented in three phases is suggested:

1. Phase I (one year)

This phase encompasses:

(i) Collection and analysis of available data to provide a realistic assessment of the local environmental quality. Data resources include laboratories of Public Works, Department of Public Health, research institutions and Universities;

(ii) Implementation of short-term monitoring scheme in co-operation with existing laboratories;

(iii) Proposal of priority remedial and control measures:

2. Phase II (two years)

Basic activities of this phase include:

(i) Commissioning of first-priority remedial and control measures;

(ii) Formulation of a comprehensive plan for pollution abatement and environmental monitoring system;

(iii) Initiation of activities and commissioning of environmental monitoring laboratory to incorporate advanced analytical instruments for monitoring micro-pollutants and hazardous emissions; data acquisition; processing and interpretation system: field monitoring would develop in co-operation with research institutions and Universities. The monitoring scheme would involve monitoring of air, water quality, industrial and domestic effluents, solid waste and occupational exposure.

3. Phase III (two years)

(i) Continuation of the priority remedial and control measures;

(ii) Expansion of the laboratory activities to cover environmental noise and radiation;

(iii) Assessment of the effectiveness of the abatement schemes and EIS [environmental impact statement] prepared by other agencies.

4. Output

The purpose of EMU is to acquire data and assess on a quantitative basis the pollutants level and consequently develop and implement the necessary measures for control of environmental quality. Specific outputs of EMU include, inter alia:

(i) Monitoring compliance with environmental quality criteria and proposing amendments to existing regulation, control and enforcement legislation;

(ii) Evaluating the overall effectiveness of the abatement strategy;

(iii) Advising on industrial siting and urban expansion;

(iv) Observing and predicting pollution trends related to emission variations;

(v) Co-ordinating and implementing inter-laboratory quality control schemes and standardizing analytical techniques among local environmental monitoring laboratories.

5. Scope of activities of EMU

The functions and duties of EMU are to be undertaken by the following sections, (Figure 4):

(i) Emission monitoring: monitors liquid effluents, air emission, solid waste from domestic and industrial sources, surveys state of environment in major industrial and residential areas, monitors sea outfalls and pollution of seashore areas;

(ii) Instrumental and analytical services: provides essential analytical back-up for monitoring activities, carries out routine and special services. Standardizes methods of sampling and analysis in co-operation with other laboratories;

(iii) Field monitoring: periodic monitoring of industrial sources and on-site treatment of industrial emissions; monitoring of fresh-water bodies and water intakes at treatment plants; assesses offending discharges and recommends on-site control measures;

(iv) Occupational health services: identifies hazardous sources, monitoring exposure levels, proposes controls to reduce exposures below limits set to protect workers' helath, evaluates medical surveys to detect effects induced by extended exposure to hazardous environment;

(v) Interpretation and assessment: data acquisition from EMU and other laboratories; processing and interpretation by multidisciplinary experts; evaluating of EIS submitted by other agencies for major development projects; assessment of environmental quality for receptors and level of compliance with criteria and standards laid down by the legislation.

EMU is not intended to replace or assume functions assigned to other institutions but should work closely with them to fill gaps; it would undertake specific activities of environmental monitoring currently overlooked or not assigned to existing organizations and, most important, provide back-up and competent advice to REPC on technological, organizational and operational aspects related to the integrated scheme of urban environmental management.

C. Environmental Monitoring Scheme (EMS)

The prime objective of EMS is to ensure compliance with the national regulations and regional guidelines set forth to promote environmental quality.

EMS should be viewed as a dynamic long-term plan for overall monitoring of environmental quality based on flexible criteria to meet the evolving technological, economic and social conditions in the region. A comprehensive EMS should consider the attainability and effectiveness of legislation and the cost of environmental monitoring and control to both industries and the community.

Basic components of EMS are:[23]

1. Permits of industrial emmissions

The proposed system for issuing permits comprises three essential steps, namely preliminary review, issuance of clearance certificate and discharge permit:

(i) Preliminary review. Prior to construction of new facilities or expansion of existing ones, industries will be requested to submit the following information: description of the process; raw materials and auxiliaries used, especially hazardous and priority pollutants; water balance with schematic for points of use, recycle and discharge; characteristics and loads of pollutants generated in the raw effluents; description of wastewater treatment facilities and the anticipated loads of pollutants discharge with the treated waste; layout of the plant and the waste treatment facility; and the anticipated date of operation. The report should be submitted to the EMU 4 months prior to starting construction.

(ii) Clearance certificate. Upon review of the report, EMU will advise the applicant of one of the following decisions: clearance to start construction; provisional acceptability pending meeting additional requirements; or refusal to grant clearance based on the submitted information.

(iii) Discharge permit. The discharge permit will include a description of effluent sources approved for discharge, pollutant parameters and their analysis frequency, applicable discharge standards, periodic reporting requirements and the expiration date of the discharge permit. EMU should be authorized to issue provisional permits in special cases. There is growing objection to the enforcement of a unified standard on all polluting establishments. New basic industries and those already in operation should be able to comply with tighter standards due to their significant pollution loads and as they have the resources and capabilities to abate pollution and can easily absorb the cost of pollution control, while the relatively small private industries which generate minor pollution should be required to meet less stringent standards. This flexible approach based on case by case assessment is appropriate for the region. The proposed permits system should replace all existing procedures for issuing permits for discharge of industrial emmissions. Concerned central agencies may participate in this unified programme; a similar practice is being employed successfully in Amman, Jordan.

2. Monitoring quality of receiving water bodies and aquatic environment

Achieving acceptable receiving water quality requires all polluting sources to face the problem of proper treatment of waste-water effluents to provide high-purity discharge streams. The deteriorating conditions of most streams require implementation of a comprehensive water quality monitoring programme for the following sources:

- Drinking water supplies;

- Water quality in lakes, and other bodies not intended for human use;

- Outfalls of major municipal and industrial origins.

The following water quality monitoring programme should be implemented:

(i) Selection of stations and monitoring procedures. Monitoring stations should be identified with emphasis on locations close to major sources of pollution. The parameters and frequency of analysis for each source can be specified at a later stage;

(ii) Temporary violations. If priority parameters exceed those specified by existing emission limitations in individual samples (once or twice every ten times, this should be regarded as a "temporary event" due to occasional industrial leaks, emergency "by-passing" of raw or effluents from sewage works or short-term non-point discharge. Temporary violations should not be regarded as a regulatory tool as they provide only circumstantial evidence of pollution, yet they are valuable in identifying chronic problems of a transitory nature such as illegal dumping of prohibited wastes and as a cross-check on incidences of major industrial leaks.

(iii) Permanent violations. The purpose of the monitoring programme is to permit disposal of pollutants within the assimilative capacity of the receiving stream. If the receiving water fails consistently to assimilate excessive loads, monitoring would indicate more or less permanent violation of the water quality standards. An overall assessment of the situation may require implementation of one or more of the following measures:

a Enforcement of stricter effluent limitations or in specific cases curtailment of industrial activity in zones of acute pollution;

b Long-term planning to limit industrial and residential developments in the affected areas;

c Diverting municipal effluents or proposing additional treatment;

- An annual report concerning the quality of the receiving water bodies should encompass a summary of monitoring data, projected changes based on statistical analysis, recommendations for a corrective course of action and a summary of location, causes and remedial measures for temporary violations.

3. Monitoring air quality

The goals of the air quality surveillance are summarized as follows:

- Assessment of urban air quality and community health effects and documentation of potential health benefits of environmental control;

- Completion of monographs to describe effects on human health of long-term and short-term exposure of population sub-groups to major pollutants (respirable, particulates, NO_X, SO_X, CO and photo-chemical oxidants);

- Potential development of predictive models for air dispersion and other atmospheric processes based on pollutants' concentrations; distributions on time-space scales and proposal of optimum inventory procedures and aerometric networks for future model evaluation;

- Evaluation of the contribution of major industrial sources (refinery, cement plant, phosphate plant, etc.) to atmospheric pollution and quantitative descriptions of the generation and removal rates associated with major emission sources.

Monitoring must be based on temporal and spatial air quality variations. Temporal variations should consider available meteorological monitoring data of other agencies in addition to continuous air sampling to obtain short-term (up to 24 hours) and annual average concentrations of pollutants. Spatial variations will be tracked by fixed and mobile monitoring units located in various districts of the region. It is recommended that the monitoring programme should include the following activities:

(i) Monitoring ambient air quality through data collected from the fixed stations network to establish an air pollution index (API), to predict long-term trends and to correlate ambient concentrations with local meteorological data;

(ii) Mobile monitoring is needed for high-risk spots identified through complaints and not covered by the stationary network, to measure the impact of new activities such as industrial plants and deployment to new areas proposed for coverage by the stationary network to assess the validity of enclosing the new areas in the monitoring network;

(iii) Air quality assessment: classification of air quality status includes emergency release from malfunctions or deliberate industrial spills of volatiles; temporary emissions from insecticides' spraying, start-up of industrial facilities, asphalt paving, etc.; and long-term impacts from industrial complexes, high density commercial areas, down-town areas and harbours...etc.

(iv) Existing industries will be required to submit to EPD an overall assessment for their incremental impact on ambient air quality, and their proposed plan for abating air emission. Actual or estimated API values above criteria set by EPD will provide guidance for acceptance of proposed additional activities in the monitored areas. Quarterly reports, when feasible, should be submitted to EPD from major industries. The reports will include a summary of excesses and statistical analysis of the emission data.

(v) New industries should submit, prior to construction, a review report covering the following: identification of emission sources (raw materials, fuel, products); characterietics and loads of fugitive emissions; location of stacks associated with point source, type of control equipment and efficiency at full and normal loads; in-house monitoring programme; and expected dates of completing construction and reaching normal operation. One permit will be issued for wastewater and air emission for each industrial application;

4. Solid and hazardous wastes monitoring

The plan involves monitoring of compliance with guidelines set forth by EPD for collection, transport, reuse or disposal of refuse and industrial residues. Implementation of the plan consists of the following:

(i) Setting guidelines for management of solid wastes and codes of practices to evaluate collection and transportation activities undertaken by the municipalities and private contractors and the documentation of data of the sanitation directorates (collection schedule, vehicles for pickups, vehicle maintenance, amount of trucked refuse, etc.);

(ii) New and existing industrial facilities should submit a statement to EPD concerning generated residues which are temporarily contained or disposed of with domestic refuse, and estimates of construction and demolition debris and their disposal method;

(iii) EPD shall prepare guidelines for siting, design and operation of sanitary landfills. Sanitation directorates of the municipalities will submit for review landfill records (class of waste, quantities and sources; specific locations of disposal and frequency of cover application and compaction). EPD will undertake spot-inspections of the sites and report on the following: proper grading, maintenance of access roads and ancillary facilities, efficiency of on-site treatment, order or vector problems, adhesion to safety and contingency procedures;

(iv) Monitoring of hazardous residues generated from industrial or public service facilities will be undertaken by EPD. Generators shall submit information concerning: chemical composition and characteristics of the residues (ignitability, corrosivity, toxicity, radioactivity, mutagenicity or infectiousness); quantities generated; storage location (climatic data, topographic and soil characteristics, hydrological data including anticipated impacts on water resources); storage procedure (dikes, transfer areas, surface impoundments and tanks): industrial operations must formulate and implement contingency plans for emergencies and major spills which specify a course of action in the event of accidental release of hazardous materials, and must provide for equipment and material used to combat release, staff training and notification procedure;

(v) As most of the hazardous wastes generated in ESCWA metropolitan centres is disposed of off-site it is necessary to develop a manifest system for followup handling, transporting and disposing of hazardous waste. The manifest should accompany a bulk shipment or individual batches and record the following information: the generators' name and address; description of waste; handling precautions and hazardous properties; quantity of transferred material; designated disposal facility.

5. Monitoring noise and occupational exposures

The monitoring plan sets forth the procedures for acquisitions, reporting and interpretation of noise and occupational exposure data.

(i) Noise monitoring at emission sources (locations of major industrial, construction and business activities) and receptor areas (residences, hospitals, educational institutions and parks). Noise should be monitored at appropriate times such as periods of relexation versus times of high-noise levels during rush-hours and shifts' changes;

(ii) Noise should be measured during normal operation for industrial facilities (compressors, generators, crushers, etc.) and temporary high-noise activities (constructions, major road repairs, renovation or expansion projects). Actions proposed for violating sources are: (a) when the noise level exceeds ambient conditions by a maximum of 10 per cent the violator will be notified to carry out routine maintenance and (b) if the level of excess is more than 10 per cent, EPD will order the violators to correct the problem and remonitor the facility after implementation of the proper corrective actions;

(iii) Occupational exposures include a host of sources: physical (noise, vibration, excessive temperatures, ionizing radiation); biological (insects, moulds, fungi, bacteria); biochemical (monitoring, repetitive motion, fatigue); and chemical inhalation or skin absorption (mists, vapours, gases, fumes). The monitoring plan encompasses: (a) evaluation of sources of hazards; (b) measurement of exposure level; (c) setting controls to reduce exposure to acceptable levels, and (d) periodic health check-up to trace unusual conditions. All major industries should be required to submit annual reports concerning levels of exposure to hazardous conditions, effectiveness of control programme, proposed modification to improve occupational environment and results of medical surveys.

(iv) EPD shall issue guidelines for occupational monitoring methods and should conduct spot-checks to assess compliance and cross-check annual reports submitted by industrial facilities. Medical data will be reviewed to determine whether adverse health effects are being caused by exposure to hazardous materials. An annual state of occupational health report will be prepared by EPD and will include

information on status and new sources of hazards and recommendations to alleviate occupational exposure poroblems. It should be noted that the Department of Manpower or Department of Public Health may be engaged in similar activities. EPD, in such cases, will refrain from undertaking field monitoring activities; however, all minitoring and assessment studies should be made available to EPD for incorporation in the region-wide State of the environment report.

In developing a specialized administrative mechanism for urban environmental management in the region, two other functions besides consolidation of environmental protection activities should be emphasized. The first is integrated environmental planning to link all environmentally related programmes with the long-range pollution prevention perspective, land use planning, natural resources allocation and management of energy; the second function is comprehensive assessment of environmental impacts of major projects. Environmental planning and impact assessment involve resolving conflicting community goals. A balance should be struck between broad environmental objectives and socio-economic needs. While environmental concerns must be incorporated in the decision-making process, they should be evaluated in the light of prevailing political, technical and socio-economic conditions.

It is anticpated that the new set-up will produce capable professionals and the much needed public support for the effort. Also, a new body for environment protection can play a catalytic role for development of strong anti-pollution public interest groups to support government programmes; this in turn will help to restore the imbalance of pressure from regulated parties and special interest groups.

VII. ENVIRONMENTAL CONSEQUENCES OF URBANIZATION: TRENDS AND RECOMMENDED ACTIONS

If present urbanization trends continue, ESCWA metropolitan centres in the year 2000 will be more populated, more polluted and more vulnerable to ecological disruption. It is unlikely that housing, water, sanitation and other public services will be able to keep pace with urban growth. Unless decisive actions are taken promptly to alter current trends, city life and environment will be more precarious by the turn of the century than it is now.

A. Urban development

1. Trends

(a) The ESCWA urban population in 1980 amounted to 48 million; in 1990 it will reach 71 million and at the end of the century it will increase to 102 million. Physical congestion and blight will dominate in major cities; they appear to defy efforts towards improvement or control and are causing insoluble problems of planning, management and financing.

(b) Throughout the region, urban/rural imbalance will continue and the existing community services and social institutions may be shattered as a result. Squatters' settlements are mushrooming and in some urban areas they constitute as much as half of the population.

(c) The technological, economic and human resources needed for urban renewal now appear to be beyond the means of most member States. The already extensive burden involved in the provision of housing and urban services is likely to be more difficult in the future as countries with popular urban settlements are experiencing acute balance of payment difficulties which severely restricts the investment in urban development and environmental services.

2. Actions

(a) Suitable planning on a regional scale (city or metropolitan territorial planning) may guide urbanization and redirect internal and external migration to enhance rather than impede development. Planning should emphasize self-reliance and full utilization of existing economic potentials of the region and promote the establishment of new centres to absorb rural people through judicious location of new industries and the development of services in a more decentralized pattern.

(b) Regional development projects at different stages of palnning and execution already exist in some member States. In spite of dissimilarities in the level of economic growth, social structure, politial organization and technological development among countries of the region, it seems possible that exchange of experience on urban planning offers a unique possibility for formulation of sound plans and development of adequate operational policy. In this regard, it should not be overlooked that practical approaches and techniques emanating from the lack of resources in some member States may now prove to be of interest to urban planners in the more developed areas.

B. Management of the urban environment

1. Trends

(a) The organizational tangle of administrative agencies responsible for community services is responsible for the gross ineffectiveness of urban environmental management. Government programmes will continue to develop piecemeal as problem and demands emerge.

(b) Local environmental protection committees will continue to be composed of heads of the executive branch and special interest groups which diminish their effectiveness and responsiveness to the real community needs.

(c) Legislators will resist providing localities with effective tools, funds and swift enforcement devices which may obstruct local initiatives to combat pollution and improve environmental quality.

2. Actions

(a) A new environmental management set-up must be created in major urban centres. The institution should have a clear perspective on the priority environmental problems, and should be flexible and responsive in assigning priorities, researching remedies and devising appropriate environmental enhancement measures.

(b) Management should rely on environmental impact assessment, cost-effective analysis, human perception studies and achievable environmental standards.

(c) Cheaper, more cost-effective programmes adapted to the needs of the local community must be developed and implemented with maximum dependence on local resources. Parctices and technologies evolved in the different social and economic environments may not be appropriate.

(d) External environmental costs should be internalized whenever feasible. Available options comprise restructuring of the pricing policies to reduce environmental stresses and wastage of resources, promotion of environmentally sound practices through rewards and penalizing of undersirable activities and imposing pollutant effluent charges to encourage reduction of emissions.

C. Public participation

1. Trends

(a) Public tolerance or indifference to negative visual and psychological manifestations of pollution and other forms of environmental degradation continues.

(b) The imbalance of pressure on government will rise as the public, in contrast to regulated parties, is not organized to influence administrative and legislative actions. Although public awareness is bound to increase, special interest groups will continue to exert pressure on public decisions.

(c) Evolution of public interest is not conceived in the foreseeable future as benefits of environmental protection are widely disperesed with individuals being affected incrementally.

2. Actions

(a) Environmental policy options must be aired to the public. Information on cost and benefits of alternative measures, environmental impacts and human perception studies must be prepared in laymen's language. Public participation mechanisms should ensure that all interests are weighed in a decision in proportion to their stake in the outcome.

(b) The institutional mechanism should permit recalling of decision-makers by the public or local legislative bodies as a mean of strengthening accountability to and awareness of the public.

(c) Information should be disseminated to the public through news papers, broadcasting services and other mass-media systems.

(d) Strengthening the financial and technical capabilities of the non-governmental organizations and citizens' groups dealing with the protection and improvement of the environment.

D. Housing

1. Trends

(a) Existing trends offer little likelihood of an early solution to the housing problems in the region. The impact of governments' intervention will not ease the housing shortage in the coming two decades, nor will the emphasis on rural development and the efforts towards establishing new cities cause any significant reduction of urban growth and associated housing needs.

(b) It is expected that inadequate financing for public housing and the lack of political commitment will continue to affect governments' investment in housing as the provision of shelter for the masses is regareded as a non-wealth-generating industry. Decision-makers continue to disregard housing as a tool for economic development and as a key source of social benefits.

(c) The region will witness the mushrooming of slums near industrial areas, water courses and railway lines and their spread will present a significant source of physical and social deterioration of the urban environemnt.

(d) Housing problems will be compounded by lack of maintenance of existing building, unrealistic government control of rental policy, absence of regional long-terms plans for housing and unavailability of labour force.

2. Actions

(a) The countries of the ESCWA region are facing the challenge of providing adequate shelter for everyone. Greater use of traditional material

and the incorporation of new techniques in traditional building methods should be advocted, particularly in large labour-surplus countries like Egypt. The excessive use of cement, steel and other scarce materials in luxury construction should be discouraged.

(b) Regional housing boards should explore the potentials for "core house constructions" in low-income areas, where basic facilities and inexpensive materials are provided through construction agencies and further expansions are left to the occupants. Using appropriate building technology with self-help content and locally available materials accords well with the aspirations of the people.

(c) Land policy should aim at mobilizing the necessary financial resources for development, control of land speculation and increase of the area of usable land by utilizing sanitary landfills in the proximity of human settlements and reclaiming seashores to cater for multi-storey construction for public housing. This approach has been followed by Qatar, Bahrain and Kuwait.

(d) Construction of multi-storey blocks in downtown areas as well as near work places should be intensified through the combined efforts of users, governemtns and co-operative organizations.

(e) Development of manpower for construction through on-the-job training and construction training institutes will create extra employment potential and aid in stabilizing housing costs.

E. Water supply, sewerage and liquid pollution

1. Trends

(a) Urban and industrial effluents will continue to be disposed of improperly in the rivers, lakes and coastal zones near the large urban-industrial agglomerations; some member States will be unable to affort the extra cost of pollution control owing to lack of financial resources.

(b) The reuse of domestic and industrial effluents is likely to increase as urban populations expand rapidly, particularly in the water-short Gulf States. The use of treated effluents can recycle nutrients which otherwise may overload the assimilative capacity of water bodies.

(c) Urbanizaion and industrialization will also increase the consumptive uses of water. Cooling for power generating facilities is expected to increase threefold by the year 2000. Thermal pollution is critical in the region as natural water bodies are usually warm for most of the year and, for many species living close to their upper temperature tolerance, thermal discharge is often lethal.

(d) Construction and operating costs of water and sewerage systems in the region are on the average the highest in the world. They are nearly double the costs of Europe and three to four times the costs of Africa and the Americas[3]. Costs will continue to escalate due to reliance on foreign

contractors, adoption of energy-intensive treatment technologies and the abnormal losses of the distribution systems which often consume half of the water supplies.

(e) By the year 2000 water coverage will reach all the urban population of the region while sanitation services will be extended to about 90 per cent of the region, with anticipated complete coverage in urban settlements of the Gulf States, Egypt, Iraq and Jordan.

(f) Provision of water and sewerage services may be impeded owing to inappropriate administrative and financial frameworks, inadequate or outmoded legal instruments, insufficient local production of materials, difficulties in using proper tariffs to curb water wastage, shortage of manpower and absence of a comprehensive long-term regional plans for water and sanitation.

2. Actions

(a) Average urban water per capita consumption has reached about 300 l/d in the Gulf States and between 100-200 l/d in other countries of the region[12]. The needs of the growing population coupled with the scarcity of water supplies require increased reliance on water recycling in industry, extnesive metering and reduction of network losses.

(b) Since provision of a continuous water supply will not be feasible in most ESCWA urban centres because of increasing size of population and limited capacity of distribution systems, it is recommended to supply water at normal pressure at specific periods with minimum pressure being maintained at all times to reduce pollution due to suction if supplies are turned off intermittently.

(c) While the benefits of dams and irrigation development may outweigh the costs, environmental impacts should be incorporated as an essential part of the river basin development schemes. The impact of the Aswan dam is a case in point, as elevation of the water table and increased salinization, were attributed to year-round irrigation; other impacts were the collapse of sardine fishing, the relocation of 100,000 people and the spread of water-borne diseases.

(d) Sewerage master plans should be prepared to relate sewage management to land use, water consumption, transportation and industrial growth.

(e) State governments and central planning agencies should promote the solution of sewerage problems on a metropolitan-wide basis rather than a local piecemeal basis and should provide the needed financial and technical support to accomplish this task.

(f) Several wastewater treatment works face chronic propblems of overloading; treatment upsets due to the pesence of toxic industrial constituents; lack of expert manpower and ineffectiveness of preventive maintenance. Performance has to be upgraded and continuously monitored to enable safe use of treated effluents for crop irrigation and other non-domestic uses.

(g) Enactment of legislation to control pollution and evolution of appropriate emission standards should be "tailor-made" to suit local socio-economic and technical capabilities. At the outset, the environmental standards should be more relaxed than those of advanced countries but gradually reviewed and upgraded to meet stringent environmental quality requirments.

(h) Autonomous water supply and sewerage boards should be established in major metropolitan centres to ensure effective and responsive performance in the construction, operation and maintenance of the services.

F. Industrial development and pollution

1. Trends

(a) The industrialization pattern in most ESCWA countries will maintain most of its present counter-productive effects. Industry will concentrate in urban centres, which will contribute significantly to overcrowding, poor hygiene, overloading of services and appreciable environmental degradation.

(b) In those countries of the region that do not have established polices, and institutional set-ups to ensure implementation of adequate safeguards to alleviate industrial pollution, transnational corporations may seize the opportunity to introduce less cost-intensive polluting industries in order to achieve maximum profitability.

2. Actions

(a) The negative consequences of industrialization should be abated through institution of suitable emission standards, installation of pollution control equipment, implementation of in-plant controls and effective monitoring of pollution sources..

(b) A concerted effort towards recovering the secondary materials would not only alleviate the waste problems but could as well provide a substantial source of raw materials. New impetus should be given to the potential of regional exchange of secondary products for recovery and utilization.

(c) Governments of populated countries should promote employment of labour-intensive less polluting industries, upgrade existing production systems to reduce wastes and decentralize industrialization to ease the burden on the strained urban centres. In the oil producing countries, efforts should be directed towards use of modern low or non-waste technologies and prohibition of hazardous technologies that are no longer tolerated in the industrialized countries.

(d) Development of regional information network for industry and environment and establishment of guidelines on the appropriate technologies and the approach to the siting of industry.

G. Air pollution and the microclimate of cities

1. Trends

(a) With increase in urban growth, the mean temperature in the cities is expected to rise owing to loss of evaporative cooling normally provided by vegetation, the gain of reradiated heat from pavement and heat produced directly by factories and exhaust of air conditioning systems. However, the incremental temperature increase is not expected to produce dramatic changes in climate in the foreseeable future.

(b) The city air will be more polluted with gradual build-up of particulate matter, sulphur oxides and nitrogen oxides. These materials have a climatological effect as well as an esthetic and public health impact.

(c) Air-borne diseases such as chronic tonsillitis and acute bronchitis will continue to prevail in the region.

2. Actions

(a) Preventive and remedial measures should be implemented through control of existing sources and physical planning of present and future areas to take into consideration the quantity and location of sources and the means of disposal of high-load emissions.

(b) To reduce environmental impacts of traffic emissions the policies for public transport and land use should be geared to improve the efficiency of mass transit and limit the growth of automobile use.

(c) Busy centres should be relieved by providing bypass routes to divert unnecessary traffic and concentrate emissions in selected corridors separated from population centres.

(d) Research and monitoring of urban air pollution should be strengthened to enable assessment of sources, loads, mechanisms of transport and dispersion in the atmosphere.

H. Management of urban solid wastes

1. Trends

(a) Mechanization of the collection system will remain the major obstacle towards effective handling of refuse.

(b) Although incineration and composting are carried out in a number of ESCWA cities, sanitary landfills will continue to be the predominant choice of a method for disposal of urban solid waste.

(c) Municipalities will continue to regard recycling of waste as capital investment projects which need to break even or make profit. However, recycling is likely to be an economically feasible option due to the high costs of other disposal methods.

2. Actions

(a) Urban planning should reserve within city master plans an adequate area for long-range refuse disposal need.

(b) Further efforts should concentrate on the potentials for material recovery and on-the-site disposal of refuse.

(c) Governments should promote recycling of solid waste through taxing on virgin materials to encourage use of secondary materials, setting up incentives for industries to use byproducts and eliminating inequity between the transport cost of scrap and virgin materials.

I. Urbanizaion and public health

1. Trends

(a) Health hazards emanating from pollution are likely to increase in the future due to continued release of toxic chemicals which causes poisoning upon exposure to high doses and may induce chronic diseases if released into the environment in low doses for long periods.

(b) The unfavourable climate, malnutrition, low socio-economic standards, hypersensitivity and the deteriorated living conditions in substandard communities will continue to hinder the objective of Health For All by 2000.

(c) Attention will be given to studies on total exposure of populations and sensitive subgroups to potentially toxic substances arriving by various pathways.

(d) Hazards of traffic pollution are bound to increases particularly in the congeste city centres; with potential formation of excessive photochemical oxidants responsible for smarting eyes, throat irritations and impairment of lung functions.

(e) Illness related to life-style in urban communities and the link between environment and mental health will remain a focus of attention.

2. Actions

The following are recommended:

(a) Continued support for the United nations and other international efforts to control major infectious diseases and programmes for promoting human environment in urban settlements.

(b) Development of effective programmes for primary health care in ESCWA's metropolitan centres.

(c) Support for research and development on improved environmental quality and actions to combat environmentally induced diseases.

(d) Threshold limit values and acceptable daily intakes of potentially harmful substances established based on regional epidemiologial studies in view of prevailing undernutrition, spread of parasitic infections and exposure to unhygienic environment among majority of urban population.

(e) Concerted efforts to develop health information systems and data on mortality and morbidity associated with environmental pollution. Such data are essential for carrying out retrospective analyses of cause - effect relationships and the consequent devising of appropriate remedial measures.

(f) Assessment of health impacts, particularly risk assessent, should be incorporated along with environmental integrity in the feasibility studies of the major developmental programmes.

J. Transprot, tourism and recreation

1. Trends

(a) Urban transport networks will gain more attention as a dominant mover of people and goods. However, progress may be slowed by lack of parking areas, lack of co-ordination between various mass-transit systems, unsatisfactory road conditions and inefficient traffic control systems.

(b) Tourism is likely to expand, especially for coastal cities and prime historical sites, which will bring added social and environmental strains along with financial benefits to areas with touristic potentials.

(c) Development of adequate urban recreational facilities is crucial for urban dwellers; however, the shortage of land, water resources and public finance will continue to affect rapid development of recreational centres in most cities of the region.

2. Actions

(a) Further actions are needed to limit noisy and polluting vehicles, continued development of roads, traffic systems and extension of services to suburban areas; regulatory instruments should be devised where appropriate to achieve these tasks.

(b) Guidelines should be developed to reduce damaging impact of tourism on fragile environments and urban communities.

(c) Recreation should be regarded as an important aspect of metropolitan planning; local governments should support private and public endeavours to provide recreational facilities in urban centres.

(d) Legislation should be enacted to provide a means of acquiring and preserving land and other natural resources for recreational use.

(e) The pbulic awareness of the social, cultural and health values of recreation should be enhanced.

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ANNEX I

CASE STUDY OF THE ALEXANDRIA METROPOLITAN AREA[6, 22]

I. INTRODUCTION

The last 30 years have witnessed an unprecedented scale of urbanization in the Alexandria Metropolitan Area (AMA). Citizens are feeling the untoward effects of environmental deterioration due to rapid urbanization, abuse of resources, inadequate community services and inferior sanitation. A considerable part of the population remain slum dwellers, unable to integrate into the urban community and its institutions.

Uncontrolled urbanization poses unique social problems. Illiterate, unskilled, and socially bewildered citizens occupy squatter shack-areas and are offered limited employment, a bare subsistence and little chance for self-improvement. They are economically idle and are a serious drain on the overburdened public services.

Public expenditure for infrastructural expansion has been quite limited as available resources are being invested in priority development projects; this places tremendous stresses on existing environmental control services.

Among the decision-makers in Alexandria, there is increasing appreciation of the linkages between improved environment and socio-economic development, and a renewed emphasis on extending basic sanitation as a contribution to development and enhancement of the quality of life. Present social and economic trends provide sufficient justification for a comprehensive approach to the conceptualization and planning of environmental management to replace current segmented approaches in AMA which tend to overlook the interactions among environmental activities and programmes designed for their control. This approach has led to the organization of categorical programmes in virtual independence of one another and their administrative assignment to different agencies. However, it is recognized that reorganization and integration of environmental management activities in AMA will require the following: massive infusion of funds; radical institutional and organizational changes; better assessment of cause and effect relationships; and firmer action to counter the diverse impacts stemming from environmental pollution.

At the outset, it is necessary to emphasize that enhancing environmental quality does not necessarily mean arresting metropolitan growth or even slowing urban development. Urbanization in AMA is a dynamic process which will continue to develop progressively in the foreseeable future. However, there are increased fears that if existing patterns of metropolitan growth proceed amidst a welter of institutional set-ups which are not prepared to handle vital issues of urbanization either functionally or jurisdictionally, then even earnest community and government efforts will bring about only limited favourable environmental impacts.

II. PROFILE OF METROPOLITAN ALEXANDRIA

A. Physical, climatological and hydrological features of of Alexandria

1. Physical characteristics

The basic physical features of AMA are the Mediterranian Sea, the lower Nile Delta lands and the vast western desert. Alexandria is characterized by varied geological and topographical features. The linear urban development of AMA was due to the location of Alexandria between a ridge and a marine lagoon, both of which parallel the seashore (see figure 5). A ridge of calcareous rock and sand occurs 500 to 1,500 metres inland from the seashore from Abu Kir in the east to the eastern desert. The lagoon lies behind the ridge and extends beyond the urban areas of the city in both directions. The width of the grounds dominated by the ridge varies from 1.3 to 4.4 km and offers suitable foundation conditions, with ground water generally present at sea level. A large area from the original lagoon has been recovered for agriculture and construction of a drainage network. The remaining water bodies are Lake Maryut to the west and Lake Idku to the east.

2. Climate

There are two seasons in Alexandria: summer, which extends from May through October, and winter, which runs from November to April. Prevailing winds are off the sea from the north-east. Winter is the rainy season with a mean annual rainfall of 192 mm; most of the rain is derived from small squalls of limited extent which under the influence of strong winds occur for relatively short periods.

The breeze from the Mediterranean Sea during summertime attracts vacationers from Egypt and other Arab countries. The mean maximum temperatures of Alexandria vary between 18 to 30 degrees C with an annual average of 25 degrees C and the mean minimum temperatures vary between 9.3 degrees C in January to 22.9 degrees C in August. Relative humidity averages 73 per cent. However, it may reach saturation during short periods in the summer season. The high humidity, together with salty spray from the sea, contributes to the appreciable corrosive effect on buildings and other structures facing the seashore.

3. Hydrological features

The hydrology of AMA is influenced by tropical zone circulation of air masses which are at high altitudes near the equator, flow north to latitude 30 degrees and descend to flow south near the equator, where rising air currents are cooled, causing precipitation. Much of the rain falling on AMA flows directly to the nearest watercourse. The sandy soil outside the urban areas allows infiltration and permits air circulation in the pore space, which causes a high evaporation rate. Therefore, the hydrologic characteristics of the area reduce the accumulation of ground water with a virtual absence of the lenses commonly found in other mid coastal areas.

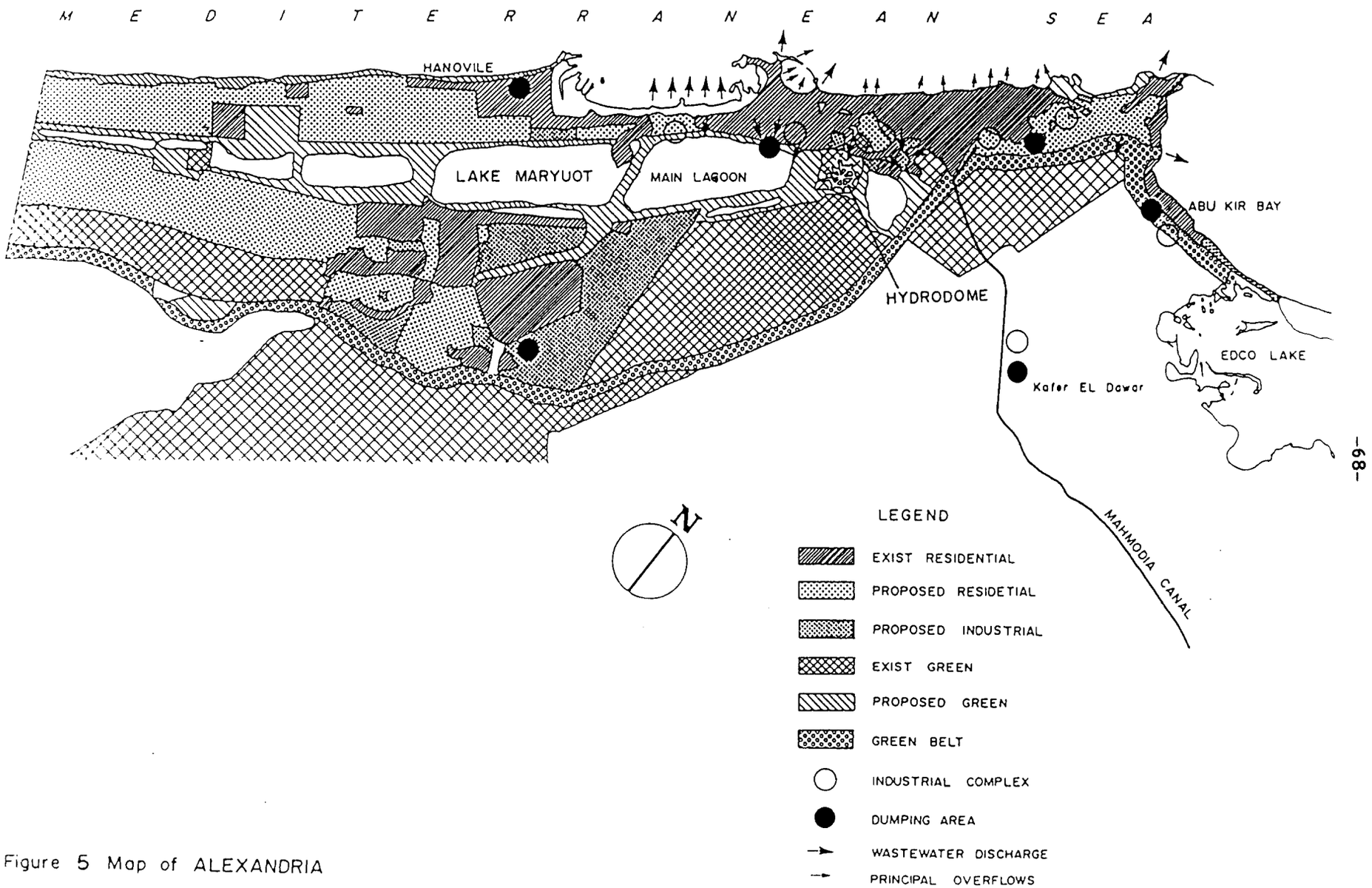


Figure 5 Map of ALEXANDRIA

B. Urban development

Most of the urban development exists in Old Alexandria around the natural harbours on both sides of the Anfushi Peninsula and has reached complete saturation resulting in considerable congestion and appreciable environmental degradation. The shoreline properties are rapidly developing as high-rise buildings which further burden the existing infrastructural facilities. The large area between Montazah and Abu Kir is not likely to be developed as a residential area owing to a recent government decision to ban urban development on agricultural lands. However, Abu Kir itself is being developed rapidly and its population has been increased tremendously during the past few years.

Industrial development has taken place along the western harbour west of the dock area in Mex along the railroad and the Mahmoudia Canal south of downtown and along Abu Kir Bay. Low-cost housing and haphazard commercial development have also taken place in several of these areas.

C. Population and housing

Alexandria's population increased from 2.32 million in 1976 to 2.71 million in 1980 and is expected to reach 5.00 million in the year 2005. Among Alexandria's districts Ameriya has a population density of 133 persons per sq km, the east district has 7,000 persons per sq km and the west district has 32,000 persons per sq km. The population density of 60,000 persons per sq km in the middle district already exceeds the "normal saturation level" of urban development. The percentage of population of each district is as follows: Ameriya 4 per cent; West 19 per cent; Gomork 11.5 per cent; Middle 27 per cent; East 25 per cent; and Montazah 13.5 per cent. The current annual rate of increase in the AMA population of about 65,000 requires a major programme of housing development to serve various population groups, especially the low and limited income groups. The Master Plan proposes extensive expansion of the area to the west of the city to preserve the valuable agricultural land located south-east of the city. The city occupies approximately 45 sq km or 1.6 per cent of the AMA total area of 2,716 km. The city currently has a shortage of 100,000 houses and the Master Plan envisages the addition of 620,000 units to meet the needs of increased population up to the year 2005.

D. Road network and public transport

Current traffic problems in AMA are attributed to the following: disorderly expansion of the city and rapid increase of private automobiles; extreme shortage of public transport facilities and inadequate connections between different transport systems in the city; shortage of car parks and insufficient road maintenance and management works. The Master Plan proposes a comprehensive network of circulation systems to link the city from east to west and provides for a number of axes from which the city can be approached and tied to a regional circulation network. Improving the road network involves construction of a highway by filling in the Mahmoudia Canal, construction of an elevated highway over the Abu Kir railway, construction of six car parks, and widening the Corniche road on the seaside.

E. Industrial pollution

Alexandria's manufacturing industry constitutes about 40 per cent of Egypt's industrial activity; industrial complexes tend to concentrate near the Mahmoudia Canal (Moharrem-Bey, Nouzha and Siouf complexes), along the coastal areas of Mex and Abu Kir. During the past decade, fish production in Lake Maryut has declined by about 80 per cent owing to direct discharge into it of industrial and domestic effluents. In addition, the lake has ceased to be a prime recreational area because of its offensive conditions and unsightly overgrowth of weeds. Similar environmental degradation is rapidly developing along the seashore as a consequence of discharge of untreated wastewaters through badly situated outfalls.

According to government records, about 1,243 industrial plants and production units are located in AMA, generating about 1 million cubic metres of untreated effluents daily. The paper, textile, and food industries are the main contributors of organic lead. The amount of industrial solid residues generated in AMA is approximately 4,500 T/d of which 85.5 per cent are inorganic non-hazardous residues, 14.1 per cent are organic and food residues and 0.4 per cent are metal and miscellaneous hazardous wastes. The General Organization for Industrialization (GOFI) has undertaken a programme to control industrial pollution in AMA. The priority list includes edible oil processing, textiles, inorganic chemicals, starch and detergents, and dyestuff and organic chemicals production. The treatment units will be installed during 1986/1987.

F. Alexandria port traffic

About 80 per cent of Egypt's port traffic is currently handled through the port of Alexandria. Despite its nominal capacity of 19 million tons per year (MT/y), the records of 1983 indicated a loaded-off loaded amount of 30.8 MT. The Port Authority will soon commission the first specialized container terminal in Egypt to service the latest generation container vessels on 14 m draught alongside the berth.

A new grain silo is being constructed adjacent to the port's existing old grain facility with a capacity of 100,000 tons. In addition, a project has recently been started to widen and deepen the main approach channel of the Great Pass from its present 183 m width and 10.5 m depth up to 220 m width and a minimum maintained draught to 13 m.

Dekhaila Port is located 23 km west of Alexandria; its first phase has been scheduled for completion in 1986/1987; the port will handle 5 MT/y of bulk, general cargoes and containerized traffic. The port will have an access channel and turning basin some 3.5 km long dredged to a depth of 20 m with an inner harbour of variable water depths at different berths. This will provide a facility adjacent to the Alexandria National Steel Company expected to be on-stream in 1986 with an initial output of 0.35 MT/y and with an ultimate output of 0.72 MT/y of steel bars and rods. The plant will utilize natural gas supplied from Abu Kir offshore fields.

G. Public Health in Alexandria

Recent vital statistics indicate that the infant mortality rate in AMA exceeds that of the country as a whole, a reflection of the serious urban environmental health situation in the city. Typhoid, paratyphoid, infectious hepatitis and dysentery are all endemic in AMA.

The combined effect of inadequate sanitary conditions for water supply, waste disposal and food processing and handling contributes to deteriorated public health conditions in AMA. Some of the most notable deficiencies are:

- Absence of sewers and adequate disposal systems for industrial effluents in some densely populated regions in the city;

- Frequent leakage of sewage from existing collector sewers or force mains into drinking water canals;

- Widespread use of contaminated surface waters for municipal purposes in the substandard communities;

- Periodic discharge of sewage to bathing beaches;

- Topography of the city which enhances formation of sewage-filled ditches.

H. Sewerage and sewage treatment works

At present, about 40 per cent of the population are provided with sewerage services. Alexandria's need for rehabilitation and expansion of the existing sewerage and sewage treatment works is essential to meet the needs of the rapidly expanding industries, population growth and tourist influx.

AMA has two sewage treatment works. The eastern plant provides secondary treatment of 60 000 m^3/d. Combined treatment of industrial and domestic wastes at this plant already causes adverse operational problems, including accumulation of sludge, clogging of the sewer network, inhibition of biological treatment processes and reduction of treatment efficiency. The western plant provides primary treatment for 85 000 m^3/d. This facility will be expanded to 220 000 m^3/d and the effluent will be delivered to Kait Bey pumping station for discharge to a submerged sea outfall. Major untreated discharges occur at Abu Kir Bay, Kait Bey outfall, the western harbour and into Lake Maryut through a number of sewer outfalls. In addition, many local points of discharge to the Mediterranean exist for shoreline overflows. These discharges consist of primary sewage except during winter months, when sewage is diluted with storm runoff. The following are constraints which hinder proper management of the system:

- Fragmentation of activities limits the development of cohesive policies and programmes. This situation also creates the potential for overlapping responsibilities and duplication of efforts;

- Duties of managers and technical staff do not contain delineation of responsibilities nor definitions of the specific authorities granted. This leads to inconsistency and lack of direction;

- Training and management development have received low priority;

- Manpower throughout the organization is not adequately prepared, either educationally or by previous experience, for most technical and managerial positions;

- Ineffectiveness of some units is attributed to a combination of overstaffing, lack of knowledge as to what measures to take and lack of incentive or pressure for supervisors to improve productivity.

I. Water supply

The Rond Point facilities (360 000 m^3/d) were the only treatment works serving Alexandria until 1934, when the Siouf works were built to cope with the expansion to the east (337 000 m^3/d). In 1961 the Forn El-Garya plant (42 000 m^3/d) was built. Further treatment facilities have been provided by the construction of the Manshia (370 000 m^3/d), Maamoura (71 000 m^3/d) and Maryut (93 000 m^3/d) plants. The capacity of water treatment will be increased to 2.5 mm^3/d in 1990 to serve 4 million inhabitants. Surface water with a quality suitable for municipal and industrial uses is available in large quantities from the Nile River and is being used as intake for all treatment works in the AMA.

The following are difficulties encountered in management of the Water Supply System in AMA:

- AWGA (the Alexandria Water General Authority) is accountable to numerous governmental agencies for various aspects of its operation; these comprise in total, six ministries and the Governorate of Alexandria. AWGA's management has little freedom in vital areas such as rate setting, operating procedures, service areas and outside accountabilities.

- The unrealistic low water rates have prevented the organization from achieving financial self-sufficiency.

- Service areas are usually annxed to AWGA by decree. One such area is the Western Desert which represents an appreciable financial and operating burden on AWGA.

- Accountability to outside agencies emphasizes procedures employed rather than results achieved. In several instances internal decisions are overruled by outsiders who are not fully aware of the organization's needs.

- State financial subsidies are generally unpredictable; this renders long-term planning futile, dilutes internal cost controls and conceals the true impact of unrealistic tariffs.

- Delinquent payments by large users present a unique problem to AWGA. Although these represent less than 1 per cent of the total customers in the system, their revenues under the current tariff schedule account for 25 to 30 per cent of the total revenue.

J. Refuse collection and disposal in the area

A house-to-house refuse collection service is provided for about 30 per cent of the population. This service is provided on a fee basis by private collectors. However, the service is gradually diminishing in many areas due to lack of manpower and the low charge paid by the house-holders. The remaining population and most commercial establishments dump their wastes into the streets or refuse container boxes. Refuse is then transferred to "transfer points" within the city for sorting and separation of recyclable materials. The remaining residues are trucked for ultimate disposal at three land reclamation sites in the suburbs of AMA.

According to the most recent estimates the amount of refuse collected ranges from 1,500 t/d in winter to about 2,100 t/d in summer.

The salvage of reusable materials is important as it saves a portion of imports of plastics, paper, metals and much of the organic matter finds its way on to farm land, thereby improving land fertility. Recycling of solid wastes is done at a higher percentage and a far lower cost than in other metropolitan areas.

Constraints of the existing refuse management system are:

- "Garbage collectors" working for private contractors obstruct traffic, spoil the look of the city and themselves constitute a health hazard.

- The Governorate of Alexandria lacks the manpower and equipment even for removal of street wastes.

- Piles of solid wastes in the streets, at sorting sites and open dumps are breeding areas for flies and contribute to environmental degradation problems in residential areas.

  Although a pilot composting plant is currently operating at AMA (150 t/d), wide application of refuse composting will be delayed due to financial constraints. Composting would allow for efficient recovery of valuable materials, production of high quality compost at reduced volume, exclusion of the private garbage collectors from the system with consequent elimination of a source of public nuisance, and efficient control of the scavenging operation as the system will be under the direct control of local municipalities.

  AMA lacks a coherent solid waste management scheme; this in turn affects enforcement of legislation, training and development of manpower, acquisition of needed equipment and facilities and long-term planning for refuse management in the city.

K. Air pollution

Extensive rapid industrial development has increased the occupational hazards and air pollution problems in seveal areas of AMA. Existing industrial areas, although widely scattered throughout the Governorate, are mainly located in El Mex, Dekheila, Nouzha, Smouha, Siouf and Abu Kir. Areas which are undergoing substantial industrial development are located in Amria, along the northern edge of Lake Maryut, in Dekheila and along Abu Kir Bay. In Amria an industrial free zone is rapidly developing, with anticipated increase in air pollution problems in the area. A major petroleum transfer station is located in the western part of the Governorate and a nuclear energy project is planned to the west of the petroleum transfer station. Toxic gases, vapours, dusts and fumes are generated in a number of specific manufacturing operations and in-service trades requiring the use of chemicals.

Low-income housing and commercial development in dense configurations have also occurred in several of these areas. Population densities range from 400 persons/ha in higher-income areas to about 1,400 persons/h in low-income areas. In some parts of the city the densities are in excess of 1,700 persons/ha. People living in these densely populated areas are subjecting their respiratory systems to severe tests by concentrating themselves, their activities and their airborne wastes in such conurbations. Public health records show cases of individual suffering after long exposure resulting in chronic bronchities, emphysema and lung cancer; such cases are sufficiently numerous to constitute epidemiological evidence of injury from polluted air in the substandard communities.

III. REVIEW OF ENVIRONMENTAL ACTIVITIES AND PROGRAMME COMPONENTS IN AMA

Environmental activities in AMA have been arbitrarily divided into two major groups: (a) public services; and (b) activities related to promoting and maintaining favourable environmental quality.

(a) Master plan. In the course of programme development, projected community needs are merged with available resources and co-ordinated with other environmental activities so as to arrive at a comprehensive plan for specific public services. In AMA, master plans have been developed already for water, sewage and public health while those for transport, housing and refuse are being prepared and will be ready within a few months.

(b) Technology. Implementation of environmental activities depends upon technology, which represents the vehicle to convert objectives into practical solutions. Except for water and health it is apparent that most environmental technologies available to public services in AMA are either inadequate or require substantial upgrading. It is obvious that relying on less efficient technologies produced negative impacts on public services regardless of efforts put into improving other programme components.

(c) Norms and criteria. Norms include objectives and targets of environmental activities and standards of quality, quantity and efficiency to

achieve specific targets. Criteria are a set of measures on limitations which complement the norms. For most environmental activities in AMA, satisfactory norms and criteria have been developed in the light of community needs and available resources, except for industrial pollution limitations, which are not geared to the real technical and economic situations in AMA. Establishment of achievable industrial emission criteria requires a critical assessment of local capabilities and environmental protection needs. Factors such as cost, level of technology, available resources and pollution loads must be considered when establishing practical criteria for industrial pollution control in AMA.

(d) Enforcement. Environmental legislation can only be applied to the extent that there is a resolve on the part of those who have the authority to ensure their enforcement. The primary responsibility lies with officials of the Alexandria Governorate to make every endeavour to establish and organize specific environmental protection guidelines and set the necessary administrative machinery for enforcement and follow-up. The observed ineffectiveness of the legislative instruments is attributed to three constraints;

(i) There is an apparent lack of environmental awareness among some officials who fail to recognize the consequences of environmental degradation in AMA;

(ii) Despite the fact that considerable pollution is contributed by the obsolete technologies, i.e., old industrial operations, the present trend is that legislation must not be imposed retrospectively to penalize existing industries which were originally designed and operated without due consideration given to their environmental impacts;

(iii) There is an absence of a viable monitoring scheme and resources needed for effective enforcement.

(e) Manpower development. Training and management development have received low priority in almost all environmental organizations in AMA. This and the continuous draining of expertise to private enterprises and rich Arab countries have led to an extreme shortage of manpower for the key technical and managerial positions as well as operators of public services. Due consideration should be given to strengthening labour skills through apprenticeships and on-the-job training.

(f) Monitoring. In-house monitoring is an essential activity of major public service institutions. However, their monitoring programmes are, by and large, designed to meet specific operational requirements rather than satisfying the needs for integrated environmental surveillance in AMA. Monitoring should be regarded as an essential tool for feedback, control and problem evaluation. Monitoring also contributes to technical information that constitutes the scientific base for development of suitable environmental criteria in AMA.

(g) Management. Arrangements and institutional set-up for control, planning and communication constitute the corner-stone of an integrated

environmental programme. This component generates, mobilizes, procures and develops most of the others. The quality of the managerial staff, which represents a crucial element for effective implementation of environmental activities, is still lacking in AMA. Channelling of feedback information from operator, operands and monitoring network is inadequate; this in turn affects the response to public demands and reduces effectiveness of resources utilization. Other environmental management constraints in AMA are:

(i) Accountability to numerous governmental agencies, local administration and various political institutions with little control over operating procedures, service areas and project financing;

(ii) The unpredictability of government subsidies, which affects planning, dilutes internal cost controls and conceals the time impact of the imposed low tariffs;

(iii) The control of personnel administration in public service institutions by national regulations which seldom consider the special nature and the unique expertise required for certain environmental activities.

(h) Co-ordination. Co-ordination among various institutions is beset with difficulties stemming from the absence of an institutional set-up for environmental management in Alexandria, lack of clear responsibility for strategic environmental planning, fear of interference with other agencies' programmes and vagueness of the communication channels among key managers and decision-makers in AMA.

(i) Financial resources. Records of budget and financial resources of major public service institutions indicate adequate government subsidies. Substantial international aid is available to water, sewerage and public health services. However, some services and environmental enhancement projects are suffering in various degrees from lack of funding due to low or even non-existent operational revenues and inadequate government appropriations. As a consequence of the elaborate procedural safeguards and barriers against possible misuse of public moneys, most agencies were forced to function slowly, which affected their performance. Tight centralization of accounting functions in some organizations created an atmosphere of timidity. However, several agencies are currently operating on a post-audit basis which allows checking of expenditures against budget after the fact. This decentralization of financial controls permits flexibility for day-to-day operation and accelerates implementation of work programmes.

(j) International co-operation. Several United Nations and international organizations are providing technical and financial support for major public service programmes in AMA. Among these organizations are the World Bank (water), USAID (health, sewerage and industrial pollution), Japan International Co-operation Agency (refuse disposal), the World Health Organization (health) and the Italian Government (transport).

(k) Implementation. Implementation of environmental activities involves establishment and mobilization of the resources and operands needed to achieve

programme objectives. Implementation of public service maintenance and expansion schemes in AMA faces severe constraints. Managers faced with inaccessibility of inputs (financial, equipment, manpower, etc) are often forced to alter implementation schedules. Several agencies encounter serious problems due to delays in importation and clearance through customs of equipment and spare parts, unavailability of some construction materials, scarcity of expertise and insufficient funding of renovation and expansion projects. It has been noted that resources and time factors involved in programme implementation are not meshed, which leads to ad hoc emergency actions, wastage of resources and dissatisfaction among idle staff. It is recommended that administrators should address this critical problem through development and use of a Programme Planning and Implementation Scheme (PPIS) which involves co-ordination of actions in order to initiate various programme elements according to an appropriate schedule. The use of PPIS will enable the managers to concentrate on priority activities and accept some delays for non-critical activities to minimize wasted expenditures and maximize utilization of equipment and manpower.

Due to the limited scope of this report, it is not possible to detail the functions of PPIS which involve monitoring, co-ordinating, consulting, budgeting, organizing, replacing resources, adjudicating, resolving conflicts, developing manpower, controlling, evaluating, etc.

(1) Research. There is an apparent need to strengthen and promote applied research and field studies in areas of water supply, appropriate sewage treatment and disposal technologies, refuse management, abatement of industrial pollution, transport and food hygiene. Research programmes in AMA should be co-ordinated among existing research institutions (High Institute of Public Health, Graduate Research Institute, Occupational Health Research Centre, Institute for Fisheries, etc.) to avoid overlapping and to meet emerging research needs of various environmental activities in AMA. The following research activities were identified during visits to research institutions;

(i) Assessment of trace constituents in potable water and selective treatment technologies for their removal;

(ii) Treatability studies of industrial wastes to assess the need for on-site treatment, centralized or joint treatment with domestic wastes;

(iii) Assessment of occupational hazardous and remedial measures;

(iv) Survey of air-pollution sources and testing appropriate control measures.

It is recommended that research be initiated in areas related to assessment of the toxicological and epidemiological effects of water pollution, material recovery, renewable sources of energy, economic impacts of environmental pollution and potential for land application of primary treated sewage.

(m) Public awareness. Creating a strong awareness of the need for environmental protection goes in parallel with other programme components of environmental activities. A community spirit and public awareness are not apparent in Alexandria. This spirit is essential to formulating goals, developing tactics and expediting implementation of environmental activities. Environmentally oriented societies such as "The Medicine and Law Society" and the "Environmental Enhancement Society" should be encouraged to continue their role in identifying environmental threats, educating citizens, and strengthening environmental awareness in AMA.

Annex II

ENVIRONMENTAL MANAGEMENT IN AMMAN(7)

I. INTRODUCTION

The Greater Amman Area (GAA) encompasses all communities within a 30 kilometre radius of the centre of Amman. GAA comprises the municipalities of Amman (Amant Al Asama), Wadi el Sir, Suweileh, Baqa'a Camp and the suburban ring. The GAA boundaries are defined in figure 6.

GAA has experienced rapid growth in the past 30 years due to large-scale economic and industrial development and mass migration of the rural population to metropolitan Amman, coupled with waves of explosive increases in population following the wars of 1984 and 1967.

The population of GAA is expected to increase from its current level of 1.5 million to 2.1 and 3.0 million in the years 1990 and 2000 respectively. Amman will reach a population saturation within 10 years while saturation of the suburban municipalities is expected to occur beyond the year 2000. The impact of population control policies is not likely to be felt in an easing of present environmental problems; nor is it likely that the pursuance of a rural development policy and emphasis on the establishment of new smaller towns in the kingdom will cause an appreciable deceleration of urban population growth in GAA in the foreseeable future.

Problems of urban congestion, inadequacy of shelter, public services, and recreational facilities, have raised serious problems of public health, particularly in the substandard communities. A substantial proportion of the refugee camps and surrounding areas is made up of constructions which are permanent but meet only low living and sanitation standards. These slums are an inevitable by-product of rapid urban development which spread outwards from the city centre to create a source of physical and social deterioration in the urban environment.

Most environmental programmes in GAA tend to be ad hoc in terms of conception, resources support and management. Managerial policies and procedures are not compatible with the needs for closer collaboration and co-ordination among environmental institutions in GAA. As a result, there are many gaps between programmes and noticeable overlapping of programme activities. This is attributed to lack of recognition that physical, social, economic and environmental aspects in metropolitan Amman are so closely interrelated that programmes can only succeed if they are well co-ordinated and integrated within a framework of a long-term development plan.

II. PROFILE OF THE GREATER AMMAN AREA

A. Physical, climatic and hydrological features of GAA

GAA lies in central Jordan and consists mainly of a mountainous region with an elevation ranging from sea level to 1,00 metres above sea level.

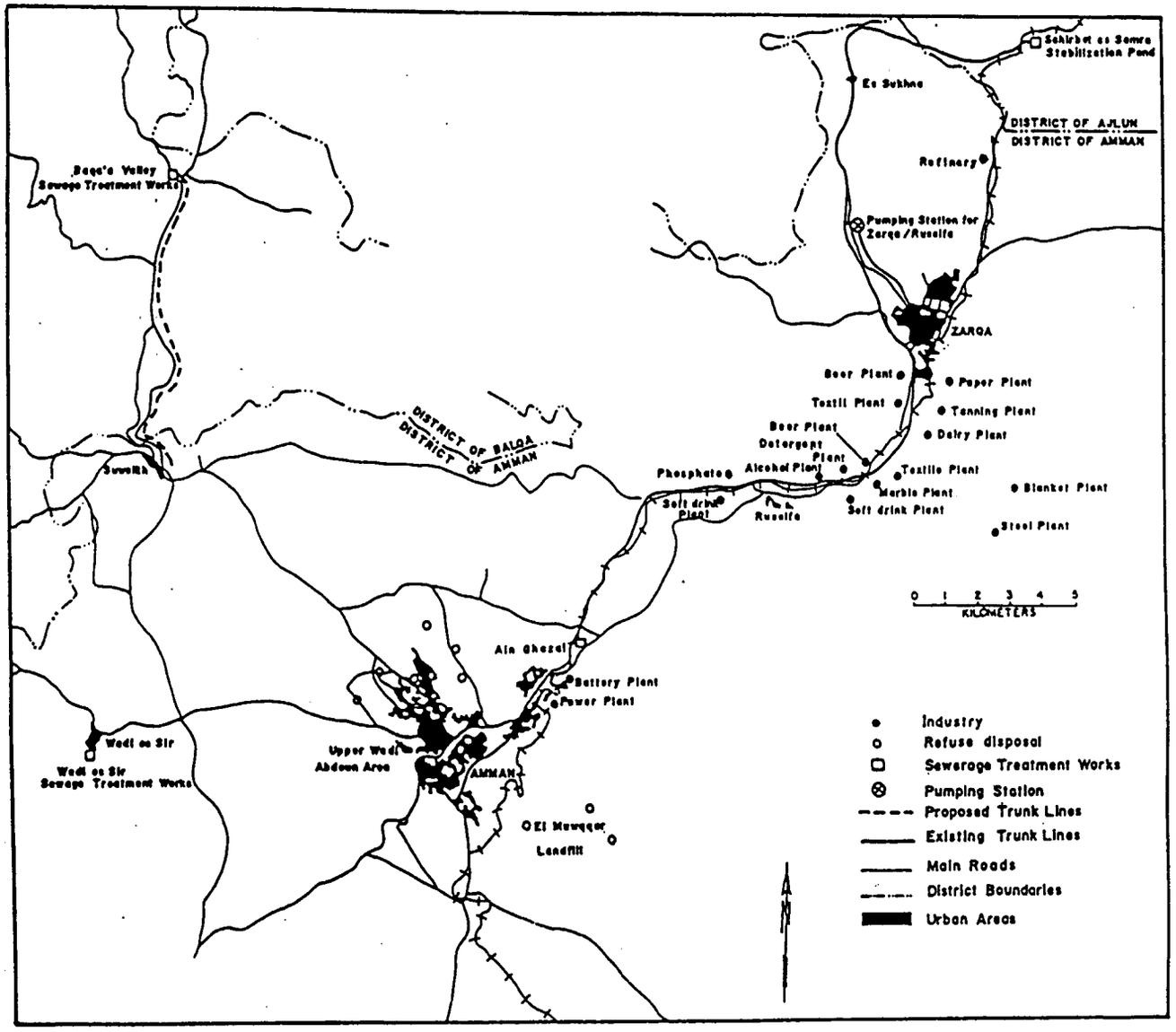


Figure 6. Greater Amman Area

The morphology of the western part is rugged and slopes are steep while the eastern part is characterized by more landscape and less precipitous inclines. The western highlands drain to the Jordan valley via wadis with steep gradient slopes. All other areas are drained mainly by the Zerka river which originates in Amman and flows towards the north-east, passing the towns of Ruseifa and Zerka. Downstream of Zerka the river twists to the west until reaching the King Talal Dam, then the wadi runs westerly until it joins the Jordan Valley.

The urban area of Amman-Zerka occupies the upper watershed of the Zerka river. The underlying area is the extensive Wadi El Sir aquifer which is still underexploited. The aquifer consists of an unconfined limestone upper zone and a confined highly fractured, dolomitic limestone lower zone. The waters in both aquifers are connected via faults.

The climate of GAA is predominantly of the Mediterranean type with relatively warm dry summers and cool wet winters. The temperature rarely falls more than a few degrees below freezing in winter and seldom exceeds 330 centigrade in summer. The rainy season starts in late October and continues through March and April and the prevailing westerly winds get their moisture from the Mediterranean and deposit it over the western uplands. The winter winds are mainly south-westerly with average speeds of 20-30 km/hr. Occational south-westerly gales are experienced. Calm conditions prevail for between 20 and 30 per cent of this period. Especially at night and in the early morning. The summer winds are mainly south-westerly with speeds of 15-30 km/hr. Khamsinic south-easterly winds occur during the early summer.

GAA occupies an area of 2,828 square kilometres, or 3.2 per cent of the nation's area. About 60 per cent of the Jordanian population lives in GAA while 76 per cent of the industrial establishments and 87 per cent of the workforce are located in the metropolitan area. It is obvious that GAA is the prime urban region in Jordan and as such a primary locus of many of its developmental and environmental problems.

B. Water supply

The water consumption of the connected supply averages 85 litres per capita per day (l/c/d). About 85 per cent of the population is connected to the public water network, the reminder being served by tanks and public taps. The present water sources of about 39 million cubic metres per year (MCM/Y) come from local wells (20 MCM/Y), from the Azrak well field located some 85 km east of Amman (12 MCM/Y) and from the Qastal and Siwaqa well fields located south of Amman (7 MCM/Y). The level of water unaccounted for is about 44 per cent which is quite abnormal and attributed to leakages in the old distribution system. The losses are being steadily reduced through an ongoing project for rehabilitation of the outdated water mains.

The East Ghor Main Canal project which has been recently comissioned has a capacity of 45 MCM/Y and is expected to increase the water supply to GAA to 85 MCM/Y. Water demands will increase to 101 MCM/Y in 1990 and to 172 MCM/Y in 2005; existing water resources and those under development would be sufficient till about the mid-1990s.

C. Sewage disposal

In GAA there are four sewage treatment works:

1. Ain Ghazal Treatment Plant (AGTP) which incorporates an activated sludge process and anaerobic sludge digestion. The plant was designed to treat 60,000 m^3/d at a biological loading of 15,000 kg/d. However, AGTP is presently treating 50,000 m^3/d servicing a population of about 600,000. The plant performance has been adversely affected by the high strength sewage (influent biochemical oxygen demand BOD 550 mg/1 and effluent BOD 100 mg/1). AGTP was temporarily shutoff on 12 May 1985 and the raw sewage was switched to the newly constructed stabilization ponds;

2. To overcome operational troubles of AGTP and to extend sewage disposal facilities a new stabilization ponds facility was commissioned in the area of Scherbet el Samra in May 1985. Sewage is currently conveyed from the city of Amman to the stabilization ponds by gravity in a transmission main with a length of about 40 km to treat an average flow of 68,000 m^3/d (35,750 kg BOD/d), or a maximum of 148,000 m^3/d. The works is expected to provide satisfactory treatment (BOD 30 mg/1, Suspended Solids (SS) 30 mg/1) to enable effluent reuse for irrigation Purposes. Both AGTP and the stabilization ponds are expected to provide sufficient capacity for treatment of sewage from Amman's draining zone up to the early 1990s;

3. The city of Salt has about 30,000 inhabitants and is situated about 30 km north-west of Amman. The sewage treatment works comprises extended aeration and effluent chlorination; surplus sludge is dried in drying beds. About 90 per cent of the population is connected to the sewer system of Salt;

4. The Sewerage and Sewage Disposal Master Plant of GAA comprises the following:

(a) Extension of sewerage services to cover 94 per cent of the Amman population by 1989 from the current level of 75 per cent;

(b) Reduction of groundwater pollution by decreasing the infiltration of cesspool effluents;

(c) Adoption of the sewage treatment requirements to effluent reuse for agricultural purposes.

The first phase of the Master Plan which covers the period up to 1990 will include: (i) extension of the sewage treatment systems in Amman and Upper Wadi Abdoun (suburban ring, the eastern Wadi El Sir and southern Suweilal; and (ii) extension of sewage treatment and sewerage in the Baqa'a Valley and Wadi El Sir drainage area.

D. Management of water and sewage

The Water Authority (WA) created in December 1983 has taken over the Amman Water and Sewerage Authority (AWSA), the Water Supply Co-operation, previously responsible for bulk water supply, the water resources division of the Natural

Resources Authority and the Municipal Water Supply Departments within GAA. The WA is an authonomous agency enjoying independent financial and administrative status.

Management constraints include the following:

1. Manpower throughout the authority is not adequately prepared either educationally or by previous experience for technical and managerial positions.

2. Tariff structure is not geared to the needs for generating adequate revenues to permit financial viability of WA and to encourage water conservation.

3. Measurement errors are significant which affects reliability of planning demands, costing and measurement of efficiency; on the other hand, appreciable water losses lead to wastage of scarce water resources. Ongoing rehabilitation programmes aim at reducing losses and eliminating measurement errors;

4. Delinquent or delayed payments by large users present a problem to WA. The WA management is devising systems to provide incentives for improvements in bill collection and reducing the proportion of outstanding receivables;

5. Inadequate water supply is the single most important constraint to GAA's socio-economic development. Demand continues to increase at a vast rate for domestic, industrial and agricultural uses. The rapid rate of urbanization and population growth are outpacing projects directed at meeting water demand.

6. Water resources identification and use information is not yet adequate to permit effective water use planning and management;

E. Refuse collection and diposal in GAA

The vast economic and population growth of GAA has contributed to the generation of enormous amounts of solid wastes; approximately 200,000 tons of solid wastes were collected during 1984.

The recently establishment Solid Waste Management Department (SWMD) of Amman Municipality is responsible for formulating a refuse management policy, identifying manpower and equipment needs, supervising operation of landfills and co-ordinating activities of refuse collection and sanitation at the district level. The sanitation units attached to the nine Amman municipal districts are responsible for refuse collection and street cleaning.

GAA refuse is currently disposed of at the Marka site and partially burned in open pits. This landfilling method is environmentally unacceptable. A field visit to the site indicated inadequate sanitary conditions, as flies were abundant due to the presence of putrescent foods.

The refuse is low in calorific value (1,300-1,500 kilo cal/kg.) and contains appreciable amounts of putrescent matter (vegetables 87 per cent;

paper 10 per cent; glass, plastics and metals 3 per cent). The refuse is difficult to burn due to its high moisture and requires a very expensive incinerator for proper burning.

The existing refuse collection system appears inadequate and the service should be improved and expanded to include suburban areas of GAA which have not yet been provided with regular collection service. The new landfill site should be equipped with sufficient earth-moving equipment and operators to ensure proper sanitary landfilling. The discussion with the municipality officials revealed no plans for considering waste recycling or composting in the near future due to technical and economic constraints.

F. Air pollution

In the past decade Amman has experienced a rapid rate of development and witnessed feverish construction and industrial activities which in turn increased the occupational hazards and air pollution problems in the GAA.

Low-income housing and commercial development in dense configurations exist in some areas within the city of Amman. People living in these densely populated areas are subjecting their respiratory systems to severe strains by concentrating themselves, their activities and their airborne wastes in such congested localities.

A preliminary survey of the Amman area indicates that the most prevalent air pollutants are sulphur dioxide, carbon monoxide, oxides of nitrogen and suspended particulates. Other pollutants such as hydrogen sulphide, hydrocarbons, ozone, fluorides and lead aerosols are considered less important due to their presence in low concentrations.

Long-term air quality monitoring data at GAA is necessary to quantify future air pollution levels and to provide a sound basis for a pollution control strategy. Presently, the Royal Scientific Society (RSS) is initiating a programme for establishing a permanent air quality monitoring network in Amman.

Efforts must be made to relieve the traffic congestion in Amman. This would lead to reduction of emission loads of airborne pollutants and thereby lower ground level concentration of these pollutants.

All open burning should cease whenever feasible or should be scheduled and conducted in a manner consistent with good air pollution control practices.

G. Industrial pollution

During the past decade Jordan's economy grew at a rapid pace. External factors such as private capital inflows, remittances and foreign financial assistance contributed to this remarkable growth. Mining and capital intensive industry benefited from large public sector investments in potash, phosphate, fertilizer and cement. To ensure continued industrial expansion, there is apparent need for easier access to risk capital, better products and

services, more reliance on advanced technology and attracting skilled technical and management personnel now employed in other countries. The rapid industrial expansion has brought an inevitable increase in water requirement and pollution, especially in GAA which accommodates major industries such as phosphate mining and beneficiation, tanning, yeast, paper, textiles, detergents, beverages and chemical industries. Total effluent flow from the 43 major industrial establishments in the area is estimated at 2.5 MCM/Y, of which 21 per cent is cooling water.

According to the industrial effluents act (202/1980), all industrial establishments are required by law to provide full on-site treatment of their wastewaters before final discharge to the receiving Zerka river, or to one of its tributary wadis. Several industries (yeast, textile, dairy, breweries, distilleries, tanning, paper and food processing) are operating biological units for end-of-pipe treatment of their effluents. However, the results of a recent survey by the water authority laboratories clearly indicate unsatisfactory performance of the wastewater treatment facilities now in operation as most effluents far exceed the emission limits set by the Jordanian standards for discharge of industrial effluents.

Most industries in GAA are low-intensive water users, with the exception of the yeast (1,500 m^3/d), phosphate (4,630 m^3/d), paper (1,390 m^3/d), tannery (500 m^3/d) and brewery industries (350 m^3/d). Evidence indicates that most industries are lacking experience for proper operation of waste treatment facilities. They also consider pollution abatement costs uneconomical, as they represent investments without a balancing increase in production capacity. However, it is necessary to recognize that the rapid environmental deterioration in GAA affects long-term industrial growth in the region, and it may also endanger human life.

Proper selection of an integrated treatment programme for the effluent from the industries in the Zerka - Rusaifa area must be appropriate to the receiving water and should require a low investment cost. The existing policy that each industrial source is responsible for its pollution and should be compelled to cure it is not practical in GAA as the majority of industrial facilities generate relatively low amounts of wastewaters (50 to 200 m^3/d) which would be handled more efficiently in a centralized wastewater treatment plant. Despite the difference in waste characteristics from individual factories, a combined treatment approach could be employed for discharge of wastewater to the Zerka river.

H. Environmental legislation

A review of environmental legislation in Jordan has revealed several legal instruments which deal directly or indirectly with issues related to protection of the environment. Typical of other countries in the region, this legislation is basically sectoral and does not deal with the emerging problems of environmental pollution. Attention is not given in existing laws to the interdependence of development activities and at best they serve for a piecemeal approach to environmental problems.

At present Jordan does not have regulations, codes of practice, or standards for air pollution, traffic emissions, solid waste, domestic effluents, noise and hazardous wastes. Developing regulatory and control limits of these pollution sources will assist in preventing further decline in environmental quality and ensure proper abatement of pollution.

The following are major points of concern regarding environmental legislation in its current format:

1. Industrial emission limitations are not geared to the economic and technical capabilities of the country. Enforceable standards should be based on national capabilities and needs. Factors such as cost, industrialization, economic resources, current and future water uses and environmental assimilation must be considered while establishing environmental standards;

2. Present regulation of industrial effluents emphasizes allowable maximum concentration of pollutants and fails to recognize loading; a crucial factor for design of waste treatment facilities and for determination of the assimilative capacity of the receiving streams;

3. Some limits are either inadequate or unrealistic while other important pollutants have no limits at all, i.e. PCBs and organic phosphorus;

4. Ineffectiveness of the legislative instruments is attributed to the following:

(a) Lack of public awareness and co-operation;

(b) Inadequacy of pollution monitoring programmes;

(c) Shortage of manpower available to enforcing agencies.

I. Transportation

Queen Alia International Airport (QAIA) has been in operation since April 1983. QAIA lies some 32 km south of Amman and handles international services while internal flights are serviced by Amman (Marka) Airport. The arriving passenger forecasts for 1986 and 1990 are 2.08 and 2.80 millions respectively. QAIA's location poses neither an air nor a noise pollution problem to Amman city.

The Public Transport Company (PTC) was established in 1975 to provide bus services to MA and to places outside Amman as authorized by the Cabinet. The vehicle fleet comprises 249 new MAN buses and 188 Iran Mercedes. A recent development in public transport has been the large number of mini-buses; service taxis are also very popular. The main problems of bus and service taxis are the use of street rather than off-street terminuses, poor surface conditions, traffic congestion, especially in the downtown area and lack of shelter. The municipality is taking appropriate measures to overcome these problems.

According to 1982 statistics, the rate of private cars in Amman was 45 per thousand and the forecast for the registered fleet in Jordan in the year 2000 is 318,000. At present, 58 per cent of passenger vehicles are private cars, 28 per cent taxis, 11 per cent mini-buses and about 4 per cent buses.

Responsibility for the planning, operations and control of the transport system in GAA is dispersed between the Ministries of Transport (highways), Interior (traffic control), MMRE (pollution), and transport agencies such as the Civil Aviation Authority and PTC (operation).

III. REVIEW OF AMMAN ENVIRONMENTAL MANAGEMENT SCHEME

A. Overall perspective

The most common cause of environmental problems in GAA derives from the unco-ordinated sectoral character of planning and management of environmental services. Agencies responsible for environmental services in GAA often have appreciable overlapping in functions and authorities, which creates confusion among the various sectors regarding their role and that of others. Expansion of many public services has not been accompanied with a well conceived delegation of responsibility.

Although co-ordination is promoted or even mandated in the management of central and local agencies, there is an apparent lack of a proper mechanism to regulate and enforce this co-ordination. Some public services agencies are reluctant to share with others experience or budgetary resources to co-ordinate implementation of programmes of mutual concern. The problem is compounded by interdepartmental competition, vagueness of sphare of responsibility and lack of proper communication.

It is imperative that the Municipality of Amman MA should establish and implement administrative machinery for environmental management in GAA that assumes and enhances inter-sectoral collaboration at all levels while eliminating any legislative or administrative impediment.

B. Assessment of environmental activities and programme compenents in GAA

Environmental planning and implementation in GAA need to be strengthened, albeit within the overall context of the national development plan. Improvement of the environment cannot be viewed as one process standing alone but rather as a priority activity that must be part of an integrated development plan carried out for enhancing the welfare and the quality of life of the community, as such policies and their implementation in various spheres of MA activities must reflect the attention and efforts given to proper management of natural resources and the environment in GAA. Based on available evidence, it may be concluded that environmental concerns are rarely explicity built into various development programmes in GAA.

The need for rational environmental management and impact assessment of developmental activities can be justified on both economic and social

grounds. It also stems from the keen desire to avoid destruction of existing scare resources which are needed for future development, or which are required for subsistence or protection.

1. Master plans. A comprehensive master plan for GAA has not been developed yet, though efforts are under way to develop such a plan in the near future. No specific master plans for public services in GAA were available, though some GAA services were considered in master plans developed by central authorities (WA, electricity, transport, etc.);

2. Regulation and enforcement. Most of the environmental laws, rules and regulations have focussed primarily upon pollution control as the way to achieve better environmental quality. Seldom have the laws focussed upon prevention. Additional regulatory barriers include piecemeal coverage, fragmented jurisdictions and inconsistent enforcement. It is essential that environmental legislation should be drawn up and enforced in such a way that if violations occur effective sanctions can be imposed. The competent authorities, whether local or central, should be authorized to take immediate action in case of need. Regulations of contaminants and product standards should be enforced on substances which pose a risk to the environment (pesticide, hazardous chemicals, etc.), in order to allow a safe and economic use of resources and to prevent detrimental effects on people and the environment;

Environmental legislation should be amended with regulations concerning implementation and with clear working directives. Legislation concerning environmental planning, implementation and monitoring procedures need to be enacted in order to eliminate the present vagueness concerning authority and responsibility for managing the environment;

3. Environmental Impact Assessment. By and large, the assessment of environmental effects has not been taken into consideration in major development activities in GAA. Technical feasibility studies are not usually complemented by assessment of effects on the environment to identify pollution hazards, ecological contingencies and possible social consequences. New industrial development projects should address the following issues: (a) the quantity and quality of needed natural resources; (b) the suitability of alternative sites; (c) added loads of water and air pollution; (d) the opportunities for waste disposal and for the recycling of materials; and (e) anticipated health impacts.. However, caution must be exercised for development of environmental guidelines for project appraisal so that they do not become bottlenecks in the implementation of projects or raise irrelevant issues to the state of the environment in GAA. It is advisable that concerned local and national environmental authorities should undertake their own experimentation and improvisations in devising appropriate guidelines for environmental impact assessment in the light of their own specific needs as they emerge in the course of development.

4. Monitoring. In-house monitoring is carried out as a complementary activity of major public service institutions. However, existing monitoring schemes do not satisfy the needs for integrated environmental surveillance in GAA.

5. Management. The quality of the managerial staff is still deficient in GAA. Channelling of feedback information from operation to management is inadequate. This in turn affects the overall performance and reduces effectiveness of resources utilization. Other environmental management constraints in GAA are:

(a) The centralized management in most environmental institutions, has to deal with issues through the headquarters. Such a situation places a heavy burden on the top management. It also acts as a retarding factor and often has undesirable impact on day-to-day operations, especially when the responsibility of the institution increases;

(b) The growth of municipal and central government responsibilities and sophistication has led to compartmentalization, thereby increasing the number of sectors and subunits within them, producing a situation which is physically difficult to co-ordinate;

(c) Information exchange is lacking among public service institutions; unavailability of detailed information makes it difficult to establish proper avenues for interdepartmental collaboration;

(d) The operation and maintenance of some environmental services is not satisfactory due to lack of proper management and adequate monitoring and consequently the huge investment in such services is not producing a full measure of expected benefits. Management and operation shortcomings, maintenance problems and manpower shortages represent major impediments to proper implementation of environmental programmes in GAA;

(e) The control of personnel administration in public service institutions is under national regulations which seldom consider the special nature and the unique experience required for certain environmental activities;

6. Research. There is an apparent need to strengthen and promote applied research and field studies in areas of water supply, appropriate sewage treatment and disposal technologies, refuse management, abatement of industrial pollution, transport and food hygiene. Research programmes should be co-ordinated among existing institutions (University of Jordan, RSS, WA, MMRE/DE, etc.) to avoid overlapping and to meet emerging research needs of various environmental activities in GAA.

7. Public awareness. A strong community spirit is emerging in GAA. This spirit is a prerequeste to develop tactics and enforce implementation of appropriate measures to enhance environmental quality. The Royal Society for the Conservation of Nature (RSCN) has been activity engaged in promoting environmental awareness through the Jordanian press, radio and TV and preparation of simple booklets on various environmental issues. RSCN should receive adequate government and community support to strengthen its vital role in identifying environmental threats and educating citizens to improve standards of civil hygiene in GAA.

ANNEX III

MANAGEMENT OF THE URBAN ENVIRONMENT IN KUWAIT(10, 11, 17)

I. INTRODUCTION

Kuwait is located on the north-western shore of the Gulf. The country consists of a small traingle of land covering an area of 17,818 km^2, which is largely a desert, except for the Al-Jahrah Oasis and a few fertile patches in the south-eastern and coastal area.

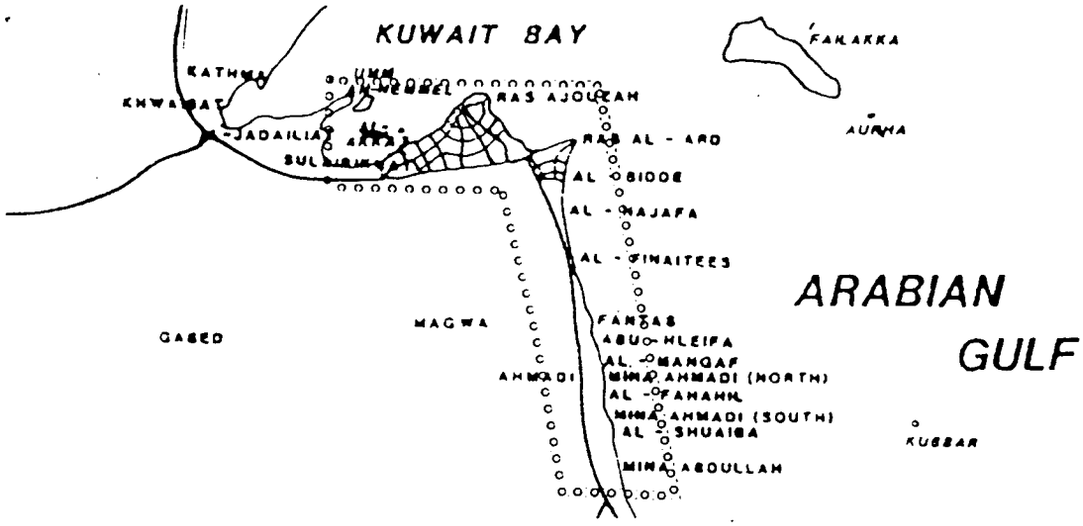
II. PROFILE OF METROPOLITAN KUWAIT

A. Physical and Climatological Features of Kuwait

The topography of Kuwait is mainly flat or gently undulating, broken only by occasional low hills and shallow depressions. The elevations range from sea level in the east to nearly 300 m in the south-western corner of the country. Seasonal variations of temperature are extremely large. The maximum temperature occurs during July/August and may occasionally reach 55° C. The coldest months are December and January with minimum temperatures as low as -30° C. Rainfall is irregular and generally more abundant along the coast and decreases inaland. There is usually rain from November to April, though its pattern is not clearly known.

A north-westerly wind is predominant in spring and early summer. Sandstorms, known in Kuwait as "Tauz" may occur at any time. However, they are more frequent in the warm months from March to September. The urban and industrial developments are mostly located within the city of Kuwait (the capital) which lies on the Gulf coast. The new suburban areas have been extended to the sixth ring road while smaller coastal towns extend some 30 km south of the capital city (figure 7).

Figure 7. Kuwait Metropolitan Area



B. Water supply

Natural water resources of Kuwait are limited to underground water as the low intensity rainfall hardly produces any usable surface flow. Known potable ground water resources are: (a) the fresh-water reserve at Rhaudatain in the north with an estimated reserve of 500 MCM (million cubic meters); and (b) the Dammam formation which outlets at Ahmadi; the concentration of dissolved solids is about 2000 mg/l which renders it suitable for some irrigation purposes. The average rate of production of both fields is about 0.5 MGD (million gallon per day) which if needed can be raised to 5 MGD. Brackish water outlets are located at Sulaibiya, Al-Shagaysa, Abdah and Al-Wafra with a total ouput of 50 MGD. This water is used mainly for agriculture, households and for blending with distilled water (8 per cent). Brackish water is provided free of charge at the lorry filling stations, while piped supplies are charged on the size of the property.

The majority of municpal and industrial water demands are satisfied by the distilled water from desalination plants associated with the electric power stations at Shuwaikh, Shaniba and Doha. Another plant will be commissioned in the near future at Al-Zor to meet the future demands for water in Kuwait.

More than 85 per cent of the population in Kuwait have access to public drinking water supply through house connections while the rest, mainly those living in non-organized areas, obtain their supply through private tankers. When the network expansion project is completed in 1990, the entire population will have access to piped drinking water. According to 1984 figures, the water consumption rate reached 50 gallons per capita per day (GPCD). Water demand projections for the year 2000 are 68,540 and 123 GPCD for municipal, industrial and agricultural uses respectively. Pursuant to the government objective of conserving natural water resources, the increased production of desalinated water and expansion of brackish water uses for non-potable purposes is expected to extend the useful life of fresh-water reserves.

C. Sanitary sewage disposal

At present, most of the population is connected to the municipal sanitary sewage system, and the remote residential areas are provided with septic tanks which are periodically emptied by tankers. The septic effluents are disposed of in afforestation areas managed by the Kuwait municipality and the agriculture department.

Sewage is conveyed through gravity and pressure mains to the sewage treatment works. The three major sewage works are: Ardiya, which uses a modified conventional method (two-stage activated sludge) with a design capacity of 100,000 m^3/d; the Jahra works which use extended aeration system for treatment of flows up to 65,000 m^3/d; and the Rikka works, which serve suburban areas and coastal villages with an average flow of 96,000 m^3/d. Most of the treated effluent is being utilized for intensive irrigation in enclosed farm complexes and for environmental foresting in large areas using low water demand tree plantations. The ultimate project design provides for

the development of 2,700 hectares of intensive agriculture and 9,000 hectares of environmental foresting.

D. Refuse and solid wastes

The municipality and private contractors provide regular collection. Public cleanliness is totally mechanized and refuse is collected in plastic bags which enhances the cleanliness of the environment. Most of the solid wastes are transported to a Jahra Desert site, about 40 km from the city, tipped along the edges of large excavation ditches and burned with sprayed oil. The partially burned waste is moved to a hole and covered with sand. The site is inadequately operated which results in spreading of insects, rodents and odour and air pollution. Recently, however, the Kuwait Municipality began converting the solid waste disposal site to appropriate operation for sanitary landfill by providing adequate equipment and employing sanitary procedures for compacting and converting solid wastes.

E. Marine environment

Greater attention is being accorded to the marine environment due to its importance for recreation, transportation and supply of desalinated water. Monitoring of the marine environment indicated the existence of locallized pollution in some areas; efforts are under way to control land-based sources of pollution to ensure the safety of water intakes to the desalination plants and to conserve the aquatic life.

F. Air pollution

The quality of air in the residential and industrial areas is continuously monitored by the Department of Environment, Ministry of Public Health. Suspended particulates reach the highest level in the industrial areas (505 microgram/cubic metre Ugm/m^3), followed by the commercial zone (459 Ugm/m^3) and the residential area (330 Ugm/m^3). A study was initiated last year to assess the impact of sandstorms on the level of suspended particulates in the atmosphere.

G. Industrial pollution

Industrial activities are concentrated in four areas, namely, Shuaiba, Ahmadi, Fahaheel and Shuwaikh. Concentration of heavy industries in the Shwaiba complex has created appreciable environmental problems within the complex and in the nearby villages. While most industries possess end-of-pipe treatment facilities, the performance has yet to meet stringent effluent criteria to ensure safety of intakes for water desalination. Recent field studies in Kuwait indicated the amenability of the combined industrial effluent from the Shuaiba complex to biological treatment and the possible reuse of the treated effluent for non-sensitive industrial processes. The majority of solid wastes from industry is disposed of on land, while minor amounts are discharged to drains or burned in the desert.

H. Urban development

The policy of the Environmental Protection Council regarding urban development aims at preservation of Arabic architectural pattern, and enhancing environmental and social life for the people, taking into consideration the coastal orientation of the State of Kuwait. The policy encompasses:

(a) Control of overcrowding by reducing the population density and limiting commercial development inside the residential areas and provision of suitable housing requirements for various population groups;

(b) Limiting the high-rise buildings on the coast and the unorganized building of chalets on the beaches so as to maximize the use of land and permit sea breezes for natural ventilation;

(c) Organizing specialized investigations to find out the architectural patterns which fit the various aspects of the Kuwait environment and developing local architecture in line of the traditional aspects of design, building materials and the shape of buildings in a way that will preserve the traditional patterns in a viable architectural environment;

(d) Study of the appropriateness of housing projects and the multi-storey complexes and their suitability for the Kuwaiti family and providing designs appropriate for the local traditions and social background and observing housing requirements for certain population groups as appropriate for their social or working conditions;

(e) Providing adequate distance between residential areas and highways so as to prevent the impact of traffic noise on the residential environment. Also, adequate land should be allocated to be developed as public parks, in addition to the green areas distributed within the residential areas.

I. Co-ordination of environmental activities

Government agencies involved in urban environmental management are the Environment Department of the Ministry of Health, the Environment Protection Council, the Shuaiba Area Authority, the Kuwait Municipality, the Ministry of Planning, the Ministry of Electricity and Water and the Kuwait Institute for Scientific Research.

Concerted efforts are under way to strengthen co-operation and co-ordination among the concerned government agencies, industry and research institutions to achieve better planning and implementation of environmental programmes in Metropolitan Kuwait.

Presently, considerable attention is being given to monitoring environmental quality, abating industrial pollution, and establishing environmental criteria in light of available resources and socio-economic features of the community. Interest is also emerging regarding development of national manpower capability, integration of environmental concerns in development activities and planning urban growth on an environmentally-sound basis.