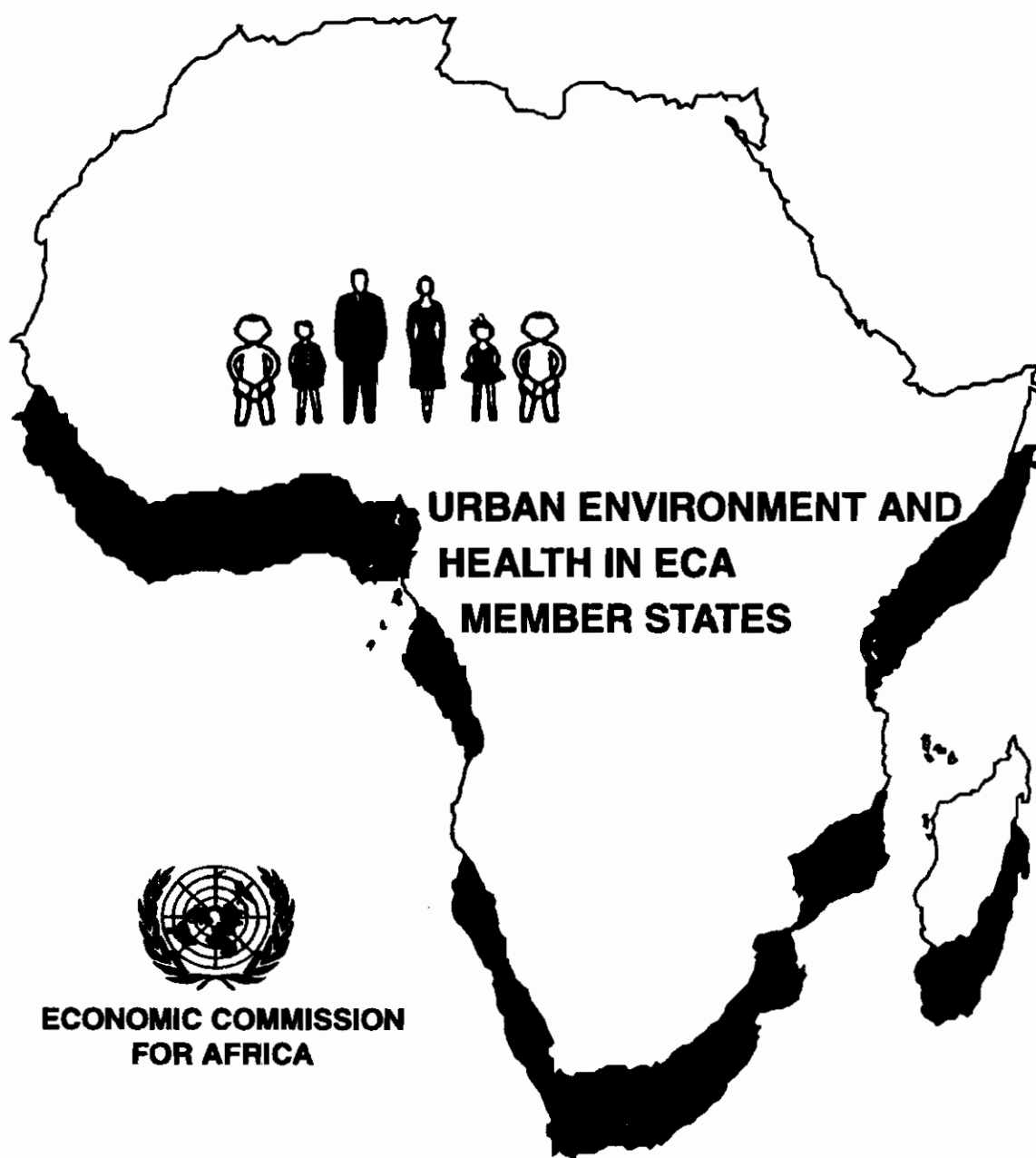


AFRICAN POPULATION STUDIES SERIES

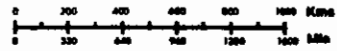
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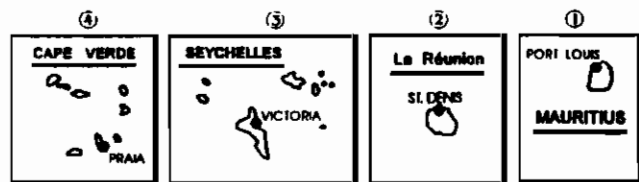
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EXECUTIVE SUMMARY 1/

Although the level of urbanization is generally low in Africa the urban population has over the last few years registered one of the highest growth rates among major, world regions. Large and/or primate cities such as Addis Ababa, Cairo, Kinshasa, Lagos, Johannesburg- which have been posting high, average annual population growth rates in recent years are disproportionately contributing to the elevated urban growth rates of their countries. The rapid expansion of these cities in population and areal sizes is creating problems for national and regional, economic, social, administrative and physical planning.

Against this background of rapid urban growth and planning problems, the paper reviewed the relationship between the urban environment and the health of city dwellers in ECA Member States by presenting a global (i.e. a regional) review along with case studies of North African cities: Alexandria, Cairo, Rabat, Tripoli and Tunis). The global and case studies focused on the following issues, namely, environmental hazards and their impact on health; urban development and environmental deterioration; interlinkages: urbanization, poverty and environment. It concluded by reviewing policy responses geared towards creating sustainable cities in Africa.

More specifically, the contents of the various sections of the paper are as follows:

- The first section focuses on environmental hazards and their impact on health and ecosystem. Major issues addressed in this section include consequences of urbanization on human health in Africa, psychological disorders, and chemical and physical hazards associated with development of urban settlements.

1/ This paper is a revised version of a draft prepared by Dr Ahmed Hamza, professor at the High Institute of Public Health, Alexandria University, Alexandria, Egypt, as a consultant for ECA.

- The relation between urban development and environmental deterioration is reviewed in section two. Major subjects discussed encompass industrialization pattern and the reasons for its concentration in major cities, the impacts of industrial pollution on city environment, sources of emission and quality of air in African cities, pollution of water resources, and the impact of squatter housing on city-life and environmental quality.
- Interlinkages between urbanization, poverty and environment are examined in the third section. Issues presented include urban development and vulnerable population groups; migrants, refugees and displaced persons in urban settings, and the impact of employment and on urban settlements.
- The fourth section presented case studies from Cairo, Alexandria, Tunis, Rabat, and Tripoli with a focus on the implications of unplanned development and population growth on quality of life and services' delivery in these cities.
- The fifth section draws policy responses geared to improved urban environment. The first part reviews management and administrative responses, including institutional mechanisms, human resources development and community participation. The second part focuses on demographic trends and policies in Africa, and outlines a regional environmental strategy on urban development. The third part presents a perspective on ECA's role in improving urban management in the Member States. The final part outlines a proposed agenda for action to strengthen environmental management in African cities.

The principal recommendation of the paper is that measures to arrest population growth of African cities should be supplemented by strategies that directly address the problems of congestion, pollution, inadequate shelters, environmental degradation and natural resource depletion.

TABLE OF CONTENTS

	Page
TABLE OF CONTENTS	i
LIST OF FIGURES	iii
LIST OF APPENDIXES	iii
 I. INTRODUCTION	 1
 A. Objectives and Structure of the Paper	 7
 II. ENVIRONMENTAL HAZARDS IN URBAN SETTLEMENTS AND THEIR IMPACT ON HEALTH AND ECOSYSTEM	 8
A. Urbanization and Human Health	8
B. Psychological Disorders of Urbanization	13
C. Chemical Hazards in Urban Environment	13
D. Physical Hazards in Urban Settlements	15
 III. URBANIZATION AND ENVIRONMENTAL DETERIORATION	 17
A. Urban Industrialization and Health	17
B. Urban Air Pollution	21
C. Environmental Impacts of Water Pollution	22
D. Urban Housing	23
 IV. INTERLINKAGES : URBANIZATION, POVERTY AND ENVIRONMENT	 27
A. Urban Development and Vulnerable Population Groups	27
B. Migrants, Refugees and Displaced Persons in Urban Settings	28
C. Poverty and Employment in Urban Africa	32

V.	URBANIZATION, ENVIRONMENT AND HEALTH IN NORTH AFRICA: CASE STUDIES	37
A.	Cairo Metropolitan Area, Egypt	37
B.	Alexandria Metropolitan Area, Egypt	44
C.	Metro Tunis, Tunisia	50
D.	Rabat, Morocco	55
E.	Tripoli, Libya Arab Jamahirya	58
F.	Urban Environment and Health in North Africa: Experience and Prospects	60
VI.	POLICY RESPONSES GEARED TO IMPROVED URBAN ENVIRONMENT IN AFRICA	65
A.	Management and Administrative Responses	66
1.	Strengthening Institutional Mechanisms in African Cities ...	66
2.	Economic Instruments Geared to Improved Urban Environment	67
3.	Enforcement of Environmental Legislation in African Cities	68
4.	Information Needs for Management of Urban Environment	69
5.	Development of Human Resources	70
6.	Community Participation	70
B.	Demographic Trends and Policies in Urban Africa	72
C.	Towards Regional Environmental Strategy on the Urban Environment	75
1.	Justification	75
2.	Policy Principles of an African Urban Environmental Strategy	76
3.	An outline for a Plan of Action on Sustainable Cities	77
D.	ECA's Role in Improving Management of the Urban Environment in the Member States	79
E.	Urban Environmental Management in Africa: An Agenda for Action	80
1.	Urban Development	80
2.	Urbanization and Public Health	80
3.	Management of Urban Services	81
4.	Housing	81
5.	Water Supply, Sanitation, and Liquid Pollution	82
6.	Industrial Development and Pollution	82
7.	Air Pollution and Micro-climate of Urban Settlements	82
8.	Management of Solid Wastes	83
9.	Transport, Tourism and Recreation	83
	SELECTED BIBLIOGRAPHY	84
	APPENDIXES	87

LIST OF FIGURES

FIG. TITLE

1.	Health Indicators by Region in 1990	9
2.	Cairo Metropolitan Area	38
3.	Alexandria Metropolitan Area	45
4.	Metro Tunis, Tunisia	53

LIST OF APPENDIXES

APPENDIX 1	PROPOSAL FOR ESTABLISHING AN ENVIRONMENTAL MANAGEMENT UNIT IN MAJOR AFRICAN CITIES	87
APPENDIX 2	TABLES	97
1	Trends in Economic Growth and Spending on Public Services in Africa	97
2	Urban-Rural Gap in African Countries	98
3	Urban Growth in Africa	99
4	Trends in Improvement of Health and Welfare in Africa	100
5	Human Deprivation in Africa	101
6	Wealth, Poverty, and Social Investment in Africa	102
7	Expenditure on Defense and Public Services in Africa	103

I. INTRODUCTION

Although the level of urbanization is generally low in Africa the urban population has over the last few years registered one of the highest growth rates among major, world regions. The per cent urban in 1995 was 34, and the average, annual rate of growth of the urban population was 4.4 percent in 1990-1995.^{1/} Large and/or primate cities such as Addis Ababa, Cairo, Kinshasa, Lagos, Johannesburg- which have been posting high, average annual population growth rates in recent years are disproportionately contributing to the elevated urban growth rates. The rapid expansion of these cities in population and areal sizes is creating problems for national and regional, economic, social, administrative and physical planning. ^{2/}

Against this backdrop of planning difficulties, the major environmental problems facing African countries in recent years, include: environmental degradation, depletion of natural resources, overcultivation, overgrazing, overfishing, deforestation, excessive commercial logging and industrial pollution. ^{3/} These environmental problems are exacerbated by a number of factors like rapid population growth, poverty, uneven spatial distribution of the population and resources, destruction of protective vegetative strip alongside water bodies and urban centres, extensive firewood foraging, land dereliction through mineral exploitation, rapid and essentially unplanned urbanization, inadequate and/or lax enforcement of environmental and occupational health legislations and the economic crisis.^{4/}

^{1/} United Nations, World Urbanization Prospects: The 1994 Revision, ST/ESA/SER.A/150 (New York:1995)

^{2/} Hardoy, J.E.; D.Mitlin and D. Satterthwaite, Environmental Problems in Third World Cities(London: Earthscan, 1992)

^{3/} Moyo, Sam et alia, The Southern African Environment (London: Earthscan Publications, 1993); and Timberlake, L., African Crisis (London: IIED, Earthscan, 1985)

^{4/} ECA, Achieving our Development Goals through the Environment: The African Environment and Development Agenda.ECA/ENV/UNCEDCA1/91/Rev.1. Addis Ababa, 1991.

The environmental problems of African cities have been classified as follows: 5/

- a. Contaminated and inadequate quantities of water;
- b. Inadequate provision for sanitary management and disposal of solid and liquid wastes;
- c. Inadequate measures to control disease vectors;
- d. Poor quality and overcrowded housing;
- e. Inadequate health services;
- f. Inadequate (or lax) enforcement of environmental and occupational health legislations.

As urban settlements grow in size, problems arise at two environmental levels. The first is the internal living environment and its immediate surroundings; the second is the outer environment that cities provide for their inhabitants. The inner and outer environmental problems of urban settlements are complex and extremely costly to solve. 6/

The deteriorated conditions of the internal environment mostly affect urban poor, as they live in crowded and unhealthy slums which lack proper ventilation, and essential water and sanitation services. They are also exposed to hazardous working conditions and high levels of indoor pollutants, in addition to chronic malnutrition, and widespread pollution in the immediate surroundings due to accumulation of garbage and sewage ponds. The extreme poverty and decadent, internal environment in crowded and unhygienic slums lead to high levels of morbidity and mortality among the vulnerable groups, particularly women, elderly and children.

5/ Makannah, T.J., "Aspects of the environmental problems of cities in Sub-Saharan Africa", Union of African Population Studies, Papers of Conference on Population and Environment in Africa, Gaborone, Botswana, 231-42

6/ Stern, R., et alia (eds) Sustainable Cities. Urbanization and Environment in International Perspectives(Colorado, Boulder: Westview Press, 1992))

On the other hand, deterioration of the external environment, affects all segments of the society regardless of their economic status, age group, or living conditions. The multiple effects of rapid population growth, desertification, global warming, declining ozone layer, spreading of environmental pollution, and depletion of natural resources, will accelerate outmigration from environmentally damaged areas and hence intensify the problem of environmental refugees. In addition, drought, desertification and famine have led to several incidence of mass exoduses of the affected population. ^{7/}

Environmental problems in African cities are further complicated by the haphazard growth of industry, the widening urban-rural gap, the inadequacy of physical infrastructure, as well as the inefficiency of transport and the increase in its pollution emissions. Another immediate challenge facing African cities, is how to absorb the influx of new residents into the city fabric and how to utilize their energies effectively.^{8/}

In this regard, measures to arrest population growth in primate cities of Africa should supplement strategies that directly address the problems of congestion, pollution, inadequate shelters and deteriorated environment. ^{9/}

Participants at the 1992 Expert Group Meeting on Population, Environment and Development observed that rapid and unplanned urbanization LDCs was making it impossible for municipalities to keep abreast with the demand for infrastructure and services, noting that

^{7/} ECA, Population and Sustainable Development With Particular Reference to Linkages among Environment, Urbanization, and Migration in ECA Member States, E/ECA/POP/95/3(b)3. Addis Ababa:1995

^{8/} Benneh, G. "Environmental Consequences of Different Patterns of Urbanization". In United Nations Expert Group Meeting on Population, Environment and Development, 20-24 Jan. 1992, New York, New York:1994

^{9/} ECA, "An assessment of problems and policies associated with the urban environment in ECA Member States", Paper presented to the 9th session of the Conference of African Planners, Statistician and Population and Information Specialists, Addis Ababa, March 1996

in many cities the demand for roads, health care, educational facilities and the provision of safe drinking water and sanitation have outstripped the growth of urban population.^{10/}

Agenda 21- the Programme of Action that emanated from the 1992 Rio Earth Summit- touches on a number of urban environmental issues, including health. It notes that urban growth has resulted in city dwellers being exposed to serious environmental hazards, and that the rate of growth of LDCs' cities has exceeded the capacity of municipal and local governments to adequately response. Agenda 21 also addressed the global challenges of the environment and development including poverty, consumption, demographic dynamics, human health and settlements.

National reports prepared by African countries for the Cairo International Conference on Population and Development(ICPD) in 1994 stressed the interrelationship among population, development and the environment. Among the consequences of urbanization on the environment mentioned were, the destruction of natural resources in the wake of urban expansion and development, the pollution of surrounding rivers and the degradation of the urban environment.

A review of twenty-four African reports indicate that issues pertaining to migration and population density ranked higher than those related to population growth. Seventy-six percent of the countries underlined the interlinkages between migration/ population density and environment compared with 52 percent between population growth and environment. ^{11/}

Thus, in the past two decades, the international community has spared no effort in addressing the problems of urban environment and health in the developing world. The search for proper solutions started with the first UN Conference on Human Settlement in 1976-

^{10/} United Nations, Expert Group Meeting on Population, Environment and Development, January 1994, New York (New York:1994)

^{11/} UNFPA, National Perspectives on Population and Development (New York: UNFPA, 1995),chapt. 1.

Habitat-I, which called for a global commitment to ensure that everyone has suitable shelter, adequate services, and equitable share of resources. The primary health care (PHC) strategy, formulated in Alma Ata in 1978, stressed the need to shift emphasis from urban curative care to a PHC-focused approach through provision of adequate environmental services, strengthening community participation, and use of low-cost and appropriate technologies.

The International Drinking Water Supply and Sanitation Decade of 1981-90, though failing to achieve its target of water and sanitation for all, has attracted attention to the grave conditions of water and sanitation in most countries of the Third World. The World Commission on Environment and Development called in its 1987 "Tokyo Declaration" for a growth that is equitable and socially just, conserving environmental resources, ensuring a sustainable level of population by improving the livelihood of the poor, reforming policies on health care and education, and integrating environmental concerns in decision-making.

The most recent global initiative is the second UN conference on human settlements-Habitat II, held in Istanbul in June 1996. The conference proposed a new "Habitat Agenda" for the twenty-first century to guide the collective efforts of governments, aid agencies, international development institutions, and NGOs. The conference proposed a series of interventions to improve housing and living conditions of low-income groups, and to provide them with safe and sufficient water supplies, adequate sanitation and drainage, primary health care and other essential services.

The rapid growth of urban Africa (see Table 3), and the expected persistence of shortages in housing, education, utilities and basic services will widen the gap between people's needs and available resources. This in turn, will reflect negatively on cities' environment and the physical infrastructure, and will certainly increase the misery of urban poor.

African metropolitan centres such as Cairo, Lagos, Kinshasa, and Khartoum, are rapidly growing under conditions of economic stagnation and improper city planning. The majority of rural migrants are bringing the traditional life-styles and cultures of their rural hinterlands to the

city. Adverse practices include haphazard urban agriculture, petty commodity production, abuse of public infrastructure, inappropriate use of urban space and spread of spontaneous settlements. Despite the fact that city administration responded negatively to these ruralization practices, such profound features are becoming institutionalized.

Throughout the continent, urban water-supply systems are exceeding their serviceable life and have serious leakage problems, exceeding 50 percent of the produced water in some cities. Service connections are frequently worn out or inappropriately installed, causing enormous wastage and potential cross-pollution. Surveillance of the water quality in the networks and at households is nominal; in few instances, city's water supplies are virtually unmonitored. Water rates in most cities are low which encourage wastage and irrational use. Water treatment plants in some cities are very old and far exceeded their serviceable life which results in operational difficulties and excessive use of chemicals.

On the other hand, sewers and sewage treatment works receive nominal attention in most African cities. The emphasis on provision of water supply as a first priority of most local 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 problems.

Another facet of the problem of urban Africa, is the inability of municipalities to manage an efficient solid waste system; this is attributed in part to relegation of waste handling and disposal to the lowest level of responsibility. Manual sweeping of streets is common, except in a very few cities. Open incineration is practiced on wide-scale, which causes severe air pollution problems, particularly when burning of accumulated garbage takes place near residential areas. The remaining portion of urban solid waste and refuse is disposed of by open dumping in an unhygienic way, although controlled tipping is being practiced in some cities. Composting has received attention lately, since it yields a cheap fertilizer suitable for farming.

A. Objectives and Structure of the Paper

Harmful environmental hazards are spreading at an alarming rate in most African cities: the ensuing deterioration of environmental amenities will not only threaten human health and the ecosystem, but may impede urban development as well.

This paper aims to examine the interlinkages between urban environment and health of city dwellers in ECA Member States. From a macro-perspective, the paper attempts to identify major environmental hazards and their impact on health; the consequences of urban development on the environment and ecosystems; and the interlinkages among urbanization, poverty and environment. From a micro-perspective, the paper presents the profile of urbanization and environmental health in selected cities in North Africa, and addresses issues pertaining to appropriate urban development patterns in the future. The paper concludes by presenting an overview of policy responses geared towards creating sustainable cities in Africa.

To this end, the paper has been divided into five sections:

- The first section focuses on environmental hazards and their impact on health and ecosystem. Major issues addressed in this section include consequences of urbanization on human health in Africa, psychological disorders, and chemical and physical hazards associated with development of urban settlements.
- The relation between urban development and environmental deterioration is reviewed in section two. Major subjects discussed encompass industrialization pattern and the reasons for its concentration in major cities, the impacts of industrial pollution on city environment, sources of emission and quality of air in African cities, pollution of water resources, and the impact of squatter housing on city-life and environmental quality.
- Interlinkages between urbanization, poverty and environment are examined in the third section. Issues presented include urban development and vulnerable population groups: migrants, refugees and displaced persons in urban settings, and the impact of employment and on urban settlements.
- The fourth section presented case studies from Cairo, Alexandria, Tunis, Rabat, and Tripoli with a focus on the implications of unplanned development and population growth on quality of life and services' delivery in these cities.
- The fifth section draws policy responses geared to improved urban environment. The first part reviews management and administrative responses, including institutional mechanisms, human resources development and community participation. The second part focuses on demographic trends and policies in Africa, and outlines a regional environmental strategy on urban development. The third part presents a perspective on ECA's role in improving urban management in the Member States. The final part outlines a proposed agenda for action to strengthen environmental management in African cities.

II. ENVIRONMENTAL HAZARDS IN URBAN SETTLEMENTS AND THEIR IMPACT ON HEALTH AND ECOSYSTEM

A. Urbanization and Human Health in Africa

Deterioration of the immediate environment in the households and their surroundings is causing rising concern. For city dwellers in Africa, health problems induced by indoor pollution, malnutrition, and deteriorated housing, are receiving more attention than the long-term environmental problems such as the loss of biodiversity and rain forests. Attest to this fact, is the deteriorated health standards in Africa compared to other regions in the world (see Figure 1).

As stated before, the booming growth of African cities has outstripped the resources of the municipalities to deal with garbage collection, sanitation, and primary health care, specially in the overcrowded low-income areas. This vast growth has not been only associated with destructive effects on the physical environment but contributed to spreading of diseases and deterioration of public health.

Where adequate environmental services are available, marked improvement in public health is achieved. A WHO study confirmed that, a distinct decline in infant mortality rates was observed where coverage of water and sewage disposal services increases.¹²

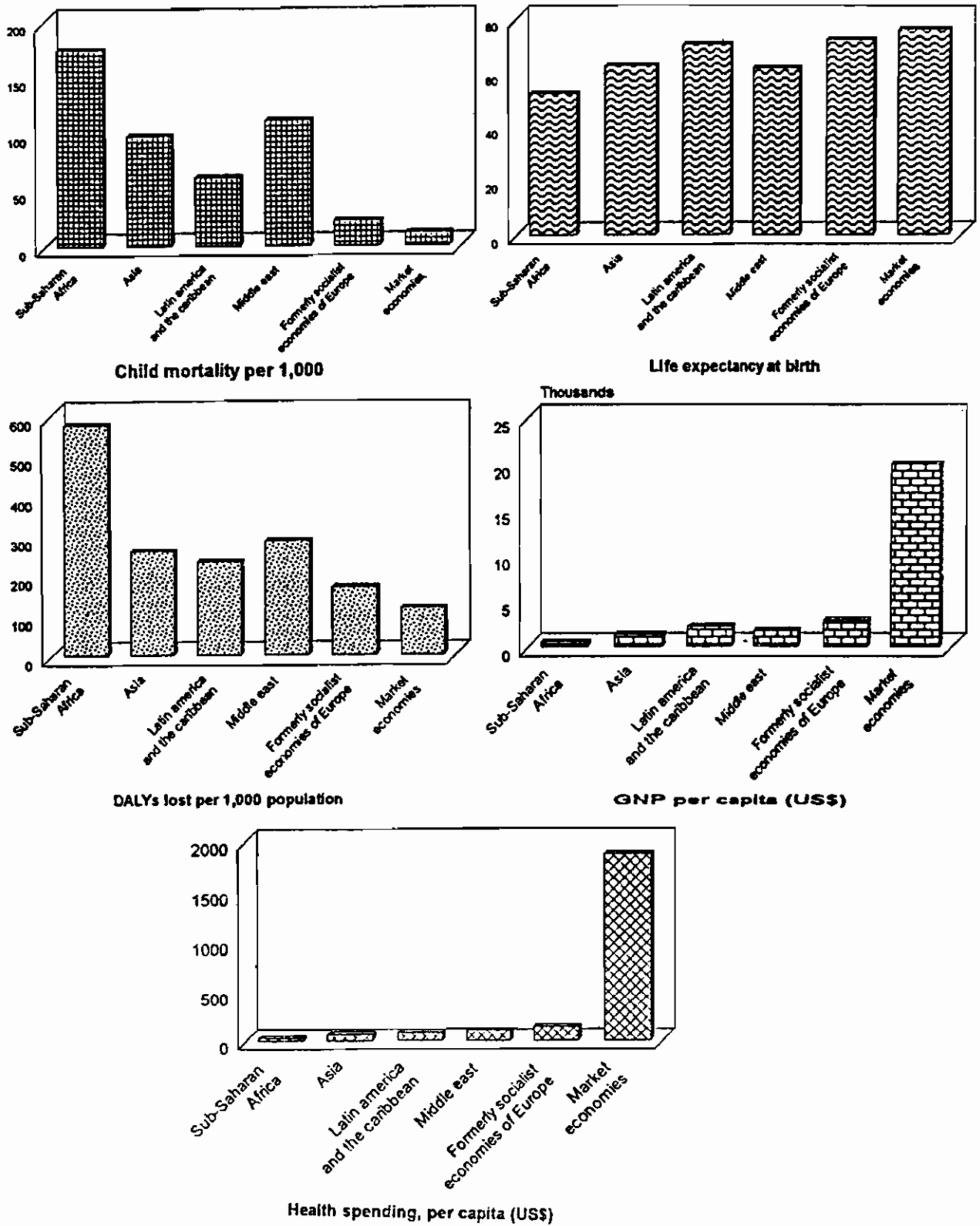
The impact of improper water and sanitation on health is clearly demonstrated in *Accra*, where only one third of the people have running water and flush toilets in their houses; the other two thirds rely on street vendors for clean water and use common latrine facilities. Inadequate water supply and sanitation has contributed to significant spreading of diarrhea and malaria in the city.¹³

City dwellers in Africa are also exposed to respiratory diseases such as asthma, bronchitis and emphysema. This is attributed to the intense exposure of humans to noxious doses of industrial emissions, car exhausts and other harmful pollutants, particularly in the congested metropolitan centres.

Unfortunately, the epidemiological records of African countries are mostly based upon routine reporting on patients visiting hospitals. This render health statistics biased, as most care-seeking clients are middle-income people, while urban poor have restricted or no access to medical care facilities. In some countries disease episodes are not reported for political or social reasons, and where no civil registration system exists, causes of death are only recorded for hospital inpatients.

12. World Health Organization, "Water, sanitation and health", EM/RC 32, 1985.

13. McGranahan, G., and Songsore, J., "Wealth, health and the urban household: weighing the environmental burden in Accra, Jakarta, and Sao Paulo ", Environment, July/August, 1994.



Source: "National experience with shelter delivery for the poorest groups" UNCHS, Nairobi, 32, 1994.

Figure (1) : HEALTH INDICATORS BY REGION IN 1990

While diseases of urban affluent are attributed mainly to unhealthy practices such as over-eating and lack of physical fitness, urban poor suffer mostly from environmentally-induced diseases, malnutrition, and work-related accidents. In the lower-income communities, infant mortality which often exceeds 100/1000 live births, is basically attributed to environmentally related diseases such as acute respiratory infections, malaria and diarrhoea. In the affluent societies where infant mortality drops below 25/ 1000 live births, the common causes of mortality are accidental injuries, poisoning and malignancy.

Air pollution has been identified as a major cause of mortality and morbidity from asthma and bronchitis. Excessive water pollution causes diarrhoeal diseases and hepatitis. Cholera, typhoid, and bacillary dysentery are major bacterial enteric infections in areas not provided with piped water. Inadequate housing and overcrowding cause respiratory diseases, tuberculosis, and meningitis.

Skin infections such as impetigo and scabies dominate in the slum and sub-standard areas where people are forced to share unhygienic sleeping accommodation. Sexually-transmitted diseases are also common in poor urban settings, where poverty, social frustration, and unemployment prevail. Despite official banning of prostitution in most African countries, it still represents the only income source for some desperate urban poor.¹⁴

An analysis of causes of death in African urban settlements provide evidence of city dwellers suffering from the worst of both worlds, as they experience typical problems of underdeveloped populations (dominance of infectious diseases and postnatal deaths) and diseases commonly found in affluent societies (deaths from neoplasm's, heart diseases and accidents).

Cairo demonstrates the gravity of environmental health problems in an African metropolis. Higher risk problems include particulates, lead and microbial contamination. Particulate matter in air exceeds health standards by a factor of 5 to 10, with levels higher than any of the world's largest cities. Air pollution causes between 9000 and 16000 deaths each year. Lead is widely present in food, water, and air. Environmental linked diseases include diarrhoea, infectious hepatitis, typhoid, schistosomiasis, and other water-borne diseases.

The diseases most commonly recorded in Ethiopia for outpatients include dysenteries, helminthiasis, eye diseases, skin infections and upper respiratory infections, while those most frequent among inpatients include tuberculosis, gastroenteritis, pneumonia, complications of pregnancy and dysenteries. Similar disease patterns were reported in Kenya and Ghana.¹⁵

14. Tabibzadeh, I., et al, "Spotlight of cities: improving health in developing countries", World Health Organization, Geneva, 1989.

15. Nordberg, E., ad Finer D., "Society, environment and health in low income countries", IHCAR, Karolinka Institut, Sweden, 14, 1990.

A health survey in Ilorin, Nigeria, indicated that the most common single cause of death in children was measles, followed by diarrhoea, malaria, and anemia. Infant mortality was 130/ 1000 live birth. In Kinshasa, Zaire, 38 percent of children admitted to hospitals had malaria with a fatality rate of 21 percent.¹⁶

A study undertaken in Monrovia, Liberia¹⁷, concluded that water-related health problems are linked to inadequate food and water storage, and poor hygiene. In the city slum areas, 63 percent of the stored foods were contaminated with bacteria while 81 percent of baby foods were heavily contaminated. In another study performed in Bakau, Gambia¹⁸, a significant association was found between social factors related to improved living standards and heavier and taller children.

Several studies have established the link between poor housing, water and sanitation, and the prevalence of helminths in African cities. A study in Dakar, Senegal¹⁹, concluded that the majority of Cholera cases originated from households with over 30 residents. Only 18 percent of reported cases' houses had running water and 36 percent had sanitation facilities. In Dar es Salam, prevalence of hookworm in a poor urban district was associated with low socio economic status.²⁰ In Addis Ababa, a morbidity survey in low and high socioeconomic kebele, about 20 percent of low-income residents reported diarrhoea and other abdominal conditions where incidences were 11 percent in the high income areas.²¹

16. Adedoyin, M., and Watts, S., "Child health and child care in an indigenous area of the city of Ilorin, Nigeria" Social Science and Medicine, 29 (12), 1989.

17. Molbak, K., et al, "Bacterial contamination of stored water and stored food: a potential source of diarrhoeal disease in West Africa" Epidemiological Information, 102:309-16, 1989.

18. Pickering, H., "Social and environmental factors associated with diarrhoea and growth in young children: child health in urban Africa" Social Science and Medicine 21(2): 1985.

19. Coll, M., et al, "Cholera et urbanization a Dakar" In Salem G, And Jeanee, E., eds., Urbanization et sante dan le tiers monde. Transition epidemiologique changement social et soins de sante primaire, 87-91, 1989

20. Killewo, J et al "Patterns of hookworm and Ascaris infection in Dar es Salaam, Tanzania" Acta Tropica, 48:247-49, 1990.

21. Kloss, H., et al, "Illness and health behaviour in Addis Ababa and rural central Ethiopia", Social Science and Medicine, 25(9), 1989.

In Bobo Dioulasso, Burkina Faso, severe malnutrition was associated with living in peripheral spontaneous settlements and in downtown old quarters.²² A report summarizing the available literature on health and the urban environment²³, concluded that the health impact of both chronic and acute morbidity and consequent mortality is primarily inflected on urban poor. The report noted that urban poverty is a complex proxy measure for a composite of deprivation extending from command over resources, education, social support, self-esteem to housing quality and sanitation. Most reported studies suggest that addressing the intermediate variables of urban environment in African cities is appropriate for improving the quality of urban life. However, poverty remains the leading predictor of urban morbidity and mortality.

As shown in Table 4, environmental degradation is associated with high child mortality in Africa, while decreased child mortality and increased life expectancy are commonly linked to improved income, literacy, and access to safe water. Increased water consumption in households has shown a median diarrhoea reduction of 25 percent and even larger reductions are likely in cases of very low pre-intervention water consumption. The effect varies considerably with the causative organism, and *Shigella* and *Escherichia coli* diarrhoea is affected much more than episodes caused by *amoebiasis* and *rotavirus*.²⁴

Pollution of fresh water may cause human health risks through other direct pathways, including consuming food crops irrigated with contaminated water, or consuming fish that have bio-accumulated pollutants while living in contaminated water. Each of these different pathways has been investigated in some African cities, and water was found contaminated through its pathway from raw intakes through treatment, to distribution and in-house storage practices.²⁵

Disease-transmission to humans, and hence the frequency of man-vector contact, can be reduced by improving environmental conditions in the African cities. For instance, malaria incidences can be reduced through elimination of breeding sites and making dwellings inaccessible or unattractive to vector mosquitoes. Making local surface water inhabitable for snails reduces cases of schistosomiasis.

22. Gazin, P., "Comparasion de l'etat ntritionnel des enfants en milieu urbain et rural The(Bobo-Dioulasso et environs) Burkina Faso", In Salem G, And Jeanee, E., eds., Urbanisation et sante dan le tiers monde. Transition epidemiologique qchangement social et soins de sante primaire, 139-40, 1989.

23. Bradley, et al, "A review of health impacts in developing country cities " The World Bank, Urban Management Program Discussion Paper No. 6, 1992.

24. Esrey, S., Feachem, R., and Hughs, J., "Interventions for the control of diarrhoeal diseases among young children: improving water supply and excreta disposal facilities". Bull. WHO 63: 757-72, 1985.

25. United Nations Environment Programme, "Public health problems in coastal zone of the East African region " Regional Seas Reports and Studies No. 9, 1982.

B. Psychological Disorders of Urbanization

While proper physical and social environments are conducive to good mental and physical health, psychological disorders are attributed to prominence of drug abuse, suicide, delinquency, and violence in urban societies.

Most psychological problems of city dwellers are linked to poor housing, forced displacement, and deteriorated working conditions. Furthermore, mental disorders and deviations in social behaviour are aggravated by city-life stressors including noise, environmental pollution, over-crowding, and poor sanitation.

Deteriorated living conditions in African urban slums and insecurity of tenure contribute to mental stresses, and development of anti-social behaviour. Concomitantly, diseases which are typically associated with modern life-styles also affect large segments of African urban population. These include malignant neoplasm's, heart diseases and hyper-tension related conditions.

Although mental disorders in urban settings are contributed by a multiplicity of factors including poverty, homelessness, illiteracy, alienation and environmental degradation, it is surprising to note that the hardships of squatter life have managed in some instances to strengthen endurance and tenacity of the suffering from precarious living conditions in urban slums. It appears, therefore, that enhancing resourcefulness, self-esteem, and empowerment of urban poor may enable coping with the complexity of life in the deteriorated physical and moral environments of the squatters.²⁶

Where strong social networks and a sense of belonging exist in urban settings, a remarkably low level of psychological disorders has been observed. Such effective social systems are important, not only for the survival of urban poor but for remedying the influence of the deteriorated environment and the ensuing psychological problems.

C. Chemical Hazards in Urban Environment

The widespread use of chemicals in households, industry and agriculture causes increased public health risks and environmental pollution. In severe cases of groundwater contamination, high levels of nitrates and pesticides were detected in water. Improper handling and disposal of hazardous wastes releases organic chemicals in water bodies. Lead from industrial and vehicular sources can be significant contaminant in acidic waters.

Although drinking water contributes little to the daily intake of city dwellers, it may constitute a health risk where water is withdrawn from highly contaminated sources. Treated surface water may contain high levels of residual coagulants and disinfection byproducts. Some communities consume water with high levels of lead driven from pipes or solder.

26. World Health Organization, "Report of the panel on urbanization", Commission on Health and Development, WHO/EHE/92.5, 1992.

Chronic exposure to a specific chemical can occur through ingestion of drinking water and water used in cooking, through penetration of skin, or by inhalation of the contaminant becomes air borne as an aerosol or vapour. The effect varies among members of the same family, and among regions due to differences in fluid intake, respiration, pollutant concentration, volatility and absorption.²⁷

Toxic substances associated with industrial pollution and excessive use of household chemicals pose detrimental effects on human health. Cyanides are extremely toxic as they inhibit the phosphorylative oxidation reactions which permit cellular respiration. Mercury and its compounds, especially methyl mercury, have been associated with a number of episodes characterized by impaired hearing, vision and muscular coordination, and in some outbreaks, by high mortality. Lead, which is considered a global pollutant, can produce a variety of serious effects, including neurological disorders.

Exposure to hexavalent Chromium is particularly hazardous as it causes carcinogenic and mutagenic effects; it also exerts toxicity on the renal, hepatic, skin, and gastrointestinal systems. Exposure to Arsenic compounds in drugs, drinking water, and occupational environments is associated with skin cancer and neurological disorders in humans. The incidence of lung cancer increases ten folds in smelter workers who inhale high levels of Arsenic trioxide. Excessive intake of Cadmium is associated with increased risks of proteinuria, prostatic diseases and respiratory cancer.²⁸

Trihalomethanes (THM's) have been detected in chlorinated water supplies. However, concentrations vary with the type and dose of chlorine being used as disinfectant as well as the type and level of organic precursors in the raw water. THM's in drinking water should not exceed 100 ug/l based on evidence of carcinogenicity in animals. On few occasions, the intake of the Noubaria water treatment plant in Alexandria, Egypt, had traces of organic matter due to mixing of fresh and drainage water in the Noubaria canal. This led to formation of THM's and their detection in concentrations of up to 70 ug/l in the treated water. Though, still within the permissible limit, the water authority, in a precautionary move, is planning to use carbon adsorption to ensure complete removal of THM's from drinking water.²⁹

27. Hamza, A., " Water Quality Monitoring in the Developing Countries: Challenges and Prospects." Proceedings of Stockholm Water Symposium, Vatten, Sweden, August 1993.

28. Kipen, H., and Weinstein, B., " The role of environmental chemicals in human cancer causation" In Principles and Practices of Environmental Medicine, Edited by Tarcher, A., Plenum Medical Book Co., New York, 459, 1992.

29. Hamza, A., " National Strategy for Potable Water in Egypt", Center for Environment and Development for the Arab Region and Europe CEDARE, Consultancy Report, December, 1994.

D. Physical Hazards in Urban Settlements

Physical hazards in urban settings range from natural causes such as earthquakes, flooding and landslides, to man-made causes such as fires, explosions, release of toxic substances from industrial accidents, and collapse of faulty structures. The complex nature, and unpredictability of physical hazards which may hit cities without warning requires upgrading emergency preparedness procedures, training of personnel, and promoting community involvement and awareness.

Setting priorities on the basis of the potential risks should be the core of an emergency preparedness plan, particularly in cities with heavy industrial activities. Since it may be impossible to devote adequate resources to meet all types of emergency situation, it is necessary to prioritize potential problems based on adequate information base.

The tasks of hazard management in African cities are often assigned to various institutions. Among these are manpower (occupational safety), civil defense (confirmation with codes of fire prevention), industry (safe operation of equipment and storage facilities), and environment protection (limitations on use and disposal of hazardous chemicals).

The procedures for control of sources of physical hazards administered by these institutions typically focus on specific activities such as licensing and monitoring compliance with safety codes and regulations. This fragmented approach has tended to compartmentalize and hinder integration of efforts within a comprehensive scheme for management of hazards during emergency situations. Accordingly, procedures being employed for accident prevention in African cities and industry-intensive areas can be improved through effective control at source, enforcing unified licensing and permitting systems for hazardous activities, and proper zoning.

Control of work environment, which is limited in most instances to satisfying safety requirements in construction and operation of manufacturing facilities, should be broadened to ensure safety of the surrounding population. Effective management of occupational safety programmes should also promote community awareness of chemical risks and public preparedness in case of industrial or transport emergencies.

In addition to common licensing requirements, priority dangerous installations should also be requested to submit safety analysis to describe the nature of hazard, the probability of accidents, and the anticipated damage, should they occur. Such analysis usually encompasses characteristics of the site area, nature of flow of all hazardous substances; evaluation of the possible risks and their potential for occurring; interactions with the surrounding environment and neighboring installations; and evaluation of the consequences of an accident.

Licensing storage facilities for hazardous chemicals, particularly those located in or close to residential areas, should be based on careful examination of characteristics such as ignitability, corrosivity, toxicity, mutagenicity, or infectiousness; quantity, location and storage procedures.

The approach for identifying high-risk situations may involve development of alternative accident scenarios, including those with the worst effects. High-risk events subject to investigation may include:

- Risks linked to liquefied combustible gas facilities.
- Risks linked to containers of liquefied or non-toxic gases which risk breaking during handling or after explosions or external shocks.
- Risks linked to toxic gas facilities .
- Risks linked to high-capacity storage of inflammable liquids .
- Risks linked to the use of explosives or explosive products.

For each metropolis or large city, a local emergency preparedness committee should be established with broad representations of agencies concerned with occupational safety, public health, transportation, and civil defense; as well as industry and NGOs. The functions of the committee may encompass identification of hazardous facilities, development of emergency and notification response procedures, identification of resources to combat disasters, and designation of coordinators from local departments and manufacturing plants. The emergency preparedness scheme may embrace:

- Undertaking surveys to identify potential critical areas in dangerous facilities and hazards associated with operational emergencies or natural catastrophes. A fault sequence analysis may be applied to identify the eventual result of a series of circumstances leading to a build up of hazardous conditions.
- Defining the probability of an event having dangerous consequences (fatalities, injuries, damage to property or the environment). Sequence models may be employed to assess the effect of accidental release of flammable or toxic material to the atmosphere.
- Recommending in-situ measures such as the modification of layout, application of additional safety devices, change in process and equipment, and use of less hazardous materials. Off-site measures may include zoning, early warning of the neighbouring community and evacuation exercises. A plan involving a combination of these measures should be developed to enable safe management of hazardous activities to maintain security for adjacent population.

Major cities in Tunisia, Morocco and Egypt have already established permanent committees on emergency preparedness at the local level, in cooperation with the UN Environment Programme (Awareness and Preparedness for Emergencies at the Local Level APELL).

III. URBANIZATION AND ENVIRONMENTAL DETERIORATION

A. Urban Industrialization and Health

The large majority of industries in African countries are medium- to small-scale enterprises which produce manufactured goods for the local markets. In the few cases where complex industries exist, they usually rely on labour-saving techniques due to extreme shortages of skilled manpower.

The spatial distribution of industry in major African cities typically depends on abundance of employment pool, availability of services, access to utilities and transport networks, and proximity to principal markets. Agglomeration of a specialized industry in urban settings creates opportunities for support activities to provide specific services for this industry. Thus, for example, concentration of textile mills in a particular city leads to establishing a pool of skilled textile workers, dye formulation plants, and a specialized spare parts industry.

On the other hand, the inferior infrastructure of transport, utilities, services and communication in provincial towns of Africa impedes development of industries in these locations. Exceptions are the raw material based industries such as sugar, canning, forestry and ore processing, which are usually located in predominantly rural areas.

Industries in these settlements are relatively small in size and labour-intensive. They usually involve textile finishing, food processing, furniture manufacturing, formulation of chemicals, etc. The availability of land for industrial and housing developments, demand for cheap consumer goods, and abundance of unskilled workers, encourage development of simple-technology small-scale industries in provincial towns. High-technology enterprises such as electronic equipment assembly, metallurgical, and chemical manufacturing industries are usually confined to metropolitan locations.

Down stream processing of secondary products comprises broad range of products such as detergents, cosmetics, tanned leather, plastic moldings, toiletries, pesticide formulations, ceramics, converted papers and beverages. The processing facilities are typically medium- to small-scale plants, most often located within the boundaries of urban settlements in areas with readily available utilities and supporting services. The main hazardous residue resulting from these processes are likely to be spent lubricating oils, used organic solvents, spent catalysts, electroplating liquors, and hide cuttings contaminated with chromium. Both liquid effluents and solid hazardous residues are either discharged to municipal sewers or to water bodies; solids may be incinerated or dumped with domestic wastes wherever convenient.

While in most people's minds, industrial pollution is mainly contributed by large industries, it is still not appreciated that the bulk of pollution in urban areas is the result of dispersed medium- and small-size industries which comprise the major part of manufacturing activities in African cities. Uncontrolled discharge of hazardous contaminants from these industries results in buildups of toxic constituents in surface water supplies used for drinking and irrigation, contamination of groundwater, and severe operational troubles in sewerage systems. In addition, open dumping of solid hazardous residues and emission of toxic gases pose serious environmental and health risks.

Artisan enterprises such as car maintenance shops, food outlets, photographic laboratories, dry cleaning, gas stations and machine shops, represent the day-to-day activities of very small establishments normally located in areas close to or within the residential districts. Their noise, gaseous emissions and other waste arising are immediately felt by local residences in terms of nuisance and health risks.

Industrial wastes usually contain traces or larger quantities of the raw materials, intermediates, final products, co-products, by-products and residuals of ancillary or processing chemicals used. The composition and amounts of pollutants discharged by a specific industry can be determined only by a comprehensive survey of sources of pollution in the processing operations.

Thus, complete enumeration of the substances present in manufacturing wastes in any industrial city would run into thousands. They include among other things, detergents, solvents, cyanides, heavy metals, organic acids, nitrogenous substances, fats, salts, bleaching agents, dyes, pigments, phenolic compounds, tanning agents, sulphides and ammonia.

While wastes are generated by almost all branches of the manufacturing industry, a few major groups are most likely to produce hazardous residues requiring special handling. The chemical industry manufactures inorganic, organic, and synthetic chemicals as well as fertilizers and synthetic fibers; the generated residues invariably contain mixtures of varying physical and chemical complexity, and they are often toxic, non-biodegradable and/or persistent in the environment. Metallurgical industries emanate considerable hazardous residues in the form of slags, slurries, sludges and spent liquors from pickling, anodizing and electroplating processes. Other industries which produce hazardous residues include petrochemicals, batteries, paint and pigment, electric and electronic components, pharmaceuticals, paper and textile finishing.³⁰ The following paragraphs present a brief review of the environmental impacts of industrial pollution in some African cities.

30. Lindgren, G., "Managing industrial hazardous wastes", Leis Publishers, New York, 1989.

In Kenya, there is a wide range of organic effluents containing soluble substances of which coffee wastes are the most widespread and the most severe. In Nigeria, the brewing, slaughtering and sugar refining industries have few or no facilities for either air or water pollution control. Somalia's main industries are located in and around Mogadishu and Kismayo. Pollution inputs to the sea consist of untreated effluents from slaughterhouses, tanning, and small-scale food processing plants. These wastes are characterized by high organic loads, repugnant odours and high levels of nutrients which promote algal blooms.

In Dar El Salaam, the capital of Tanzania the discharge of untreated industrial effluents into the Msibazi River and its tributaries has rendered some sectors of this waterway out of bounds for swimming and fishing because of the high level of pollution. The Pangalanes Canal in Tawagave, Madagascar, flows through the industrialized part of the city where untreated processing effluents are dumped into the canal thus causing considerable degradation of its water quality.

In Zambia, major agro-industries, textile mills and an oil refinery are located in the capital city of Lusaka; their effluents are discharged without treatment into the public sewers or surface waters. The sewage treatment works are overloaded due to heavy loads of sewage and industrial wastes. The inferior quality of the treated effluents further aggravates pollution problems of the Kafue and Zambazi Rivers and renders their water unsuitable for domestic and irrigation uses.

Industries in Cote d'Ivoire include plants for food processing, chemicals, fertilizers, and pesticide formulations. About 80 percent of the manufacturing industries are located in and around the capital city of Abidjan. The majority of processing effluents are disposed of without pre-treatment in the sewer system or in the nearby streams. Harmless wastes and sludges are handled in a special processing facility at Akouredo northeast of Abidjan, however, most toxic residues find their way to this facility which is ill-equipped for handling hazardous wastes.³¹

Health hazards of industrial emissions include exposure to high concentrations of toxic chemicals causing poisoning and burns, or exposure to low doses for long periods which induces chronic diseases, cancers, sterility and reproductive problems.

The environment can assimilate industrial effluents through two major routes: (a) by chemical decomposition into compounds that enter the natural cycles; and (b) as a food for some living organisms whose waste may enter the natural cycles. Some chemicals such as DDT, PCB's, and some forms of plastics remain stable for 50 years or more. In addition to pollution of water resources, industrial wastes also lead to terrestrial and atmospheric pollution.

31. Hamza, A., "Impact of industrial and small-scale manufacturing on urban environment in developing countries", UNCHS Urban Environment Programme, Consultancy Report, 1991.

The land may become a hazard or nuisance to local residents when industrial residues accumulate under conditions of uncontrolled discharge. The mechanisms by which land becomes contaminated include:

- Dumping on land of industrial solid, and hazardous wastes such as metal-bearing sludges, concentrated spent acids and alkalis, organic residues, wasted oils, etc.
- Uncontrolled burning of solid wastes on land sites leaving residuals of ash, burned rubber, toxic chemicals, and other burned debris.
- Storage either temporarily or permanently, of discarded chemicals, production residues, toxic wastes, putrescible matter and industrial rejects.
- Deposition of stack emissions which transfer toxic substances via the atmosphere to the land.
- Where liquid wastes are allowed to run uncontrolled overland, they inevitably cause soil pollution.

The consequences of uncontrolled disposal of industrial solid wastes include:

- *Health and safety impacts:* breeding of disease carriers at sites of decomposing organic matter, contamination of crops, fish and drinking water by direct discharge or by leachates run-off from waste tips, and fires and explosions due to improper storage of hazardous residues.
- *Aesthetic effects:* unsightliness due to accumulation of waste heaps close to industrial and residential areas, and emission of obnoxious odours from burning or decomposition of organic matter.
- *Environmental deterioration:* damage to fauna and flora caused by direct discharge of toxic residues, and contamination of water resources by leachates and run-off from open waste tips.

On the other hand, controlled disposal of hazardous residues may also cause undesirable terrestrial pollution as illustrated by the following examples:

- Lagoons are commonly used for the disposal of hazardous slurries. Improper construction of lagoons may result in bursting and inundating the adjacent sites or in groundwater contamination through seepage.
- Deep well injection, where practiced, causes contamination of groundwater supplies.
- Controlled tipping is practiced in some African cities through co-disposal with domestic refuse in landfills. The potential impacts of this method include proliferation of rodents in dumping sties which may transmit such diseases as Leptospirosis, Salmonellosis and Trichinosis, and emission of harmful gases which affect human health and impair the growth of plants. The leachate may migrate from the disposal site as surface flow or by percolation through underlying strata and recharge to groundwater.³²

32. Salvato, J., "Solid waste management " In Environmental Engineering and Sciences, 4th Ed., John Wiley & Sons, Inc., 707-21, 1992.

B. Urban Air Pollution

The existence of clusters of obsolete manufacturing establishments within cities generate excessive air emissions. In addition, primate cities have intensive motor vehicle traffic that further complicate air pollution problems.

Major industrial emissions include: Nitrogen oxides (NO_x) mainly produced from high-temperature combustion operation; Sulphur oxides (SO_x) primarily emitted as SO₂ from the combustion of fuel oil and coal at stationary sources; Hydrogen sulfide (H₂S) emitted in large quantities from paper plants, natural gas cleaning and processing plant, and oil refineries; Carbon monoxide (CO) released at high concentrations in the production of cast iron and other metallurgical processes; Volatile Organic Chemicals (VOCs) make up a vast group of chemical emitted from industry, household and commercial solvents, incinerators, and hazardous waste sites.

Ozone (O₃) is formed through chemical reactions between precursor emissions of VOCs and NO_x in the presence of sunlight; hazardous particulates may be emitted as metallic oxides from spray painting, as asbestos fibers from the insulation, and from special releases such as barium, beryllium, boron, lead, and arsenic from the metals processing industry.

Industrial solvents which include alcohols, aldehydes, ketoses and chlorinated hydrocarbons, emit toxic vapors. Exposure may occur in different processes, such as degreasing of metals in the machine industry, extraction of fats or oils, dry cleaning, painting, and the plastics industries. Solvent vapours enter the body mainly by inhalation, although some skin absorption may occur. The vapours are absorbed from the lungs into blood, and are distributed mainly to tissues with a high content of fat and lipids such as the central nervous system, liver and bone marrow.

Compared to their large-scale counterparts, small industries contribute smaller loads of gaseous emissions. Nevertheless, their effect are sometimes more pronounced due to the cumulative impact of concentrations of small polluting establishments located within a residential area. The resulting "heat islands" render life in the affected areas, particularly in the warm seasons, unbearable. The emitted pollutants cause direct damage to buildings, paint-work, unprotected steel-work and public monuments as well as appreciable soiling which makes life dirtier and unpleasant.

The importance of air pollution stems from the fact that its effect is not localized but commonly affect areas far distant from emission sources. In addition to its adverse health effects on urban population, air pollution also pose damaging effects to water, fishery, forests, natural vegetation, agricultural crops, buildings and historic monuments.

Air emissions are generated from point sources such as manufacturing and institutional facilities, fossil-fuel power stations, and incineration processes; or from non-point sources including mobile vehicles, use of aerosols, and burning of forests.

Gaseous emissions are classified as primary or secondary. A primary pollutant is emitted as such into the atmosphere, while a secondary pollutant is formed by chemical or physical processes. Smog is an example of secondary pollutant formation. Photochemical oxidants are formed in the atmosphere in the presence of sunlight through a series of complex reactions that involve nitrogen oxides, organic carbons and other reactive gaseous emissions. Fine particles of less than 1 μm in size are secondary pollutants formed through reactions of gaseous emissions that include recondensed metal vapours and oxidized sulphur and nitrogen compounds. Industrial sources of air pollution are the most noticeable, because emissions are usually discharged through a single stack or duct.³³

Acute Respiratory Infection (ARI), is one of the chief killers of children. Children with ARI symptoms usually live in homes which use wood extensively. In Gambia, girls under 5 years carried on their mother's back during cooking were found to have a 6 times higher risk of ARI compared to the risk of parental smoking.

Indoor air quality in residential settings is receiving more attention due to their damaging health effects, particularly on those who spend most of their time indoors such as the elderly and infants. Important indoor pollutants include tobacco smoking, VOCs emissions, combustion products, radon, asbestos fibres and aeroallergens.

Smoking indoors contributes to the levels of respirable particles, nicotine, PAHs, CO, NO₂ and a variety of other substances. Smoking is the single most important source of respirable particles indoors. Other indoor sources include combustion, pollen, molds, bacteria, animal dander, fungi and building materials.

Indoor combustion of fuels emits CO, CO₂, SO₂, NO_x, particulates and VOCs. When a gas stove is used for heating - a common practice among urban poor in African cities- excessive CO is generated indoors. Where Kerosene heaters and wood stoves are used, NO₂ and CO are released in significant amounts.³⁴

C. Environmental Impacts of Water Pollution

The specific responses of water bodies to a given pollutant depend on its load and the characteristics of the receiving water. Pollutants may cause a toxic effect to aquatic life, an aesthetic insult, or blanketing effect that hinders photosynthesis and limits the process of self-purification.

33. Muralikrishna, K., "Air pollution and Control", Kaushal & Co., India, 1995.

34. Spengler, "Outdoor and indoor air pollution", In Principles and Practices of Environmental Medicine, Ed. Tarcher, A., Plenum Medical Co., New York, 21-42, 1992.

Chronic toxicity due to steady release of low-level toxic pollutants results in changing the entire aquatic population balance through destroying susceptible species and flourishing of the less desirable but more tolerant species; and diminishing algal and invertebrate food supply. In addition, reproductivity may be altered as eggs are more susceptible to sub-lethal concentrations of toxicants than are the adults.

Eutrophication due to enrichment of water by nutrients discharged with municipal effluents, notably phosphates and nitrates bearing wastes, may cause accelerated formation of objectionable algal growth. Many organic materials may be biologically degraded in water streams, thereby causing excessive oxygen demands. These substances constitute a considerable pollution load on water resources. Oils, by floating on water surface impose a barrier, while detergents interfere with the uptake of atmospheric oxygen in water.³⁵

Complete exhaustion of dissolved oxygen in a polluted stream would render the water incapable of supporting fish-life. In the stream stretches that are anaerobic, the variety of species decreases compared to that in cleaner ones. The relatively few species that dominate are bottom feeders, adapted to anaerobic conditions.

The depreciation of property for residential uses and recreational development in urban settlements is a tangible resource loss due to gross pollution of water bodies. In addition, stretches of rivers and reaches of lakes located close to congested urban areas have been written off as large open sewers. The formed pockets of pollution forces dwellers in the adjacent areas to move out which involves additional expenditures to build and run new infrastructure.

D. Urban Housing

Provision of adequate shelter to the lower-income groups represents an acute problem in major African cities. Scarcity of housing finance, a lack of political will, the low return on investment and the extreme shortage of building materials contribute to lowered production of public housing units. In addition, 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 environmental enhancement³⁶

35. United Nations Environment Programme, "Chemical pollution: a global overview", Earthwatch/UNEP, Geneva, 63-86, 1992.

36. US Agency for International Development, "Urbanization and the environment in developing countries", Office of Housing and Urban Program, Washington, DC, 1990..

Squatter housing usually spreads on undesirable land, such as flood-prone low-lying areas or unstable hill sides. Settlers invade deserted lots and rapidly construct temporary housing to avoid eviction by governmental authorities. Such informal housing gradually becomes permanent as the threat of repression recedes.

On the other hand, restrictions on rents of substandard housing deprive owners from investing in upkeep and maintenance services, which cause progressive deterioration of such housing. The cost of water provided by private vendors in these settlements is much higher than that charged by municipalities for piped supplies.

Despite strong opposition in the past, local Governments have come to accepted squatter settlements as an inescapable part of the urbanization process. However, these settlements are provided with meager public services. Municipalities have to face the emerging problem of providing services to instant settlements of middle income people, which inevitably cuts expenditures on services for urban poor.

A case in point is Nairobi, Kenya, where the city has grown from 350,000 inhabitants in 1963 to a present population of over two million. Dwellers in informal settlements live in temporary houses constructed from timber, mud and wattle. The "Nairobi Convention" held in July 1993, adopted a comprehensive plan which relates informal settlements to existing structure of urban management. In the aggregate, informal settlements occupy 5.8 percent of the residential area of the city, but they house 55 percent of the city's population.

A major problem of Nairobi's informal settlements is the inaccessibility, inadequacy and unreliability of water supply systems. Water vendors, who deliver by wheelbarrow, normally retail water at three or more times the tariff charged by the council.

About 94 percent of the informal settlements residents do not have access to adequate sanitation. Pit latrines which serve an average of 50 people per unit are inadequately maintained and pose considerable health hazards. The dense physical layouts of these settlements and the temporary housing structures preclude the introduction of adequate sanitation facilities. The health of those living in the settlements of Embakasi and Kasarani are also affected by severe industrial pollution from the neighbouring manufacturing industries. Since almost all households use paraffin or charcoal for cooking, the generated indoor pollution has serious implications for respiratory health.³⁷

37. Alder, A., "Tackling poverty in Nairobi's informal settlements: developing an institutional strategy", Environment and Urbanization, IIED, London, Vol 7, No. 2, 85-107, 1995.

A similar situation occurs in Abidjan, Ivory Coast, a metropolis of 2.5 million people, 20 percent of whom live in precarious settlements. The informal housing of these settlements has partial or no infrastructure services. These settlements are now recognized as an integral part of the urban system. They exist not because of the tolerance of the local authority, but more particularly because of lack of other decent living alternatives. While only 38 percent of the residents are nationals, the rest are foreign immigrants from neighbouring African countries.

The inhabitants of informal housing within precarious settlements in the city are very diverse-Africans from different generations of migrants drawn to the city including wage-earners as well as the self-employed and retired people. However, most residents are illiterate and engaged in unskilled jobs in which provide meager income.³⁸

Most municipalities tend to accommodate squatter housing and encourage self-financed improvements rather than build new public housing. While provision of public services does not seem to gain sufficient recognition in most of these slum improvement schemes, some African cities have adopted a novel approach based on "sites and services". This approach is based on providing core housing units and a rudimentary infrastructure to be later expanded at the residents' own pace. Another approach has proved successful in Ismailia, Egypt, where squatter settlements are provided with essential infrastructure financed solely from the sale of lands in these settlements.³⁹

Lagos experience in upgrading urban slums deserves special consideration. The city population is expected to jump from 4.4 million in 1980 to about 13 million by the turn of the century. The inadequacy of housing has encouraged the proliferation of slums and squatter settlements which now accommodate over half of Lagos residents.

The Olaleye-Iponri area has been selected as a site of a pilot urban renewal project designed to provide basic infrastructure upgrading activities without total slum clearance. The area constitutes several adjacent "villages" close to the Lagos business centre. Its substandard housing was built of corrugated iron sheets and located haphazardly which hindered traffic, ventilation, drains and natural light. Although the area is well-sited on prime land, its disorderly development contributed to inadequacy of infrastructure necessities.

38. Yapi-Diahou, "The informal housing sector of the metropolis of Abidjan, Ivory Coast", Environment and Urbanization, IIED, London, Vol 7, No. 2, 11-30, 1995.

39. World Resources Institute, "Human settlements" World Resources, A Guide to the Global Environment, WRI/UNEP/UNDP, 1990.

The upgrading project centered around mobilization of residents to implement urban improvement projects including self-help housing, personal hygiene activities, environmental sanitation and social programmes with minimum external assistance. The project enabled widening and paving major roads, building community clinic and town hall, improving sanitation and water services, and internal resettlement of those displaced by these activities.

A Community Development Association assisted in launching the improvement scheme and in mobilizing local resources. The minimal renewal without total clearance guaranteed secure tenure and avoided displacement of local residents. As both tenants and landlords fully understood the objectives of the project, they welcomed the renewal scheme because it did not threaten the property or rental rights. In addition, it was clear to the residents that they will be the immediate beneficiaries of the self-implemented projects of upgrading infrastructural services.⁴⁰

40. Paulina. K., et al, " Squatter settlements in Nigeria: the experience of Olaleye-Iponir", Urban Services in the Developing Countries, United Nations, 1988.

IV. INTERLINKAGES: URBANIZATION, POVERTY AND ENVIRONMENT

Urban poverty in Africa is misunderstood and its environmental consequences are often underestimated. Millions of dwellers in African cities with incomes which are considered above the poverty line, actually live in poor housing in overcrowded neighbourhoods which lack basic infrastructure and services. They accept poorly paid jobs and work for long hours in hazardous environments. In essence, the majority of city residents live in "life and health-threatening" conditions (see Table 5).

Poverty lines, are rarely high enough to enable decent livelihood, particularly in primate cities, where the cost of housing, food, transportation and expenditures on health care and education are generally higher than the comparable costs in provincial towns and rural areas. Another important feature of the poverty problem in Africa is the wide gap between the rich and the poor city dwellers, and the discrepancy between rural and urban income (see Table 6).

A. Urban Development and Vulnerable Population Groups

Recent studies in Africa have indicated the complexity of factors contributing to urban impoverishment and how the social, economic and political structures lead to aggravation of the poverty problem. While the general features of urban poverty are more or less similar among African cities, they are markedly different when addressed in the local context.

In Harare, for example, it was not possible for households to respond to hardships induced by the economic restructuring programme by increasing the number of earners as job opportunities were very limited. By contrast, in cities with stable economies such as Alexandria and Tunis, more urban poor can enter the workforce to earn supplementary income needed for the survival of the household. However, it has been noted that increasing the earning opportunities to alleviate economic stresses on households may bring undesirable side-effects such as increased violence against the vulnerable family members.⁴¹

Urban poor are not only subjected to the stresses of falling incomes and escalating prices, but they also suffer from injury, deteriorated health and premature death due to unfavourable home and work environments. They often live under a constant threat of eviction because their homes are built on land that is occupied illegally. Those who have unlicensed street stalls often face harassment and confiscation of their wares. In addition, dwellers in low-income areas are more prone to natural and man-made hazards as they live on less valuable or deserted lands. These include low-lying areas subject to flooding, on hillsides subject to landslides, near garbage dumps or under high-tension wires which pose health risks to the inhabitants.

41. Kanji, N., "Gender, poverty and economic adjustment in Harare, Zimbabwe", Environment and Urbanization, IIED, London, Vol 7, No. 1, 57-76, 1995.

The use of shelters as workplaces adds to health and environmental risks. Wastewater flowing from highly polluting manufacturing facilities located in residential areas, and air emissions from on-site burning of industrial residues expose residents in the affected low-income dwellings to serious health problems. High noise levels near railway tracks and noisy industrial activities cause hearing impairment.

Commercialization of land markets, particularly in prime downtown areas, often lead to forced displacement and creation of new slums in the peripheral areas. For instance, in Dar es Salaam, land allocation and urban improvement projects have permitted only the socially powerful members of the society to get access to planned land cheaply, while lower-income and less powerful people have great difficulty acquiring land for housing in the city.⁴²

Another important facet of the problem of urban poor, is the growing gap between men and women in terms of access to income, resources and services. Such disparities cause gender-based problems including social instability, violence and increased vulnerability to health hazards, particularly for working women, the elderly and children.

For the majority of women, tensions increase with husbands who are more interested in spending money for private rather than household needs. Commonly, increased poverty leads to longer and harder working hours, fewer leisure activities, and physiological stresses, which reflect negatively on family relations.

Additionally, the problems of parasitic activities and the growth of unplanned settlements are further aggravated in economically strained cities as more medium-income people are rendered poor. The competition of the "new poor" makes the suffering of the vulnerable "very poor" much worse.

B. Migrants, Refugees and Displaced Persons in Urban Settings

Massive migration of people -either voluntary or forced- poses a problem for the social and political stability of African cities. The migratory flow in the continent precipitated by various stresses including environmental degradation, poverty, job scarcity, depletion of natural resources, ethnic conflicts and wars. In addition, economic constraints, and uncontrolled population growth have accentuated the problems of involuntary migration in many African countries. According to a UNFPA report, the number of migrants fleeing poverty, political oppression or environmental instability is growing at a time when the need for unskilled or semi-skilled workers is in decline in industrialized countries.⁴³

42. Kironde, J., "Access to land by the urban poor in Tanzania; some findings from Dar es Salaam" Environment and Urbanization, IIED, London, Vol. 7, No. 1, 77-86, 1995.

43. Sadik, N., "The state of world population", United Nations Population Fund, New York, 1992.

Recent indicators of human development in Africa are disappointing. The per capita income in the continent as a whole, has not increased for the past two decades, while the average infant mortality of 90/1000 live births is the highest in the world. The grain production per person is lower now than it was in 1950, and famine is a common occurrence in areas which experience long periods of drought. Frequent eruption of armed conflicts and dominance of political extremism, particularly in the least developed African countries, are responsible for dislocation of people. In some countries, spending on defense is higher than the combined spending on health, education, housing, and social services (see Table 7).

When these problems intersect, as in the cases of Somalia, Angola, Liberia and most recently in Rwanda and Burundi, they usually result in disastrous consequences, particularly for the vulnerable sectors of the society. Somalia's conflict stems from a century-old continuous migratory flow of major Somali clans away from the nomadic grazing areas that have been excessively overpopulated. Resident minority clans such the Goshu have been totally dispossessed of their land. As a result of continued political unrest, and the mounting economic and ecological stresses, about half a million Somalis are presently forced to flee to neighbouring countries, while more than 700,000 are internally displaced.⁴⁴

In Rwanda, the most densely populated country in Africa, ethnic tension between Hutus and Tutsis, was compounded by severe environmental and economic impoverishment. This in turn, aroused hatred, factionalism, and insecurity which eventually erupted into a deadly violence in 1993. In the wake of this civil war about 2.1 million Rwandans became refugees by the end of 1994. The fighting, in some instances, took place as a class struggle between the poor and rich of same ethnic group.⁴⁵

Since 1990, Malawi has hosted more than 80,000 refugees from Mozambique, a number equivalent to 10 percent increase in the country's population. Nearly 65 percent of these refugees are women and children in dire need of health care and nutritional assistance, which the Malawian government is hard-pressed to provide for its own people.⁴⁶

44. Brown, L., Lenssen, N., and Kane, H., "Vital signs 1995: the trends that are shaping our future". Worldwatch Institute, W. W. Norton & Company, New York, 1995.

45. Kane, H., "The hour of departure: forces that create refugees and migrants", Worldwatch Paper 123, 1995.

46. Government of Malawi, "Malawi country paper" Paper presented in the Conference on Safe Motherhood for the Southern African Development Coordinating Conference (SADCC) Countries, Harare, Zimbabwe, 1990.

Mozambique is facing similar crises, as more than three million people have been displaced within the country due to internal strife. These refugees often migrate to the periphery of urban centres, and end up living in sub-human conditions, in a situation of extreme poverty, famine and disease.⁴⁷

It should be noted however that the recent cessation of hostilities in war-torn countries, presents a new promise to stem the tide of involuntary migration in Africa. The war in Mozambique which claimed a million lives was brought to an end in 1993. After 30 years of fighting, Ethiopia is at peace, and Eritrea is a new country with a promising future. The Apartheid has ended in South Africa, and so have civil wars in Chad and Angola

In countries experiencing economic, political or climatic hardships, urban poor have been forced to exhaust available water aquifers, forests and other natural assets at a rapid rate. In addition, the population growth rate is not expected to slow down in the near future. If this situation endures, specially in Sub-Saharan Africa, the escalation of the displacement and refugee problems is likely to continue through the next century.

A case in point is Ethiopia where the population has doubled in the last four decades. It now stands at 57 million, with a projected increase to over 106 million by 2035. As the country has some of the world's most severely eroded soils and frequent encounters cycles of devastating famine, most of the next generation will have to choose between emigration or starvation.⁴⁸

In addition, severe climatic conditions in some African countries result in significant migration. The climate in Africa has been characterized by extreme changes during the past three decades. In the 1970's and 1980's droughts ravaged Sub-Saharan Africa causing devastating effects on crops and animals, and the spread of famine in several countries.

In the various ecological zones of Africa, including forests, woodlands, savannas, cultivated plains and river banks, soil degradation follows a common pattern. When natural vegetation is removed, it exposes top soil to the rains and results in severe erosion by heavy rainstorms. This process results in steady decline of the capacity of soil to hold water and hence reduces its productivity. As the land resources dwindle the impoverished peasant population is forced to migrate to ensure survival.

47. Cecatti, G., "Strategy for the national programme of safe motherhood in the People's Republic of Mozambique", Paper presented in the Conference on Safe Motherhood for the Southern African Development Coordinating Conference (SADCC) Countries, Harare, Zimbabwe, 1990.

48. US Department of Agriculture, "Production supply and demand view" "USDA, Washington, DC, 1993.

Land degradation and the misery associated with climatic extremes have ousted millions of Africans through internal displacement from rural to urban settlements. In the Sahel drought of 1968-1973, about 20 percent of Mauritania's population fled to towns when they could not feed themselves at home in rural areas. In the mid 1980's another severe drought forced more than two million people out of Chad, Mali, Mauritania, Burkina Faso and Niger.

Recent droughts and harsh environmental conditions in Sahelo-Saharan and Sahelian regions of Mali have forced massive exodus of rural inhabitants to the more urbanized regions of Gao, Tombaouctou and Sikasso. The migrants exert serious pressures on the limited resources of the new destinations which creates a vicious circle of continued misery of the migrants and accelerated degradation in their new squatter settlements.⁴⁹

As a result of this steady migration flow to urban areas, cities are facing increasing problems due to unsafe, unhealthy and demoralizing conditions, particularly in the squatter areas which lack water, sanitation, garbage collection, and other public services. The impact of forced displacement and random population movement on some African cities is described in the following paragraphs.

Forced displacement of Khartoum slums caused an international uproar in 1991. Thousands of people were forced to leave the Karmuta area in downtown Khartoum as the area had been designated for reconstruction and improvement. The displaced population was relocated in Salaam camp about five miles northwest of the city. The new site lacks sanitation, water supply and other public services. Makeshift homes are not comparable to the mud-brick housing most of those displaced inhabited in the city. Children suffer from malnourishment. The relocation program has sparked acrimony between the government and the tens of thousands of the evicted families. Massive relocation is facing strong opposition because of its immense social and economic implications.⁵⁰

49. Thiam, B., "Environmental migration and the spatial redistribution of the population", Population, Environment and Development, Department for Economic and Social Information and Policy Analysis, United Nations, 175-85, ST/ESA/SER-R/129, 1994.

50. Parmelee, J., "Sudan razes homes, relocate thousands" The Washington Post, March 7, 1992..

In Cairo, Egypt, the overflowing road traffic has caused a grave transportation problem. To ease the problem, a new highway ring around the city is being constructed. However, a situation close to settlement catastrophe has emerged since about 550000 people have moved to random communities exploiting access to the new road but depending on rudimentary services and causing heavy pollution, slope erosion and severe environmental problems. Despite the need for the new highway, its construction is likely to cause more intractable problems than the city managers can solve.⁵¹

The black townships of South Africa suffer from tremendous pressures on the physical infrastructure at a time when the country is facing economic hardships. The most enduring problems in these townships are lack of adequate housing, human congestion, and absence of social amenities; these problems are heightened since the townships are usually contained within fixed geographical boundaries.⁵²

C. Poverty and Employment in Urban Africa

The meaning of poverty, what it constitutes, and how it could be measured is still a debatable subject. In general, "primary poverty" refers to families with income less than the minimum needed for provision of adequate food supply. Countries or regions may encounter primary poverty, when one third or more of the population live under conditions of mass poverty. Where the family income is sufficient to cover the dietary needs, but spent unwisely for other purposes, the term "secondary poverty" becomes applicable. Countries at the aggregate level, even the rich ones, may also suffer from secondary poverty.

The term "extreme poverty" applies to people suffering from severe deprivation who strive to secure the absolute minimum needs for survival. A "poverty line" is a universal but arbitrary demarcation of the lower-income group. Countries that establish a poverty line, normally calculate the cost of "basket of food" and increase the sum by a factor ranging from 1.5 in the poorest countries to 3 in the rich countries. However, the use of a "poverty line" approach offers limited information on the magnitude of poverty (i.e. whether the poor majority are clustering around the line or far below it).

51. Abdul Aziz, M., "Legalizing law breaking" The Egyptian Gazette, May 17, 1992.

52. Abbott, J., "The decline of the urban management system in South Africa" Environment and Urbanization, IIED, London, Vol 6, No. 2, 1994.

The World Bank uses the poverty line as an indicator for cross-country comparisons and aggregations. Purchasing power parities PPP are used by the World Bank to adjust the income level in local currency, below which people are considered poor. Another accepted definition of poverty among the working groups, is the "working poor". The term refers to those among the poor who can make living when forced to work for long hours for very low pay, or are engaged in low remunerative business.

The inherent drawback in all above definitions is their inability to account for major factors influencing poverty, such as the rural-urban disparities, and the time effect (seasonal or permanent), or to define the impact of poverty on those most affected (i.e. the vulnerable groups). In situations where poverty lines are set at unrealistically low level, all those presumably above the poverty line are actually lacking sufficient incomes for meeting basic needs. Poverty lines, in such cases, are rarely high enough to cover the cost of basic necessities other than food including expenditures on housing, services, health care and education.

For these reasons, defining poverty in the narrow context of income, should be viewed with caution. A recent publication noted that, "if the poor are viewed simply as statistics, figures and ciphers, the policy that is formulated to alleviate poverty will in all likelihood follow suit and be more relevant to the manipulation of the statistics than to the needs of the people"⁵³

Realizing the differences in the ways that social and economic policy perceive poverty and its underlying cause, the World Bank has adopted a three-tier strategy to tackle poverty problems in the developing countries which include measure to (a) improve the physical infrastructure (housing, water, sanitation, land use, and transportation); (b) enhance the social infrastructure (primary health care, education and nutrition); and (c) promote compensatory measures as a solution to protect the poor against the impact of the macro-economic reform and adjustment measures. The urban components include food and nutrition assistance, employment and income generation such as the SFD programme in Egypt, and socio-economic interventions.⁵⁴

Despite increased resources allocations to urban development, sectoral interventions have yet to exhibit a significant impact on alleviation of urban poverty. Absence of a cross-sectoral planning among providers of public services results in arbitrary interventions that lack coherence. On the other hand, strategies of the beneficiaries at the household level constitute trade-off in different sectors, relating to such factors as stages in household life cycle, and the needs of the different members of the family.⁵⁵ It is obvious that the scarce resources of the urban poor dictates difficult decisions involving trade-off between basic demands to satisfy the most immediate life-support needs.

53. Beck, T., "The experience of poverty: fighting for respect and resource in village India", Technology Publications, London, 1995.

54. The World Bank, "World development report 1990", Washington, DC, 1990.

55. Moser, C., "Urban social policy and poverty reduction", Environment and Urbanization, IIED, London, Vol. 7, No. 1, 159, 1995.

Although the urban poor in Africa are among the poorest in the world, little is known about the nature, causes, and scale of their poverty. This lack of knowledge often limits efforts to predict trends and develop appropriate policies to combat poverty.

Recent studies on urban poverty in Africa, clearly show the complexity of the processes that underlie impoverishment and how they are rooted in the economic, social and political structures of African countries. In Zimbabwe, the economic structural adjustment programme (ESAP) which was launched in early 1991, included measures to cut government spending on public services and consumer subsidies, reduce civil servants by 25 percent, liberalization of prices, and promotion of exports. By the end of 1993, the number of retrenched workers due to ESAP austerity measures was estimated at 45,000. As a result of deregulation, labour security has been eroded, and a system of collective bargaining for wages has replaced the government system for wage-setting. The rises of wages since the programme started have been completely eroded by inflation. Savings for future investment in housing, education and health care has been depleted by the rise in the cost of living, with anticipated repercussions on the well-being of low-income households.⁵⁶

The inhabitants of informal housing in Abidjan, Ivory Coast, live in precarious conditions. Most city dwellers with little schooling are engaged in unskilled jobs that generate low income. They demonstrate a tremendous resistance to the exclusion policy favoured by city planners and decision makers. The public authorities who are responsible for evicting squatters justify their actions as a means of imposing town planning which has been violated by unplanned housing. Since it is risky to build permanent structures under such circumstances, tenants prefer to use wood and metal sheets which could be reused somewhere else in the event they are evicted from the illegally occupied lots.⁵⁷

About 100 squalors presently exist in Khartoum and these shelter more than half of the city's population. These settlements lack basic facilities, particularly water and sanitation services. Both material deprivation and social isolation make the life of people inhabiting these settlements acutely miserable. Whilst rapid population growth in Khartoum is an obvious cause of urban poverty, another important factor is the lack of a clear policy to alleviate poverty and to improve living conditions of the urban poor. The acute shortage of financial resources combined with inadequate institutional and physical infrastructure contribute to continued deterioration of the city's environment.⁵⁸

56. Kanji, N., Gender, poverty and economic adjustment in Harare, Zimbabwe", Environment and Urbanization, IIED, London, Vol. , No. 1, 37, 1995.

57. Yapi-Diahou, A. , " The informal housing sector of the metropolis of Abidjan, Ivory Coast" Environment and Urbanization, IIED, London, Vol. 7, No. 2, 11,1995.

58. Ahmad, A., and El-Batthani. A., " Poverty in Khartoum". Environment and Urbanization, IIED, London, Vol. 7, No. 2, 195, 1995.

As illegal slums in African cities are becoming overcrowded, the remaining vacant lots in some cities are controlled by intermediaries who get rents for their use. In Nairobi, the influential land developers have manipulated the housing by-laws to their advantage to exclude poor people from the unauthorized squatter settlements. The extensive demolition of slum housing have ultimately forced the poor into privately rented housing.⁵⁹

In many African countries, the problems of the urban poor are compounded by the rising unemployment. Poor living conditions push many peasants towards cities. Rural migration has contributed to the growth of urban labour force at a higher rate than that of the population as a whole. In North Africa for example, the labour forces in Egypt, Tunisia, Algeria, and Morocco, is expected to grow to the year 2000 at an annual rate of 4 percent⁶⁰, compared to a population growth rate of 2 percent⁶¹.

Unlike the situation in the developed countries, urbanization in Africa is not linked to the existence of productive jobs in cities. Most of those who quit the miserable life in rural areas end up in slums without income-generating jobs where they live under even more appalling conditions.

With job creation lagging far behind growth in the labour force, the unemployment problem continues to rise in many African countries. Another added dimension to the problem, is the continuous increase of women's share in labour force in Africa which reached 37 percent in 1994. This share is expected to grow further because of increased educational attainment by women and economic pressure for a second income. Rising costs of living, inflation, and continued erosion of the value of wages, will force men to seek secondary jobs, and more women to enter the job market to augment the dwindling household income.

Although a larger work force in Africa could bring increased production and faster economic growth, investment in production and services is much less than that required to meet the surplus of labour force. The urban poor are expected to be the hardest hit by the unemployment problem as new jobs in industry and production usually require educated and skilled workers, usually lacking among the poor..

59. Andreassen, J., "Urban-rural linkages and their impact on urban housing in Kenya", Baker, J., (ed.), Small Town Africa: Studies in Rural-Urban Interaction, Uppsala, The Scandinavian Institute of African Studies, 1990..

60. The World Bank, " A population perspective on development: the Middle East and North Africa", August, 1994.

61. United Nations Development Programme, " Human development report 1995" Oxford University Press, 1995.

In the less developed African countries, patterns of employment are typically more labour-intensive and rely on workers which are less skilled and less organized. Industry is dominated by small and handicraft enterprises, which employ outdated technologies to produce low-cost goods for distribution in the local markets.

The savings in labour costs is frequently offset by lower productivity, inferior product quality and higher operating costs. Complex products which require special skills often cost more when produced in these countries due to scarcity of trained workers and increased rejection of faulty products. Those employed in the public industry and service sectors often paid more than what they deserve as workers are not only technically unfit but they also lack discipline and motivation.

To overcome this problem, new approaches are being adopted to encourage private investment and subsequently create more job opportunities. However, in some instances, regulations intended to protect the labour force makes it difficult to fire unproductive workers, while guaranteed minimum wages raise the labour cost. Such policies may hurt rather than benefit the workers by discouraging private businesses from hiring. If deregulation is pursued wisely, it may reduce joblessness by encouraging investment and hence creating new employment opportunities.

While using modern technologies may affect employment in the short-term, they are bound to improve productivity and profitability, which could lead to creation of more jobs by encouraging investment in manufacturing and services. Evidence indicates that labour-intensive activities are unable to solve acute unemployment problems in major cities, including unemployment resulting from rapid population growth.

On the negative side, creating more employment opportunities in the congested cities may result in excessive pressures on utilities, housing and public services with severe repercussions on the city environment and urban dwellers. Social costs would also rise with the increased concentration of labour-intensive enterprises in urban centres.

Furthermore, rapid development of industry and businesses in congested cities intensifies traffic problems and generates more pollution which in turn cause more suffering to the inhabitants. The costs of the ensuing deteriorated livelihood and public amenities may exceed the benefits of creating new businesses and job opportunities in the congested urban centres.

Thus as social costs increase, and environment deteriorates, the benefits of concentrating labour-intensive activities in cities vanish, and the alternatives of decentralization or switching to capital-intensive and less labour-dependent activities appear to be more attractive to city planners, policy makers, and the investors.

V. URBANIZATION, ENVIRONMENT AND HEALTH IN NORTH AFRICA: CASE STUDIES

A. Cairo Metropolitan Area, Egypt

The Cairo Metropolitan Area includes the three cities of Cairo, Giza, and Shubra El-Kheima. Cairo is the capital and the largest city in Egypt. The CMA extends along both sides of the Nile. The following is a brief description of the basic features of the CMA, and the environmental implications of its development as the largest metropolis in Africa:

*(a) Administrative Structure*⁶²: Cairo constitutes 34 administrative divisions and 70 percent of the CMA population. The city of Giza is located to the left bank of the Nile opposite to Cairo. Its development started after the Second World War as an urban extension to Cairo; at present the city accommodates 22 percent of the CMA population. Shubra El-Kheima has developed to the north of Cairo as an informal settlement. It began as a peri-urban village and has gradually become a major industrial centre. The city currently accounts for 8 percent of the CMA population.

The central core of Cairo spreads along the right bank of the Nile river and consists of the old Islamic city and the old Coptic agglomeration, which group the most deprived population of the capital. The central business district houses most ministries, banks, commercial institutions, most tourism activities, and high-income residential communities.

As shown in Figure 2, the populated area is bordered on the East by the Mokattam Hills which separate the city from the Eastern Desert that extends to the Suez Canal. To the west are the Abu-Rawash Hills of the Western Desert. North of the city, the Nile divides into the Rosetta and Damietta branches, forming the fertile Delta. South of the CMA is a string of largely agricultural towns along the Nile.

The first belt spreads around the centre and it groups the urban extensions of Giza, Maadi, Nasr City, and Heliopolis, and the spontaneous settlements of Shubra El-Kheima, Imbaba, Bulac and Mataria. The peripheral zone, located some 15 kilometres from the centre consists of the highly polluted industrial area of Helwan, and the new development poles and several satellite industrial cities.

62. United Nations Centre For Human Settlements, "Metropolitan planning and management in the developing world: special distribution policy in Bombay and Cairo" Habitat, 1993.

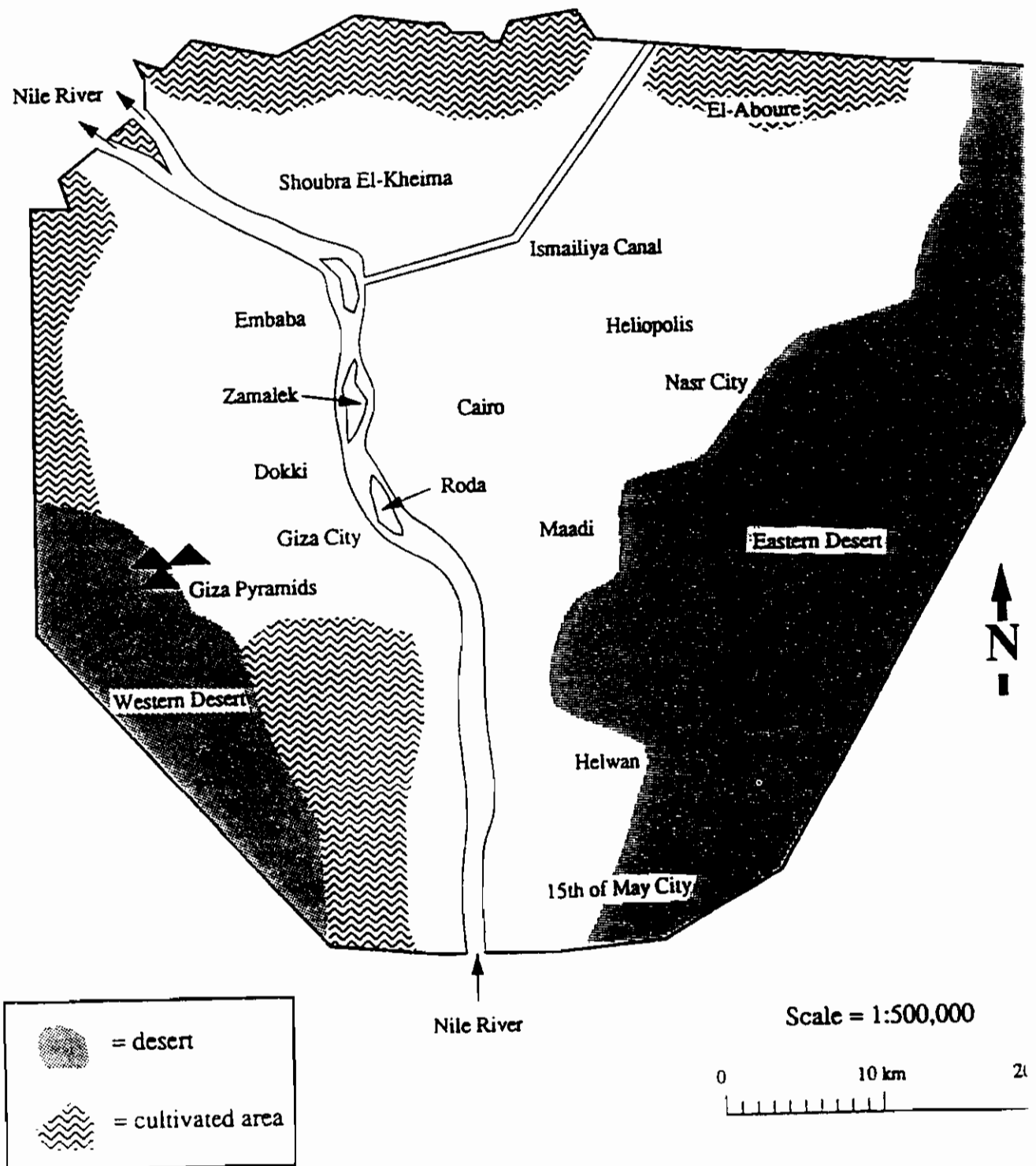


Figure (2): CAIRO METROPOLITAN AREA

(b) Demographic Characteristics: Egypt's population was 59.6 million in 1993 and is expected to climb to 67.9 million by the year 2000. According to 1990 data, the CMA accounts for 35 percent of the total urban population in Egypt; its annual population growth rate was 2.2 percent during 1990-95. About 38.7 percent of CMA inhabitants are under 15 years of age. The population of CMA has doubled in the past two decades; the estimated population in 1995 was 14.8 millions, with a projected increase to 16.09 million inhabitants by the year 2000. This rapid population growth is attributed to the concentration of industrial, commercial and service activities in the capital which offers more employment opportunities, higher income, and better living conditions compared to other regions in the country.

The population of the CMA is concentrated in an area of about 400 km² of the Nile Valley. Average population density is 30,000/km², which is 20 times that of the country's average. The urban infrastructure including housing, transport, water, sewerage, and other public services is unable to cope with the explosive population growth.

To enhance public awareness of the population problem and its negative effects on development and the environment, a series of one-minute television spots was developed as a vehicle to provide information about family planning and the risks of early and repeated pregnancies. The use of well-known celebrities which delivered the message with humor and respect, gave these campaigns broad public appeal. In addition key messages are reinforced through religious leaders, newspaper articles, as well as through incorporation of population issues in formal education.

(c) Migration Pattern: In the past two decades, Egypt has experienced stabilization of urban-rural population ratio around 44 percent. However, in the CMA, the 1986 census indicated a decrease in rural-urban migration rate accompanied with a relative decline of population growth. The percentage of migrants to the CMA has declined from 30 percent in 1960 to 20.3 percent in 1986, while recent unconfirmed figures indicate another drop to about 10.3 percent. This phenomenon has also been observed in other Egyptian cities with a population greater than 100,000 inhabitants where significant drops in their annual population growth rate were registered between the two censuses of 1976 and 1986.

However, this trend was in contrast to the significant increase in the annual growth rate of the medium and small-size cities, and the rural agglomerations. Out of the 8 million identified migrants in 1986, 43.3 percent had migrated to a final urban destination with a great portion originating from other urban settlements, while 53.7 percent of rural residents moved between rural settlements.

(d) Employment and Labour Force: According to 1986 statistics, the public sector offered 41.7 percent of the total jobs in the CMA while the private sector provided 54.7 percent. The distribution of the labour force in services, industry and construction, and agriculture was 56.6, 31.4, and 9 percent, respectively.

The economic reform policy adopted in the 1970's, was responsible for increased unemployment in the CMA. However, unemployment was attributed to the poor matching of available skills to the jobs that are vacant, rather than from the total lack of opportunities. The recorded increase in unemployment between 1960 and 1976 went from 3.8 percent to 6.2 percent for males, and from 9.4 percent to 20.6 percent for females.

At present, the unemployment problem is aggravated due to restructuring of the state-owned industries and public services. Replacing labour-intensive manufacturing processes with automated ones would further intensify the problem.

*(e) Industrial Development*⁶³: During the 1950's, Egypt's industrial development turned from its traditional agrarian base to heavy industry; most industrial development took place in Cairo and Alexandria.

Helwan, one of the largest and highest polluting industrial zones in the country, the cement, steel, foundry, ceramics, smelting, textile chemicals, and military industries employ over 100,000 workers. In Shoubra El-Kheima, about 87,000 workers are employed in 1300 establishments for the manufacturing of metals, glass, textiles, engineering, and food products. Most of the industrial plants in both areas are not provided with end-of-pipe treatment which creates severe industrial pollution problems, and hence causes immediate health risks to an estimated 3 million inhabitants.

Over 800 small-scale enterprises are located in the central area of Cairo, including 52 tanneries and 12 lead smelters, which cause severe environmental degradation. The government is currently preparing a plan for relocating hazardous and polluting industries in desert areas; the new locations will be provided with centralized facilities for wastewater treatment. According to the World bank estimates, the cost of abating industrial pollution problems in CMA is US\$ one billion, or about 0.4 percent of the GDP over a ten-year period.

In CMA, the state-owned plants still account for about 70 percent of the manufactured goods. The new economic reform policy involves price decontrol, termination of subsidies, liberalization of trade and industry, and instituting incentives to encourage private investments in the manufacturing sector.

(f) Water and Sanitation Services: In the early 1980's fewer than half of CMA residents were provided with adequate water and sewer services. Cairenes, particularly those living in low-income housing and slum settlements relied mostly on communal water standpipes, shallow wells and water vendors for drinking water. Piped water was often cross-contaminated from leaking drains and sewers when the pressure of the damaged joints and pipes in the water distribution system dropped. The unserved population relied on pit latrines and septic tanks that were rarely emptied.

63. Egyptian Environmental Affairs Agency, "Environmental action plan" May, 1992.

As a result of the investment in water and sanitation projects of over US\$ 6 billion in the past 10 years, more than 93 percent of the CMA population are now provided with piped potable water, while over 75 percent of the population are connected to the sewer system.

A huge sewer tunnel has been completed recently which links Maadi in the south to El-Marg in the north. The underground tunnel is 5 metres in diameter, and extends for 17 km descending to a depth of 30 metres in some locations. Wastewater treatment works presently handle up to 2 million m³ daily, with most of the primary treated sewage being reused for irrigation of non-edible crops, or discharged in the drainage network.

*(g) Solid Waste Management*⁶⁴: About 10,000 tons of the municipal, institutional and industrial solid wastes are generated daily in the CMA. Approximately two-thirds of this is from the residential households, while the rest is from industrial, commercial and street cleaning activities. The proportion of food waste is higher in the lower-income areas, while potentially recyclable waste paper, plastics and glass increases in the higher-income areas.

Collection rate vary from less than 10 percent in the poorest areas to over 80 percent in the affluent residential and business areas. The uncollected garbage is often burned on site when accumulated in noxious amounts, dumped in vacant areas, or illegally disposed of in waterways. The local government is promoting private sector participation in solid waste management through selling franchise rights to cooperatives and community-based groups. However, this initiative is currently limited to higher-income areas because of their ability to pay for services and the greater value of recyclable wastes in the collected garbage.

A sanitary landfill was commissioned in 1986 with a capacity of 1000 tons/day. Three composting plants are utilizing about 600 tons/day, while the remaining solid wastes are mostly dumped in open landfills or burned on site which results in serious environmental problems.

Medical wastes generated at a rate of 16 tons/day are co-disposed with domestic wastes which poses health risks to those involved in collection, transport, sorting and disposal of these infectious wastes. Despite equipping major hospitals with incinerators, they have been inadequately operated due to lack of spare parts and poor maintenance.

Hazardous industrial wastes are normally disposed of with municipal wastes, or left to accumulate in large stockpiles on-site. These unsafe practices are taking place due to the virtual absence of special sites for the containment and/or disposal of hazardous wastes in the CMA.

64. US Agency for International Development "Local development program II", Wilbur Smith Associates, 1993.

(h) Transport: The most important achievement in the CMA transport infrastructure is the fly-over bridges which permit the linking of congested centres and enabling shortening the travel distance between major poles in Cairo. The ungrounded network is the only in operation in Africa. The first line connects Helwan to El-Marg is 45 km long, and serves over a million passengers daily. The second line which connects Shoubra El-Kheima to Ramses Square is due to start in October 1996.

(I) Housing: Despite efforts to improve housing conditions for CMA low-income dwellers, sub-standard housing in the old city districts and the informal quarters in the first ring and peripheral zone are still spreading. Nearly 45 percent of buildings situated in these areas are in an advanced state of decay. The earthquake of October 1992 hit the buildings in the old city as well as its ancient monuments; more than 30,000 buildings collapsed, while many others were partially demolished. The existing acute shortage of housing also contributes to illegal construction in both the formal and informal quarters. In 1990, about 60000 illegal buildings existed in Cairo, with 70 percent of the buildings in the informal settlements are collapsing.

To ease the population stresses on Cairo, a plan was drawn in 1979 to establish 18 new cities that could compete favourably with Cairo in attracting inhabitants by offering better living conditions, employment opportunities and efficient public services. These new cities were to be built away from the narrow green strip which was shrinking rapidly due to urban expansion in and around existing settlements in the Delta.

Unfortunately, however, most of these new cities were built close to major urban centres; services provided were inadequate and housing was relatively expensive. As a result, the present population of the 10th of Ramadan, Sadat, and 6th of October represents 8, 3.5, and 1 percent of the planned population in these cities, respectively. The over-estimation of the necessary infrastructure in the new cities resulted in unrealistically high investment costs per inhabitant. A case in point is the construction of 341 km of tarred roads in Sadat City to serve a population of 5000 inhabitants.

(J) Health Impacts of Environmental Pollution: Cairo has a desert climate characterized by dry heat with an average annual rainfall of 22 mm. Scarcity of rainfall minimizes washout of air pollutants, while stable atmospheric conditions and Cairo's valley location drastically limit dispersion of gaseous emissions. Northerly winds, which prevail most of the year, blow pollutants from Shoubra El-Kheima into the city centre, while southerly winds bring pollutants from industrial Helwan into the closely residential areas in Maadi. The Nile with its daily flow of 80 to 150 million m³ does dilute to the estimated 2-3 million m³ of domestic and industrial effluents generated in the CMA. However, conveyance of wastewater through a drainage system, and the eventual recharge to the fresh water bodies transfer pollution to downstream users.

Poor sanitation services in the past were responsible for spreading of communicable diseases in the CMA. The average annual incidence of diarrhoea among children under five years was 3.5 episodes, with the risk of fetal incidence increasing among the malnourished children in slum areas. However, in the mid

1990's, the registered diarrhoea cases in CMA slums provided with water and sanitation services, were reduced by 65 percent .

On the other hand, air pollution problems are worsening in CMA which has over 40 percent of the national industrial activities, about half of the country motor vehicles, 41 percent of Egypt's thermal electric generating capacity, and more than 50 percent of the nation's energy consumption.

Ambient levels of air emissions in the CMA far exceed levels that threaten public health ⁶⁵. Concentration of particulate matter PM (350-857 ug/m³) exceed US standards by a factor of 5 to 10. A USAID study on health assessment estimates that about 3000-16000 deaths and 90-270 million restricted activity days can be avoided if the PM is reduced to the normal background levels. The study estimates that heavy lead emissions resulting from leaded-gasoline and lead smelters causes 6500-11600 heart attacks and cardiovascular deaths, and an average IQ loss of 4.25 points per person. ⁶⁶

The Environmental Action Plan of 1992, stated that in areas close to the cement plants in Helwan, 29 percent of the children suffer from lung diseases compared to 9 percent in the nearby rural areas. Other survey studies have indicated that about 20 percent of the inhabitants of Shoubra El-Kheima suffers from lung diseases because of high exposure to smoke and sulphur dioxide.

Environmental contaminants are found in food consumed by CMA residents, including pesticides, metals, and microbial agents. Pesticides in food may result in 7000 excess cases of cancer among the CMA population according to the USAID study.

Despite the rising environmental problems, the infant mortality rate has decreased during the last decade from 88/ 1000 live births in the early 1980's to 34/ 1000 live births in 1994, due to successful implementation of the oral rehydration salt programme, and the expanded programme of immunization.

Other health problems affecting CMA inhabitants are primarily attributed to overcrowding and poor living standards. These include household accidents, severe indoor pollution and the associated air borne diseases, respiratory infections, and serious psychological disorders. Depression, drug abuse, delinquency, violence, and vandalism still represent social pathologies in CMA slums; these disorders are attributed to poor housing, insecure tenancy, noise and environmental degradation.

65. Nasralla, M.& Moustafa N., "Particulates and Sulphur compounds in Cairo atmosphere" , Egy. J. of Industrial Medicine, In press.

66. US Agency for International Development, "Comparing environmental health risks in Cairo, Egypt", Chemonics Int., Vol 1, Sept. 1994.

B. Alexandria Metropolitan Area, Egypt

Alexandria is located on the north-east fringe of the Nile Delta, on the Mediterranean sea. the Alexandria Metropolitan Area AMA is a relatively prosperous urban centre which houses over 35 percent of the national industry, about 80 percent of the seaport traffic, and an appreciable portion of the commercial and tourism activities in Egypt. The character of the city is derived from its ribbon-like development along the Mediterranean coast.

A sea rise induced by global warming of just 20-30 centimeters would significantly accelerate the retreat of the coast line and would put the port and newer suburban areas at great risk, and would certainly jeopardize the tourism industry. A relative rise of one metre could submerge lowlands within 30 kilometres of the coast. Engineering solutions could mitigate the flooding problems but the capital cost is enormous⁶⁷.

AMA is the second largest urban settlement in Egypt with an estimated population of 4 million at present. Rapid population growth coupled with vast economic development, has given rise to several slum areas on the periphery of the city where basic amenities such as water, sewerage and refuse collection are not provided. Unabated urbanization also poses serious social problems as illiterate and unskilled citizens living in the squatter areas are offered limited employment, a bare subsistence and no incentive for self-improvement.

In the past, expenditures on infrastructural services in the AMA have been scarce as most public investments were directed to economic development. Recently, however, considerable investment have been made in the rehabilitation and modernization of public services with emphasis on improving water and sanitation systems.

The following briefly describes the basic features of the city, its environmental concerns, and existing management constraints:

(a) Urban development: As shown in Figure 3, most urban development exists in old Alexandria around the natural harbours on both sides of the Anfushi Peninsula. Development has reached complete saturation resulting in considerable congestion and appreciable environmental degradation. The shoreline properties are rapidly developing and are often composed of high-rise buildings which further stress 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 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 taking place in several of these areas.

67. Killey, s., et al, "Cities in crisis ", BNA Int, London, 1990.

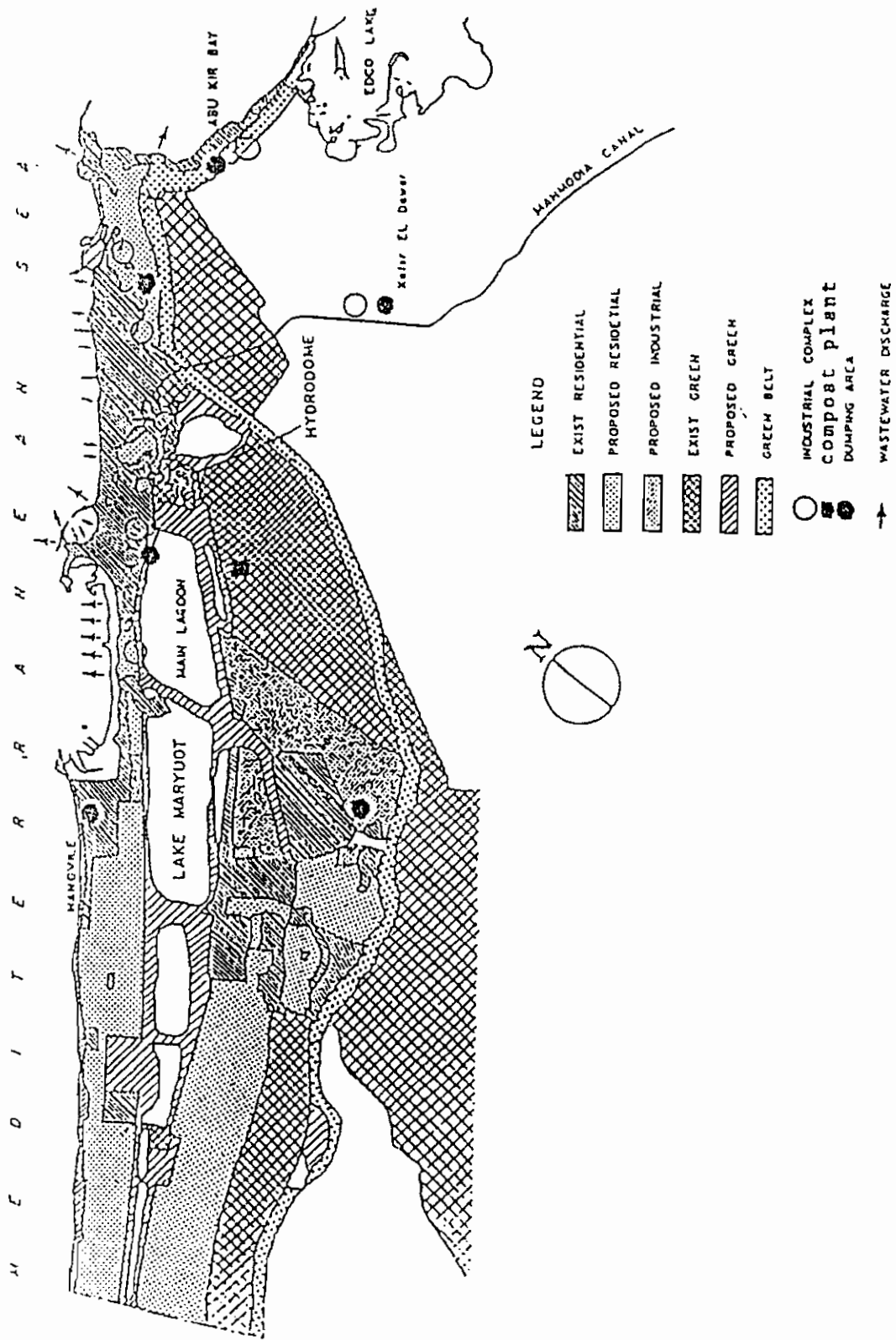


Figure (2) : ALEXANDRIA METROPOLITAN AREA

(b) Population Growth: Alexandria's population has increased from 1.51 million in 1960 to 2.92 million in 1986 and is expected to reach 5.00 million in the year 2005. The average population density is 11,100 persons/km². The AMA suffers from an extreme imbalance in the spatial distribution of population; the central core accommodates 29 percent of the total population and densities reach 133,000 persons/km² in El-Gomrok, and 87,500 persons/km² in Mohrem Bey. The eastern sector constitutes more than 30 percent of the AMA and accommodates 1.7 million inhabitants. The western sector accommodates 22 percent of the population in 60 percent of the AMA area; Ameriya has a population density of 133 persons/km².

(c) Housing⁶⁸: The affluent residential areas are mainly located in the eastern sector parallel to the coast. South of this area are the middle-class residential areas. The western sector includes the main industrial zone and poor-quality housing for lower-income people. In the outer strip, a series of informal and spontaneous housing schemes are rapidly developing due to lack of affordable housing for the unprivileged dwellers.

Social segregation is apparent in AMA, with distinct areas being occupied by high-income, middle-income, low-income and the lowest-income groups. The northern and eastern areas occupied mainly by the affluent, who enjoy better road access to the coast, good services and less pollution. Urban poor occupy the southern part which has poor road access, deteriorated services, cramped conditions and extensive pollution. The middle strip is occupied by the middle-income groups with reasonable access to services.

The city has a shortage of 100,000 housing units. The Master Plan of the city envisions the addition of 620,000 units to meet the needs of the increased population up to the year 2005. Most of the expansion will take place in areas to the west to preserve the valuable agricultural land located south-east of the city.

(d) Road network and public transport: Current traffic problems in the AMA are attributed to disorderly expansion of the city, the rapid increase of private automobiles, extreme shortage of public transport facilities, 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 the widening of the Corniche road on the seaside. However, this plan has been postponed temporarily due to lack of financial resources.

68. Soliman, A., "Legitimizing informal housing: accommodating low-income groups in Alexandria, Egypt" *Environment and Urbanization*, IIED, London, Vol. 8, No.1, 183, 1996.

(e) Industrial pollution: Alexandria's manufacturing industry constitutes about 40 percent of Egypt's industrial activity; industrial complexes tend to concentrate near the Mahmoudia Canal (Moharem-Bey, Nouzha and Siouf complexes), and along the coastal areas of Mex and Abu Kir. During the past decade, fish production in Lake Maryut has declined by about 80 percent owing to direct discharge 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.

At present over 1300 large- and medium-scale industrial establishments are located in the AMA. The paper, textile, and food industries are the main contributors of organic load. Environmental degradation is manifested in deteriorated water resources, unsightly overgrowth of weeds, decreased fish catches and adverse public health conditions. Liquid effluents from industrial sources are not pretreated on-site before discharge to public sewers. Since more than 75 percent of industrial establishments in AMA are still state-owned, it is difficult to enforce the emission regulations due to mounting economic, and political constraints.⁶⁹

The estimated flow of untreated industrial effluents discharged into the city sewer system, or directly in the sea, drainage canals or Lake Maryut is 1.7 million m³ per day; pollutants include Chromium wastes from tanneries, Mercury from chloralkali and electronics industries, oil from petroleum and edible oil refining, black liquor from pulp and paper mills, and hazardous chemicals from dyestuffs and textile finishing plants. Solid wastes of various industrial activities amount to about 1.63 million tons per year.

Despite successful reclamation schemes for some industrial residues, several recyclable materials are being disposed of incorrectly giving rise to serious environmental problems, in addition to loss of potentially marketable products. The Egyptian Environmental Affairs Agency has launched a programme to control pollution in priority polluting industries, most of which are located in the AMA and CMA.

(f) Alexandria port traffic: Despite its design capacity of 19 million tons per year (mt/y), recent records indicates a loaded-off loaded-on amount of 35 mt/y. Dekhaila port is located 23 km west of Alexandria; its first phase was commissioned in 1987, and the port handles 5 mt/y of bulk, general cargoes and containerized traffic.

(g) Water supply: The Rond Point facilities (460 000 m³/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 m³/d). In 1961, the Forn El-Garya plant (42 000 m³/d) was built. Further treatment facilities have been provided by the construction of

69. Hamza, A., " Industrial environmental management in Egypt : synthesis and analysis", Egyptian Academy of Scientific Research and Technology/ USAID Project No. 398-0365, December 1995.

the Manshia (370 000 m³/d). Maamoura (71 000 m³/d) and Noubaria (93 000 m³/d) plants. The capacity of water treatment has been increased to 2.5 mm³/d in 1995. Surface water is available in large quantities from the Nile River and is being used as intake for all treatment works in the AMA.

(h) Sewerage and sewage treatment works: At present, about 70 percent of the population are provided with sewerage services. 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. The AMA has two sewage treatment works. The eastern plant provides primary treatment of 60000 m³/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, and reduction of treatment efficiency.

The western plant provides primary treatment for 220000 m³/d and the effluent is delivered to Kait Bey pumping station for discharge through a submerged sea outfall. Major untreated discharges occur at Abu Kir and Kait Bey outfalls, in the western harbour and into Lake Maryut through a number of sewer outfalls. In addition, emergency 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.

(i) Solid Waste Management: At present, house-to-house collection service is available for less than 20 percent of the population by private collectors. This service is diminishing due to the decreased profits and the shortage of manpower. The remaining population and most commercial establishments dump their wastes into refuse containers, if available in nearby locations, or in any convenient open space close to their residences. Refuse collected from the high-income residential areas is sorted "on-site" by scavengers for separation of recyclable materials. The collected refuse from all districts is trucked for ultimate disposal to a land reclamation site 70 km north of the city.

According to the most recent estimates, the amount of refuse and commercial wastes handled daily ranges from 1500 tons/day in winter to about 2100 tons/day in summer. The actual amounts generated are expected to be higher, since refuse in the non-serviced areas is either incinerated "on-site" or merely left to accumulate in the dumping sites until handled by the municipality on an *ad hoc* basis

The salvage of recyclable materials is an essential part of the waste management scheme in the AMA as it saves an appreciable portion of the reusable plastics, paper, glass, metals, etc. Recycling has long been regarded as a profitable business for private concerns in the AMA due to the high demand for the salvaged materials and the relatively low recovery costs.⁷⁰

70.. Hamza, A., " Environmental impacts of urban solid wastes: case study of Alexandria." Proceedings of Int. Conf. on Environmental Planning, Roorke, India, April 1990.

Scrap iron and steel are reprocessed pyrometallurgically in one AMA plant. Careful presorting of the scrap is essential to remove metals retained in molten iron such as tin and copper. Aluminum scrap is melted in furnaces and slags from aluminum and iron scrap reprocessing are stored for processing or disposed of at an authorized dumping site. Imported copper-bearing wastes, mostly high-grade electrolytic scrap, are melted and used for manufacture of electric cables and miscellaneous products. The scrap is refined in converters in which zinc, lead, and tin are volatilized. The metal is further refined to pure copper. The wastes from the electrolytic refining are exported to recover their content of precious metals.

Lead is mainly recovered from batteries after the containers are broken and discarded. The collected scrap lead is smelted at a battery plant in the AMA to yield crude soft Lead and antimonial Lead which are further refined to remove Arsenic and Tin by caustic treatment and reused in the manufacture of automobile batteries.

The output of the four wastepaper reprocessing plants in AMA is 300 metric tons/day. Paper manufacturers suggest that half the total of Egyptian paper is suitable for recycling of which less than 20 percent is being recycled at present. Development of efficient collection systems from household and trade sources will increase the stocks of wastepaper and permit expansion of the paper reprocessing industry.

Most hazardous residues, such as solvents, organic chemicals, and spent lubricating oils, are currently discharged into the sewerage network or disposed of through open dumping. A state-of-the art facility for reprocessing of 3000 tons/year of spent lubricating oil will be commissioned in the AMA in October 1996 permitting recycling of this valuable material and alleviating problems associated with its improper disposal.

(j) Air pollution: Extensive industrial development has increased the occupational hazards and air pollution problems in the AMA. 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. Toxic gases, vapours, dusts and fumes are generated in a number of manufacturing operations and in-service trades requiring the use of chemicals.

(k) Health Impacts of Environmental Pollution ⁷¹: Health statistics indicate that infant mortality rate in the AMA exceeds that of the country as whole, a reflection of the serious urban environmental health situation in the city. Typhoid, paratyphoid, infectious hepatitis and dysentery are all endemic in the AMA. The combined effect of inadequate conditions of waste disposal, food handling, and industrial pollution control contribute to deteriorated public health conditions in the AMA.

71. Hamza, A., " Baseline Evaluation and Plan of Action for Integrated Environmental Management in the Bay of Abu Kir Region, Alexandria" Vol. V, Egyptian Academy of Scientific Research and Technology, June 1994.

Some of the most notable factors that aggravate the environmental health problems in the AMA are: frequent leakage of sewage from existing collector sewers of force mains into the water supply network; widespread use of contaminated surface waters for municipal purposes in the substandard settlements; and topography of the city which enhances formation of sewage-filled ditches.

People living in the 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 bronchitis, emphysema and lung cancer; such cases are sufficiently numerous to constitute epidemiological evidence of injury from pollution in the substandard communities.

Hazardous residues from manufacturing industries, discharged into the air, water and on the soil, cause severe health problems. The short and long-term effects are far more serious than those caused by municipal wastes. While the latter is more readily biodegradable, most synthesized industrial residues are toxic, persistent, biomagnifiable and tend to accumulate in the receiving environments.

The prevailing malnutrition, inferior socio-economic standards and hypersensitivity of city dwellers in the AMA reduce the tolerance exposure limits of most toxic substances; a grim fact which adds to the misery of most industrial workers inhabiting the squatter areas around the city.

C. Metro Tunis, Tunisia

Today, Metro Tunis MT, the largest urban centre in the country, is experiencing a marked modernization of its urban form and structure which mix the Arab-Islamic, and the French colonial cultures with modern urban development and architecture. The MT urban area has grown from 40 km² in 1956 to 200 km² in 1993. The city centre has become a showcase of a modern society open to international business, while new satellite urban communities are mushrooming along its lake shores.

Unfortunately, however, public housing programmes for the low-income groups are only able to meet 40 percent of the demand; a situation which encourages land speculation and growth of spontaneous settlements on the rich agricultural belt surrounding the city. Rapid urban growth in the old city quarters has not been matched with the necessary expansion of infrastructural services, which causes further hardships to the residents in these areas.

To meet its growth, the MT has to achieve harmony in developing the old quarters "medina", the colonial city, and the new settlements along the northern lake shore. In addition, the MT must ensure an adequate mix between modernity and authenticity of the traditional Tunisian culture.

(a) Population: The Tunisian population was 8.7 million in 1994, with a projected increase to 9.9 million in 2000; the population growth rate in 1992 was 1.9 percent.

Tunisia has witnessed sustained urban development over the past four decades. At present, the urban population is about 62 percent of the total population and is expected to rise to 67 percent by 2001. Urban development is concentrated along the east coast where Tunis and other major cities are located. Over 80 percent of the urban population is presently concentrated in settlements along the east-coast, which cover only 25 percent of the country's area.

The MT population has increased from 900,000 in 1975 to an estimated 1.9 million at present, with a projected increase to 2.22 million by the year 2000. In 1990, MT represented 39 percent of the country's urban population with an average growth rate during 1990-95 of 3.1 percent.

The MT population is twice as much as the next three largest cities of Sfax, Sousse and Bizerte. In addition, MT has the fastest rate of economic growth in the country and provides half of all non-agricultural jobs; it also has a major share of productive and social infrastructure and services. However, MT is encountering proliferation of informal developments as a result of the rural exodus, a typical problem in most primate cities in Africa.

The rapid population increase exerts severe pressures on environmental services such as water supply, sanitation, solid waste management, and health care. However, the government is committed to containing population growth as a way to reduce tensions in the labour market and to reduce the pressure on services, housing, and education. Overtime, legal reforms have increased the age of marriage for men and women to 20 and 17 years, respectively. Girls now have equal access to education with equal status being granted for women.

Tunis has adopted a national social development agenda which includes a broad range of concerns from population and health, to family welfare and women's status. The agenda sets out measurable objectives in each of these fields, along with multi-sectoral strategies for achieving the targeted objectives. The success of family planning has been demonstrated in bringing about a decline in fertility from 7 children/ woman in the 1960's to 3.8 today.

(b) Housing: The population density in MT was about 635 persons/ km² in 1989 with an average of 1.9 person/room. In spite of concerted efforts to improve the quality of housing stocks, parts of the MT population continues to live in crowded tenements or "oukalas" shanty dwellings in the peripheral areas.

While over 54 percent of dwellers still live in one- or two-room households, luxury dwelling units with five rooms or more are rising steadily. By and large, the apparent improvement in urban housing has benefited the high income groups more, and to a lesser extent, middle-income families. The lowest income groups still suffer from the unhealthy and deteriorated housing conditions, due to inadequate attention that has been given to the housing needs of urban poor.

The housing pattern of MT is shown in Figure 4. The luxury residential area in the north is contrasted by the low-income housing in the south which also includes most industrial activities. The Ben-Arous suburb contains over 600 factories and

Chargouia hosts the majority of the MT light industries. To the west, new forms of spontaneous housing "gourbiville" has emerged in the Jebel Lahmar and Tadhamen areas. These now represents 60 percent of the total housing stock in MT against 30 percent for the formal housing system⁷².

Spreading of spontaneous settlements in Tunis has led to encroachment on green areas which stifles the city's "lungs". The total green space in the capital city is 126 hectare ha or 0.9 m²/person. Settlements with low architectural standards which develop haphazardly, impair the traditional landscape of the city, and create problems for delivery of public services due to the labyrinth street systems, which hinder access. Provision of essential public services has been costly as primary networks are extended over larger distances to serve lower population densities through lengthy and uneven layouts with higher number of connection points.

The National Environmental Protection Agency, attributed the proliferation of spontaneous habitat to the current shortage of urban land; the limited capacity of the existing infrastructure to cater for the growing demand; the scarce resources available to municipalities which limit their capability to tackle problems; the restrictive financing policies for real estate development; and the ineffectiveness of land use policy.

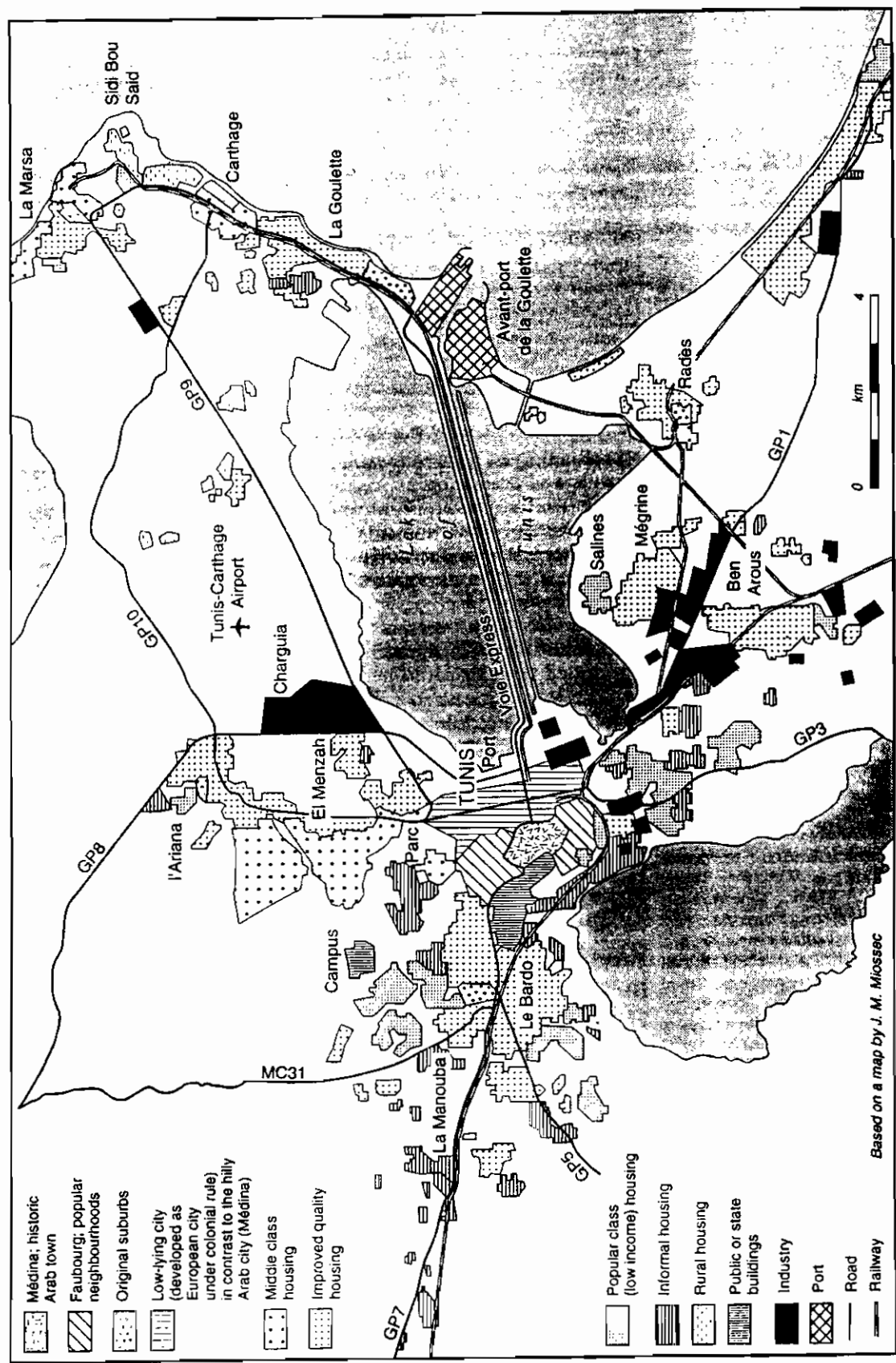
(c) *Water Supply*⁷³: Surface water provides 96 percent of the supply to Tunis and Cap Bon drinking water systems; the remaining portion comes from underground water sources (230,000 m³/d in 1990). About 85 percent of the households are provided with piped water supply, while the rest have easy access to standpipes. The unaccounted for water (i.e. water lost in the distribution mains and in-house systems) amounts to 28 percent.

Ben Metir Dam which has a capacity of 70 million m³ provides the MT with 30 percent of its water needs. Water is treated in a plant situated 12 kms downstream from the dam, and then conveyed via a 135 kms pipeline to MT. Kasseb Dam provides the MT with another 30 percent of its water needs which is conveyed via 126 kms water-main. Sidi Salem Dam provides the rest of the MT water need. Its water is treated in the Cheddar El Gold's complex before connection to MT water distribution network.

(d) *Wastewater Management*: The Office National de l'Assainissement (ONAS) is the national sanitation authority responsible for the operation and maintenance of the MT sewerage system as well as its four sewage treatment plants. About 70 percent of the sewage flow of 217000 m³/day is presently treated before discharge to the sea. Over 75 percent of the households in Tunis are connected to the sewer system.

72. Stambouli, F., "Tunis city in transition", Environment and Urbanization, IIED, London, Vol. 8, No.1, 1996.

73. World Health Organization, " Water resources conservation and protection from pollution in Tunisia" CEHA/EMR, Special Studies, N0. 2/E, 1996.



Figure(4):THE HOUSING PATTERN OF METRO TUNIS

In areas which are not served by ONAS, wastewater disposal is achieved by individual or semi-communal facilities ranging from cesspools to septic tanks. However, most of the septic tanks in low-income settlements are not properly maintained, and in some instances sullage is directly discharged onto the streets or into gutters which creates environmental problems and poses health risks to the exposed residents.

Today, irrigation with wastewater serves 1750 ha of land, which will be soon increased to 6700 ha using 95 percent of the treated wastewater in the TM region. Government sponsored studies indicated that using properly treated wastewater for irrigation is safe, and produces higher yields than crops irrigated with ground water. Quality standards are established, with definition of crops that may be irrigated with wastewater, as well as guidelines for ensuring the health and safety for workers and consumers ⁷⁴.

(e) Solid Waste Management ⁷⁵: About 1600 tons/day of domestic and industrial wastes are generated in MT (0.75 kg/cap/day domestic, and 0.25 kg/cap/day industrial). The collection service covers about 96 percent of the households. While garbage collection is being conducted in a satisfactory manner, the two landfills in Henchir El-Yahoudia and Raoued are lacking sorting facilities, transfer vehicles and proper filling and compacting equipment. The environmental impacts of poor site management on the surrounding environment have led to the decision to close the existing sites in the near future and replace them with sanitary landfills in other suitable locations. A small composting plant is presently operating in Henchir El-Yahoudia site. However, expansion of composting is not expected in the near future due to lack of financing and weak demand for the produced compost.

Industrial hazardous wastes are disposed of by generators or private contractors in the MT municipal landfills. This practice generates hazards to the exposed workers and the neighbouring population. In addition, infectious hospital wastes are dumped in the existing municipal landfill without undertaking the necessary precautions, a practice which pose health and environmental risks.

Scattered activities for recovery of wastepaper, plastics, and metals are undertaken at the landfill sites by ragmen. The two plastic recycling plants in MT have an installed capacity of 5000 tons/year, far less than the estimated plastic-wastes suitable for recycling which amount to over 100,000 tons/year. Out of the estimated 180,000 tons/year of generated wastepaper, about 18 percent is presently recovered and recycled. Such embryonic waste recycling activities need be expanded through encouraging private investments, improving on-site sorting and collection of recyclable wastes, and enhancing public awareness to secure proper in-house sorting and storage of recyclable wastes.

74. United Nations Development Programme, "Urban agriculture: food, jobs and sustainable cities" Publication Series for Habitat II, Vol. 1, 1996.

75. World Health Organization, "Solid waste management in some countries of the Eastern Mediterranean region" CEHA/EMR, Special Studies, NO. SS-4, 1995.

(f) Health Impacts of Environmental Pollution: Per capita expenditure on health in Tunisia was US\$ 43.8 or 5.3 percent of GNP in 1992. Health indicators of MT are all above the national average, which is attributed more to the improved health services and better living conditions in the capital area, rather than to improvements in environmental conditions. In 1992, life expectancy in MT was slightly over 72 years compared to a national average of 69 years, while infant mortality was 28/ 1000 live births compared to a national average of 41/1000 live births.

According to 1990 records, the three top causes of mortality in MT were cardiovascular, prenatal and traumas diseases which represent 29.3, 13.4, and 12.7 percent of the total deaths in the metro area. At present, mortality in MT is caused less by infectious diseases and increasingly by cardiovascular and respiratory ailments. This transition is being accelerated by the increased exposure to urban pollutants, as well as unfavourable changes in lifestyles⁷⁶.

It is estimated that between 65-75 percent of air pollution in MT is caused by motor vehicles, 20-25 percent by industry and commerce, and 1-2 percent due to domestic heating. According to 1990 estimates the annual amounts of CO, hydrocarbons, NO_x, and SO₂ released in MT are 55300, 15100, 8800 and 5000 tons, respectively.⁷⁷

D. Rabat, Morocco

Rabat is the capital and the second largest city in Morocco. It is situated on the Atlantic coast north-east of Casablanca at the mouth of the Bou Regreg river. An out-post of little significance until the beginning of this century, Rabat was designated in 1912 as the administrative capital of the French protectorate. The city is presently witnessing an even more phenomenal growth than that of Casablanca.

(a) Population Growth: The Moroccan population was 26.6 million in 1994 and expected to rise to 31.6 million in the year 2000. The present population growth rate is 2.4 percent. In 1936, Rabat's population was 83000. During the following 35 years, the population has increased eight fold, in 1971, its population surpassed 750,000 and it has since been ranked as the second largest city in the country. At present, the estimated population of the Greater Rabat Area is 1.4 million with an annual growth rate of 3.1 percent. In the congested city centre and the old quarters " medina" the population density averages 70,000 inhabitants/ km².

76. Leitmann, J., " Rapid environmental assessment; lessons from cities in the developing world" The World Bank, Urban Management Programme Discussion Paper No. 14, Vol 1, 1993.

77. Leitmann, J., " Rapid urban environmental assessment: lessons from cities in the developing world" The World Bank, Urban Management Programme Discussion Paper No. 15, Vol. 2 Tools and outputs. 1993.

(b) Migration: The flow of migrants into Rabat has been attributed to low productivity in agriculture, and limited job opportunities in rural areas. The continued flow of migrants from the economically depressed countryside to Casablanca, Rabat, and other major cities is promoted by the better living conditions in cities. Both migration and natural growth have contributed to the rapid development of the coastal plains where both Casablanca and Rabat are attracting most industrial, commercial and tourism activities in the country.

The over-development of that urban continuum on Morocco's Atlantic coast has encroached on the best agricultural land in the country, and subsequently deprived other interior cities from an equal opportunity to develop. On the negative side, the continued migration flow coupled with economic recession, were responsible for increased unemployment, deterioration of living conditions of the low-income groups and creation of more squatters at the outskirts of the capital city.

Urban poor or "Bidonvilles", living in makeshift housing exemplify the plight of rural migrants to Rabat. As the new migrants did not have sufficient income to build permanent housing, they have been allowed to reside away from the European quarters and the "Medina" or old native quarters. In the past four decades the bidonvilles on the outskirts of Rabat have grown at a much faster rate than the city itself.

The deterioration of health conditions due to overcrowding, are further heightened by the lack of essential water and sanitation services in these squatter settlements. Even with one family per room in the shacks of the bidonvilles, the cost of rental is high due to the increasing demand. On the average, rents cost half of a family's earnings. In these deteriorated physical conditions and with the associated socio-economic stresses, bidonvilles display a high incidence of social disorders including violence, crime and strained social relations.

(c) Housing: The pattern of urban settlements in Rabat can be divided in three distinct types, which are nevertheless in close proximity to each other. The first is the modern European style villa which was initially developed by the French colonial authority during occupation and is now inhabited by the Rabatian elites. The second, is the old medina where most of the urban inhabitants live. In medina, old buildings and crowded markets or "Souks" are common, while the streets are typically narrow and new housing units are build without appropriate planning.

The early waves of rural migrants who descended upon the medina were settled in few quarters. At present, the crowded quarters of Yacoub El-Mansour and Youssofia have an average space of 3 m² / capita, which is significantly less than the 10 m² /capita, the minimum recommended by WHO. Overcrowding and extensive subdivision of properties to house several low-income families are responsible for the physical deterioration and unhealthy living conditions in the medina. Few properties are owned by their occupants, and multiple ownership of single dwellings by absentee landlords is common. This situation has contributed to deterioration of existing housing stock as tenants are not willing to invest in repair and maintenance of residential properties.

Despite the steady decline in the physical and social conditions in the medina, it still remains better off than the bidonvilles squatters where living conditions are much worse. The shortage of suitable housing for the low-income groups in urban Morocco, prompted the establishment of the National Low-Income Shelter Agency (ANHI) in 1985 to implement low-housing projects in major cities, which could control proliferation of shanty settlements, and conservation of old medinas.

(d) Rabat Environmental Action Plan⁷⁸: A medium-term action plan (1996-2005) has been developed to enhance and protect environmental amenities in Rabat. The plan involves expansion of green areas, renovation of historic and touristic sites, improving solid waste management, control of air pollution from industry, transport and power generation, enhancing public awareness, and strengthening mechanisms of pollution monitoring and enforcement of environmental regulations. The plan includes prioritization of projects, their budget estimates, the executing agency(s), and implementation schedule.

(e) Water, Sanitation, and Solid Waste⁷⁹: In 1993, about 83 percent of the inhabitants in Rabat were provided with piped water, while the rest were getting their water needs from standposts. The Office Nationale de l'Potable (ONEP) has launched a national plan to improve service delivery of water in urban areas. The plan involves rehabilitation of 80 percent of the water distribution network in Rabat and extension of water services to all inhabitants in the city by the year 2000. To ensure cost recovery of the service, ONEP will increase tariffs to recover 90 and 98 percent of the water cost by 2000 and 2020, respectively.

Sewerage service is provided to about 50 percent of the population in Rabat, while the remaining areas, mainly in the medina are serviced by septic tanks. The unserved bidonvilles' shacks, commonly let their wastewater flow through open channels which causes severe environmental health problems.

Rabat hosts about 440 manufacturing establishments for food processing, textile finishing, foundries and metal finishing. Rabat's share of the national carpet exports presently exceeds 40 percent. Most of these industrial establishments have no or inadequate wastewater treatment facilities. The discharge of their untreated effluents in the Bou Regreg river and in the Atlantic causes severe pollution of water resources and adversely affect the aquatic life.

The estimated municipal and industrial solid wastes generated in Rabat are 205,000 tons per year. The municipality presently provides regular services in the high-income areas and infrequent service in the medina quarters, the bidonvilles are not provided with garbage collection service. About 75 percent of the collected solid wastes are disposed of in the Akrach landfill. The rest is mostly burned on-site, or sorted for salvage of metals, plastics, glass, paper and other recyclable matter.

78. Ministère de l'Environnement, "Un plan d'action environnemental concerté pour la ville de Rabat" Observatoire National de l'Environnement du Maroc, 1995.

79. Foutlane, A., Regional priorities on water quality and quantity in Morocco "", CHEHA/EMR/WHO Regional Workshop on GEMS/Water, Jordan, December, 1995.

(e) Health and the Environment: Per capita spending on health in Morocco was US\$ 12.3 in 1991; life expectancy at birth averaged 66 years and the infant mortality rate was 57.4 /1000 live births. Communicable diseases and gastrointestinal infections are the major causes of morbidity in Rabat at present. Other diseases caused by stresses and environmental degradation such as cardiovascular ailments and cancer, are of rising concern as well.

In the overcrowded shanty settlements, the deteriorated living conditions increase the risk of tuberculosis and other respiratory diseases, due to poor ventilation and significant indoor pollution. Contaminated water and food are responsible for most incidence of gastrointestinal and upper respiratory infections in Rabat. Overflowing sewage in the unserved areas causes insect borne diseases, and hence poses epidemic threat.

Public health protection is inevitably dependent on safeguarding environmental health. Improving environmental quality and service delivery in the low-income areas of Rabat requires more resources to enable public departments and the local municipality to extend water and sanitation to those in need for such essential services.

Accidental pollution from oil tankers has caused public concern in Rabat. Incidents that took place along the coastline such as the wrecking of the ship Samara in 1982 and Harry 5 in 1989 and devastating damages to the marine environment contributed to the increased sensitivity concerning environmental hazards associated with maritime traffic along the Moroccan shoreline.

E. Tripoli, Libyan Arab Jamahlrya

(a) Demographic Characteristics ⁸⁰: The Libyan population was 4.8 million in 1994 and is projected to increase to 6.5 million in the year 2000. The preliminary census data of 1995 estimates that 798,000 inhabitants live in Tripoli city proper, and about 1.08 million live within the Tripoli Metropolitan Area (TMA). The population of TMA constitutes about 70 percent of the country's urban population, its annual growth rate averaged 4.6 percent during the period 1990-95 compared to 10.5 percent during 1970-75. TMA households in 1995 were 172027.

(b) Water Supply ⁸¹: The TMA is presently witnessing a severe deficit in its water resources budget. While desalination and reuse of treated sewage are expected to play an important role in the future as non-conventional water resources, the TMA will secure most of its rising water needs from groundwater which may cause a sharp decline in groundwater levels and drying up of shallow aquifers, in addition to sea water intrusion into coastal aquifers, and aggravation of the desertification problem.

80. National Authority for Information and Documentation "Statistical Book" 1994.

81. Salem, O., "Management of the diminishing water resources in Libya" UNIDO Workshop on The Role of Industry in the Development and Rational Use of Water Resources in the Arab Region, Amman, May, 1996

A strategy has been formulated to improve water supply and demand management through securing additional water from non-conventional sources, optimizing groundwater reserve and rationalizing water consumption. To achieve the strategy objectives, the "Great Man-made River Project" which is expected to be completed in 1997 will convey 2.2 billion m³ of fresh water from the south to the coastal areas in the north which include the TMA. In addition, the desalination capacity in Tripoli will be increased by 0.5 million m³/day.

At present, about 95 percent of the TMA inhabitants are provided with piped water; the per capita consumption is 147 liters/day in areas provided with a continuous supply of potable water. However, water consumption is much less in areas provided with intermittent supplies or where piped water is not available.

(c) Air pollution: About 64 percent of TMA inhabitants travel by private cars, while 25 percent use buses or taxis. The high concentration of private vehicles, causes congestion and air pollution, particularly in the city centre. Particulates, Lead and SO₂ in areas with high traffic often exceed WHO guidelines. The high percentage of aging vehicles in TMA is responsible for the excessive release of hydrocarbons, CO, and NO_x. Particulate emissions from poorly maintained diesel vehicles are significant.

(d) Sewerage: About 85 percent of the TMA population are connected to the municipal sewerage network. Only 40 percent of the wastewater is subjected to treatment before reuse in irrigation and landscaping; the remaining 60 percent is discharged to the sea without treatment. To enable effective reuse of wastewater in irrigation and to control sea pollution, additional sewage treatment plants are being constructed in the TMA.

Although direct discharge of untreated industrial effluents in the sewer system may cause problems for both the network and the treatment plants, it is believed that the TMA does not have heavily polluting industrial facilities which could pose serious problems for the sewerage system.

(e) Solid Waste Management⁸²: The amount of domestic and solid wastes generated in the TMA is about 280,000 tons/year. About 93 percent of the solid waste is disposed of in open landfills, while the remaining portion is sorted for recovery of recyclable glass, paper, plastics and metals. Little and fragmented information is available on hazardous wastes generated from industrial and medical establishments in TMA. However, it is believed that the types and size of these activities in the TMA are limited, and hence do not constitute a major problem that warrant special handling.

Solid waste management accounts for more than 40 percent of the municipality budget, yet the quality, frequency and service coverage leave much to be desired. The inadequate dumping of municipal solid wastes in open landfills requires replacement by sanitary landfills and modern collection and sorting equipment to enable effective composting and recovery of recyclable materials.

82. Personal communication, Secretariat of Utilities, Technical Centre for Environment Protection, Tripoli, June 1996.

(f) Health and Environmental Pollution: Life expectancy at birth in Libya was 66 years in 1990, while infant mortality rate averaged 66/1000 live births. Air pollution seems to present an environmental problem in the TMA. However, information on emissions and their impact on public health is scarce.

Evidence from other cities in the region suggests that Lead emissions associated with heavy traffic are responsible for impairing neurological development in children and cause respiratory disorders, which in turn contribute to a significant number of premature deaths.

In the past decade, tangible progress has been made to improve delivery of primary health care in the TMA; the sharp drop in infant mortality and the increase in life expectancy at birth by an average of 8 years attest to this fact.

The Directorate of Social Medicine in Tripoli is responsible for monitoring occupational health in the TMA including pre-employment medical examination and periodic examination of the workers exposed to specific occupational hazards. Major problems of the work environment include excessive noise of more than 120 dba in textile manufacturing, exposure to lead fumes in the battery plant, and release of toxic solvents in paint formulation and degreasing processes. Despite the importance of occupational medicine as an essential preventive tool, human resources and diagnostic facilities are lacking. More attention, therefore, should be given to health care for workers⁸³.

F. Urban Environment and Health in North Africa: Experience and Prospects

Since the early 1960's, most cities in North Africa have experienced significant population growth. Natural growth and reclassification of rural settlements account for 70 percent of urban growth, while rural migration contributes the remaining 30 percent. Unfortunately, efforts to curtail rural-urban migration have failed due to the inability of agriculture to absorb the increase in rural population, and the relatively better employment opportunities, and access to government welfare benefits in cities.

In trying to tackle the problem, Egypt, Tunisia, and Morocco are providing assistance to create new opportunities in small-scale agro-industries and traditional handicraft products, promoting higher value-added agriculture, and improving the infrastructure and living conditions in the rural areas. Successful implementation of these policies is bound to reduce the tide of rural-urban migration in the long-term.

The case studies presented above, clearly demonstrate the plight of urbanization in North Africa. Rapid population growth coupled with unplanned urban development are causing a multitude of environmental health problems in cities

83. El-Batawi, M., "Occupational health in Libyan Arab Jamahirya", WHO/SOH/68, 92/23, 1992.

throughout the region. In the capitals and primate cities, squatter settlements and spontaneous housing continue to grow in a haphazard manner, while green areas in cities have eroded or been destroyed.

In addition, major cities in North Africa are facing severe water and air pollution problems because inadequacy of solid waste management, and inefficiency of both water and sanitation services. Environmental problems are also compounded by the concentration of polluting industries near residential communities which poses serious health risks to the exposed population.

Populations of North African cities can be broadly classified into four sub-groups according to the socio-economic status and location within the city proper: (a) the affluent who enjoy the benefits of urban life and efficient environmental services; (b) middle-income groups including civil servants, traders, and self-employed groups who live in acceptable housing and are provided with adequate public services; (c) low-income groups which live in sub-standard housing within the city and are provided with meager services; and (d) the underprivileged and forgotten urban poor, who live in slum dwellings in peripheral areas, with no access to water, sanitation, and other public services.

As a result, urban poor are the most exposed to health hazards induced by the deteriorated city environment. They suffer from communicable diseases, and high maternal and infant mortality, due to poor housing conditions and inadequate health care services. Among this group, there are usually higher incidences of cancer, drug abuse, violence, and sexually transmitted diseases. In most slum areas, the cost of water supply and sanitation is much higher than that of the affluent areas which paradoxically have access to cheap, and high quality environmental services.

To alleviate the problems of the urban poor, various promising approaches have been pursued in North Africa. A case in point is Egypt, where WHO has launched a collaborative programme for the improvement of environmental health by promoting enhanced awareness among the urban poor. UNICEF is also undertaking a community development project in Cairo intended to serve a population of 0.75 million. In addition, the government has established the Social Fund for Development (SFD), which aims to alleviate poverty, and to cushion the effects of the national structural adjustment policy. The SFD is presently extending finance for community development for vulnerable groups, with emphasis on creating self-employment opportunities for the educated youth.

In North African cities, particularly Cairo and Alexandria in Egypt, Casablanca and Rabat in Morocco, Algiers in Algeria, and Tunis, Gabes and Sfax in Tunisia, industrial pollution generates excessive pollution loads which deteriorate the receiving water, soil, and air. Most of these cities and their industrial zones are situated along the coastline. Directed discharge of polluted effluents into the Mediterranean sea and the Atlantic ocean is causing severe damage to the aquatic life. And because of rapid growth of population, tourism, and industry in these cities, the potential of worsening impacts on environmental amenities is substantial. These impacts in turn, could in turn affect the tourism industry itself.

Vehicular emissions of aging cars dominate in most North African cities; Emissions from these old vehicles are usually ten to twenty times higher than that of the new ones which are normally equipped with catalytic converters. Unfortunately, efforts to introduce unleaded gasoline in countries like Egypt have been hampered by the high price set by the government. Environmentalists argue against the high price of the unleaded gasoline, since studies indicate that the cost of impaired health attributed to leaded gasoline is three to four times the additional cost needed for producing unleaded gasoline.

By and large, health problems in North African cities may fall into four categories: (a) poverty-linked health problems induced by poor housing, overcrowding, poor nutrition and lack of environmental services; diseases in this category include gastrointestinal and respiratory tract infections, and malnutrition; (b) environmental health problems attributed to air, water and soil pollution; with universal impacts that extend across all population groups; (c) medical problems associated with urban lifestyles which include diseases of metabolic, degenerative or nepotistic origin; these problems are major causes of morbidity and mortality among the affluent groups, and in some cases they also pose added health risks to urban poor; and (d) psycho-social problems represented by the incidence of mental and neurotic disorders, adolescent delinquency, sexually transmitted diseases and drug addiction; prevail mainly in the vulnerable groups such as the unemployed youth and street children⁸⁴.

Provision of adequate environmental health services in North African cities is constrained due to high population mobility, weak community participation, inequity in providing services to communities in need, and physical and social isolation of vulnerable groups.

The disability adjusted life years (DALYs) has been suggested as a measure of the loss of health and human life because of premature mortality and disability induced by deteriorated environment, and unhealthy living and work conditions. WHO surveys in the region found that improved water supply and sanitation produced a median reduction of morbidity and mortality in order of 25 percent and 65 percent, respectively. When accompanied by better hygienic standards, improved water supply and sanitation can substantially reduce water-borne diseases such as diarrhoea and typhoid.

In North Africa, communicable diseases are endemic in some cities due to inadequacy of water supply, sanitation and solid waste infrastructures. The prevalent diseases in these cities include hepatitis, gastrointestinal diseases, diarrhoea, parasitic diseases, and leptospirosis. The urban poor are also at risk of acquiring mosquito-borne diseases, including malaria and filariasis. Inadequate housing and overcrowding contribute to incidences of tuberculosis, pneumonia, bronchitis, measles and meningococcal infections.

84. World Health Organization, "The impact of urbanization on health" Regional Committee for the Eastern Mediterranean, EM/RC 39, July, 1992.

The long-term and accumulative impacts of hazardous wastes are even more serious as their associated diseases are costly and difficult to cure. Many industrial and some household wastes are highly toxic; prolonged human exposure to these wastes may cause carcinogenic or teratogenic effects.

In the Middle East and North Africa region (MENA), the World Bank estimates that the increase in health expenditures associated with diseases from lack of safe water, sanitation and excessive air pollution are on the order of US\$ 1-1.5 billion.

Environmental health problems in North African cities are compounded by the absence of administrative entities responsible for planning and coordinating delivery of environmental and health care services. Municipalities, local governments, central agencies, the private sector, and NGOs share various responsibilities for provision of environmental and community services in urban settings. They execute their programme activities without coordination with other service providers. An extreme example of fragmentation is the CMA health care system, where health services are provided by the Ministry of Health, university and military hospitals, the local government, national health insurance, NGOs, and private medical centres, without adequate planning and coordination.

The absence of a unified body responsible for planning and coordination impedes the development and proper delivery of services to city dwellers, and often results in overlapping and wastage of resources. The present challenge which faces city managers is to define the role of service deliverers, and to establish a coordinating mechanism that would ensure maximum utilization of resources and higher quality of services provided by public and private concerns.

Environmental regulations and limitations on releases of hazardous and polluting waste in North African cities are comprehensive and in some instances are even stricter than those of the industrialized countries. However, compliance with environmental laws and regulations in most North African cities is ineffective, due to laxity of enforcement, or the protection extended to special interest groups.

The community could be empowered to seek environmental protection or to press for improved delivery of public services⁸⁵. In a recent encounter, an NGO in Alexandria took the local government to court and succeeded in banning projects that would encroach on green space or cause public nuisance.

A "healthy cities" programme has been launched by WHO/EMR since 1990. The programme provides an opportunity for urban dwellers to participate in activities related to health and welfare in their cities. It also promotes advocacy among decision-makers and the general public to ensure commitments for safeguarding health and the environment in urban development endeavours at the city level.

85. Leitmann, J., "Rapid urban environmental assessment: lessons from cities in the developing world" The World Bank, Urban Management Programme Discussion Paper No. 14, 1993.

Projects have been launched in Tunisia and Morocco to establish multi-sectoral "healthy cities" networks. These networks enlist the support of NGOs, citizens groups, businesses, and universities for implementing activities related to health and environmental improvement at the city level. The project encompasses health education, accident prevention, improving living conditions in slum areas, and incorporating environmental health in city planning and decision-making.

The most notable achievement of the healthy city approach is its success in forging alliances among those public and private bodies concerned with health and environment protection in urban settings ⁸⁶.

Recognizing the long-term effects of health and environment on urban dwellers in North Africa, concerted efforts are needed to ensure equity in providing environmental and health services, focusing on preventive rather curative approaches to a city's environmental and social problems, encouraging community responsiveness and participation in services' delivery, and adopting comprehensive approaches in planning sectoral activities, with particular emphasis on housing, water supply, waste management, and health care services for the urban poor. To achieve these objectives, city resources must be mobilized in an effective manner, and cities must adopt equitable approaches for cost-sharing or cost-recovery of environmental services.

To improve the institutional capacity and environmental management in cities of North Africa, the World Bank has proposed the following priority measures ⁸⁷:

- Strengthening urban land management through strategic planning that relies on incentives and regulatory instruments such as zoning and permitting.
- Establishing appropriate legal frameworks to enable local governments to decentralize essential municipal services.
- Holding municipalities accountable for services and force utilities and private businesses to comply with environmental laws.
- Providing adequate municipal finances to make devolution and accountability effective through municipal taxation, bond issuance, collection of users' fees, and polluter charges as well as accessing on-lending instruments of external finance.
- Improving cities' human resources through staff training and improved employment conditions and salary scales to enable utilities to retain competent staff.
- Promoting public participation in environmental improvement activities.
- Improving coordination among concerned entities. The jurisdiction of each entity must be sharpened, and implementation and enforcement functions must be delegated ensure effective follow-up.

86. World Health Organization" Urban health care in the Eastern Mediterranean Region " Report on Consultation Meeting, EM/PHC/92-E/L, April, 1994.

87. The World Bank, "Middle East and North Africa Environmental Strategy: towards sustainable development", February, 1995.

VI. POLICY RESPONSES GEARED TO IMPROVED URBAN ENVIRONMENT IN AFRICA

Improving the urban environment requires, among other actions: (a) promoting integration between public and private sectors; (b) strengthening communication between city officials and the community; (c) mobilizing community resources to support urban development programmes; with particular emphasis on provision of shelter for the poor; (d) control of land speculation through effective management of physical expansions; (e) strengthening institutional capabilities and law enforcement mechanisms of the local governments; (f) proper location and use of resources; (g) balanced inputs for community services and production activities; and (h) effective control of pollution emanating from urban growth. Environmental improvement requires control of the form, growth, and distribution of settlements and careful planning of the types and intensity of development activities in African cities.

There is also a distinct need for greater integration among public works and other related community services at the city level. From a management perspective, integration is perceived as a means of achieving effective environmental advocacy. Close cooperation among programme managers could help avoid divisive conflicts and overlapping activities, and lead to better scheduling and execution of interrelated projects; this objective may be achieved through creation of a focal point for the development and articulation of long-term environmental goals within local governments.

Traditionally, links are well established between central agencies and their provincial branches. This tradition may undermine the ability of governors and local councils to exercise effective control and supervision of community service programmes. To overcome this problem, strengthening vertical integration may lead to more rational organizational structure, increased efficiency, better accountability to the community and resolution of local-central administrative conflicts and controversies.

In this regard, the private sector should be encouraged to invest in public services, which could ease the financial burden on municipalities and improve service delivery in the long-term. User taxes can be imposed to reduce waste by maximizing costs to pollution generators.

Within the context of an integrated urban management strategy, policy-making and programme execution should be guided by a broader social cost-benefit analysis which incorporates the principles of resource sustainability and financial viability. Investments in urban projects should therefore, accord priority to financially self-sustained programmes while narrowing the gap between the rich and poor city dwellers.⁸⁸

88. Brown, L., and Jacobson, J., "The future of urbanization: Facing the ecological and economic constraints" Worldwatch Institute, Worldwatch Paper 77, 1987.

A. Management and Administrative Response

I. Strengthening Institutional Mechanisms in African Cities

A major impediment to improving delivery of environmental services in African cities has been fragmentation of decisions on management of services in terms of both geographic boundaries and the various uses. Therefore, upgrading existing institutional mechanisms of city governments may lead to better resource allocation and resolution of use conflicts, as well as alleviation of negative impacts of public projects on urban poor.

In major African cities, the interactions between urban growth, water supply and sanitation, and education and human health, have not received adequate attention despite their interconnectedness. This fragmentation often leads to unrelated decisions concerning management of public utilities and results in undesirable impacts on the environment and human health (i.e., improper management of water and sanitation usually results in adverse impacts on community health).

In this context, new mechanisms for city planning and management must be based on an overview of the urban system as a whole with integrated decision-making in key areas. Unfortunately, few cities in the developing countries possess the institutional structure required to achieve this objective⁸⁹. Strengthening institutional capacity is essential for the sustainability of any solution to halt urban environmental deterioration.⁹⁰

To strengthen environmental management functions at the city level, it is recommended to establish a specialized environmental management unit (EMU) with a clear mandate to monitor and coordinate all environmental activities undertaken by the city government and public institutions. The new concept has been adopted in the UNCHS sponsored sustainable city project (SIP) in Ismailia, Egypt, launched in 1993, the SIP aims to strengthen participatory urban environmental planning and the management capacities of the local government and public institutions. The EMU is responsible for implementing coordinated interventions of the public, private and community sectors. To date, the environmental planning process is progressing and monitoring procedures have been put in place.⁹¹ An outline of a generic structure of the EMU is detailed in Appendix 1.

89. Haughton, G., and Hunter, C., "Sustainable Cities", Regional Policy and Development Series, Jessica Kingsley, London, 1994.

90. Bartone, C., et al, "Towards environmental strategies for cities" Urban Management Programme Policy Paper No. 18, UNDP/UNCHS/World Bank, Washington, DC, 1994.

91. Khoury, Z., "Implementing the new urban agenda: the case of Ismailia, Egypt", Environment and Urbanization, IIED, London, Vol. 8, No. 1, 185, April 1996

2. Economic Instruments Geared to Improving Urban Environment.

Institution of a system of charges to be levied on polluters may provide vital financial resources to supplement those needed for implementing environmental improvement projects, or for investment in pollution control facilities, which lack sufficient financing. However, levying charges should not imply the right to pollute, since emission standards should remain enforceable. The charges should merely provide "supportive mechanism" to encourage compliance with the standards.

Because of their weak economic performance in recent years and the precarious state of their public finance, most African countries have not had the necessary budgetary resources to provide adequate environmental services in urban centres. As governments attempt to reduce deficits in their public finances, the prospects for increases in expenditures on public services from national budgets are likely to remain restricted. Under the circumstances, cost recovery offers a means of generating additional financial resources for urban services, in addition to promoting efficiency of service delivery and improving equity.

The most promising course of action would be to increase expenditures through imposing users' fees. A system of fees that reflects the relative cost of providing different types of services will encourage patients to ration their use of expensive resources.

Health services present a critical issue due to inadequacy of governments' financing and inability of urban poor to pay for the needed medical care services. Three alternative options are proposed to solve this problem. First, substantial inpatient fees can be imposed with generous exemption policy. In this case, insurance could be made widely available to cover the formal and informal sectors at an affordable cost.

The second option, is to concentrate on raising revenues from private amenities or services in public hospitals by charging those willing to pay a substantial additional fee for these facilities. The third option, is to set inpatient fees at levels that are low enough for most people to afford and tightening up the collection procedure. Adopting one of these options in African countries depends on the institutional capacity.

Imposing small fees in hospitals in Kenya and Zimbabwe produced revenues much larger than those generated at health centres or clinics. In Ghana, Lesotho, and Swaziland, evidence indicates that people are willing to pay for improved health care when they have serious illnesses but not otherwise. In Cote d'Ivoire, fees are fully remitted to the central treasury, a practice which does not encourage staff at the facility level to improve services or to collect inpatient fees.

In a few cases, retaining fees at the facility level led to greater flexibility in purchasing drugs and equipment and thereby enabled better service delivery.⁹²

In general, operation of public services in the African cities is very costly. The gap between costs and revenues is attributed to: (a) absence of adequate auditing of construction and rehabilitation costs of public projects; (b) high operational and maintenance costs since inexperienced staff are not able to operate services at the designed efficiency; (c) cost-recovery is hampered by inadequate metering, billing, and collection systems; (d) inefficient management of both expenditures and income due to lack of internal control mechanisms; and (e) low level of tariffs.

Practical solutions to overcome the above impediments and to harmonize services with community needs include: (a) imposing substantial charges on large customers in the commercial and industrial sectors; (b) instituting tariffs that promote rational use of services and reduction of waste which may postpone the need for expansion of public facilities; and (c) making utilities guard against the temptation to use expensive sophisticated equipment and rely more on dependable and less costly technologies.

The cost recovery and cost containment of municipal water and sanitation services have been gradually imposed in some countries (i.e. Egypt, Tunisia, and Morocco). However, as most African cities are still dominated by fast-growing, low-income consumer categories, the surplus generated from the affluent areas is not sufficient to improve conditions in the under-served areas. In addition, the high level of non-revenue households, due to delinquency of large consumers or substantial unaccounted for losses in the delivery systems, create chronic deficits between the expenditures and the cash income generated from sales of utility services.

Some countries have attempted to improve delivery of services through establishing private companies to liberalize management of public utilities, thus freeing them from government bureaucracy. However, this trend should be guarded carefully, as the absence of regulatory guidelines may result in increased tariffs beyond the capability of low-income consumers. Governments adopting this approach should therefore maintain a supervisory role to ensure that services are extended to the less privileged, that best use of available resources will be made using effective management systems, and that the private interests remain in financially viable situation without charging exorbitant prices to customers.

3. Enforcement of Environmental Legislation in African Cities

An emerging health concern in most African cities, is the increasing varieties of the imported materials and products for which scant or no information is available

92. Nolan, B., and Turbat, V., "Cost recovery in public health services in Sub-Saharan Africa", Economic Development Institute of the World Bank, EDI Technical Materials, 1995.

concerning their constituents, and health and environmental effects. To guard against their ill-health effects, regulations should include requirements for: (i) a probation on the use of any imported material banned in the country of origin; (ii) detailed qualitative and quantitative descriptions of all chemical constituents of an imported product to be used in confidence; and (iii) producer mandated assistance for proper detoxification or treatment of accidental releases of toxic chemicals in the environment.

On the other hand, environmental laws and regulations currently enforced in African cities are, in most instances, impractical, ambiguous and non-enforceable, which lead to gross violations. The weakening and erosion of the legislation is contributed by several factors including: (i) rapid growth of polluting activities in urban centres, industry in particular; (ii) increased complexity of developmental activities; (iii) loop-holes and vagueness in regulations ; (iv) transfer and evasion of pollution via other form or media ; and (v) inflation and rapid monetary erosion which render financial penalties ludicrous.

Several tools are available to ensure compliance with environmental laws. These may include withholding of permits or licenses without which the waste generators cannot lawfully operate, or providing financial assistance to enable enterprises cover part of their pollution abatement costs. These subsidies may be in the form of direct payments or grants based on a percentage of the cost of pollution abatement or on a percentage reduction in effluent quantity or strength. They may also take the form of low-interest loans for the capital costs of improved treatment facilities. Alternatively, the government can reduce or defer taxes or relax other government requirements to encourage spending on pollution control.

The main advantage of subsidies is that they reduce the costs of pollution abatement to the polluter and limit the associated increase in production costs. Government grants can be used to cover capital costs, and tax incentives can be used to relieve operation and maintenance costs. Subsidies (the carrot) combined with regulations (the stick) can be used by government to reduce stress on the environment and at the same time encourage research and development by industry in pollution abatement technology.

4. Information Needs for Management of the Urban Environment

Decisions concerning urban environmental management in Africa are often made with imperfect knowledge of the present and future needs of city dwellers. Information is essential in areas such as population trends, changes in community behaviour and lifestyles; pollution sources and loads from various domestic, industrial and commercial activities; projected increase in demands for services and alternative options to provide them; performance of service delivery; and approaches to remedy existing deficiencies.

Typically, acquisition of information requires significant expenditures of time, capital and professional resources. Therefore, it is essential that the information be relevant to the real needs of urban planners and managers. This can be achieved when: (i) a range of disciplines is to be brought to bear effectively and in an integrated

fashion on environmental management issues; (ii) the critical knowledge gaps are identified, and (iii) compiling sufficient information on missing elements through systematic monitoring.

The need to act on the basis of thorough and reliable information and the necessity of formulating a management strategy in light of all available options, requires establishment of an information system on the urban environment in African cities. Such system may provide an effective basis for dialogue among planners, policy-makers, city officials, and beneficiaries based on facts and figures rather than on speculations.

5. Development of Human Resources

One recurring issue which obstructs proper management of African cities is the acute shortage of trained manpower. Skilled staff is in short supply in various areas including management and administration of public utilities, environmental assessment of new and expansion projects, monitoring of environmental quality, and enforcement of pollution prevention regulations. In several cases, the commitment and facilities are there, but execution has failed to achieve the planned results, because of a shortage of qualified personnel.

In considering a qualitative change in the staff employed by most African cities, a number of problems should be tackled, including: (a) staff development and training in areas where shortcomings are apparent (b) easing institutional and financial restrictions to enable recruiting experts in the highly specialized management and operation fields, and (c) offering salary scales and career opportunities to attract and retain professionals of the highest caliber.

It is obvious that personnel rules, salary structures, and promotion potentials are critical aspects of staffing. Experiences in a few African countries indicates that public utilities tied to the civil system structure are less able to recruit the needed professional cadre compared to private companies which exercise more freedom in hiring and are in better positions to offer attractive salaries and other employment incentives.⁹³

6. Community Participation

A strong community spirit has been emerging slowly among urban dwellers in African cities. While this spirit is still unable to influence major decisions, it is essential to enable voluntary contribution to community improvement projects and to ensure citizens' cooperation in maintaining effective management of public utilities.

93. Cointreau-Levine, S., "Private sector participation in municipal solid waste services in developing countries" UNDP/UNCHS/World Bank, Urban Management Programme Discussion Paper No. 13, 1994.

A fundamental issue in this regard is the interest of individuals and local communities in organizing in their own self-interest. This interest is still weak in many urban areas, as citizens are discouraged by the negative official attitude towards community participation in managing public services.

Because the essence of degradation of urban environmental quality is in large part reflected in the conflict in use of scarce resources between local groups, or between national interests and local groups, it is important that mechanisms be sought to enable concerned groups who benefit or lose as a result of environmental degradation to have a greater say in the decision process.

The concentration of management powers in local government bodies, the minor community role in shaping decisions, and the powerful influence of special interest groups, all suggest the explicit need to strengthen the mechanism of public participation in management of the urban environment.

Considering the need to involve the beneficiaries in both planning and management decisions, it is important to mobilize public participation to enable their interests in the decision-making process. In almost all instances, local leaders have better knowledge of the real needs and potential capabilities of their communities. If they have a say in decisions, it is more likely that the impact stemming from the local community, or adversely affecting it, will be self-adjusting.

A case in point, is the construction of water standpipes in some Egyptian urban slums with multiple faucets arranged in a manner to permit social gathering of women. This enabled them to undertake their traditional jobs of washing clothes and utensils in a socially favourable setting.

Another pertaining issue, is the growing trend towards decentralization of community services in African countries. While this trend should be encouraged, delegation of initiative to the local level does not automatically guarantee public participation. In several instances, decentralization appears to be merely an attempt by the central government to push the political and financial costs of government onto alternative levels of government, without actually relinquishing power. A case in point is the Ghanaian government's power to appoint the municipal executive and heads of municipal departments, and therefore control local spending decision.⁹⁴

94. Dillinger, W., "Decentralization and its implications for urban service delivery" UNDP/UNCHS/ World Bank, Urban Management Programme Discussion Paper No. 16, 1994.

B. Demographic Trends and Policies in Urban Africa

The African population of 222 million in 1950, has nearly tripled in the early 1990's. In 1995, the population further increased to 746.8 million, and is projected to exceed 1.5 billion in 2025. The population growth rate averaged 2.88 percent during 1975-80, and is expected to increase to 2.98 percent during the period 1985-2000; well above the world's average of 1.63 percent. Since 1960, the population growth rate in Sub-Saharan Africa maintained an average of 3.0 percent, while the growth rate in North Africa has declined from 2.4 percent in the early 1960's to about 2.0 percent in the mid 1990's.

The rapid growth of the African population is attributed to the high fertility of women and to the marked improvement in human health. Life expectancy at birth has increased from 45.9 years in the early 1970's to 54.1 years in the mid 1990's, while infant mortality/1000 live births has decreased from 137 in the early 1970's to 94 in the mid 1990's. In some nations south of the Sahara, women on the average still have more than seven children. In addition, 45 percent of Africans are under the age of 15, the demographic increase is still gaining momentum throughout the continent.

The total fertility rate (TFR) -the number of children the average woman has in her lifetime- averaged 6.3 in Sub-Saharan Africa in 1992; almost 2.5 times that of the medium-income countries. The TFR varied from over 7 in countries which suffer economic hardships or political conflicts such as Angola, Niger, Uganda, Somalia, and Liberia, to less than 4 in countries which enjoy political stability and modest economic growth, such as Egypt, Tunisia, and Morocco. This decline is associated with the rise in the marriage age and an increase in contraceptive use⁹⁵. In Kenya, the TFR has fallen from 7.9 to 6.5 in just 12 years.⁹⁶ Despite the apparent decline in the TFR in some African countries, population continues to grow at an alarming rate in the continent as a whole.

The rapidly growing population in Africa, is exerting severe pressures on natural resources and public services, and aggravating the unemployment problem. The labour force has been increasing at an average annual rate of 3.2 percent during 1975-80. The rate will rise to an annual average of 3.6 percent during 1995-2000. This rapid growth of the labour force coupled with diminishing job opportunities will only compound the unemployment problem.⁹⁷

95. United Nations Development Programme, "Human Development Report", Oxford University Press, 1995.

96. Population Reference Bureau, "1993 World population data sheet", Washington, DC, 1993.

97. The World Bank, "A population perspective on development: the Middle East and North Africa", Washington, DC, 1994.

As previously stated, urbanization in Africa is influenced by a combination of demographic factors including rural-urban migration, natural increases in urban population, reduced mortality and reclassification of rural land as urban or peri-urban areas. The contribution of migrants to urban growth is important. They are commonly in the child-bearing age group which has higher birth rate than the urban population as a whole. Migration induced by political unrest and ethnic conflicts, is a major contributor to city growth in some Sub-Saharan countries. Such explosion in city growth often widens the gap between existing fiscal means and the resources required to sustain the newcomers.

Recently, African countries have been paying more attention to family planning to reduce family size, improve the health of mothers and children, and achieve more balanced population growth. In this regard, low-cost contraceptives should be available to the urban poor, and proper information must be disseminated about the advantages of family limitation and birth spacing. The religious institutions, NGOs and the media have an important role to play in encouraging community acceptance of family planning, particularly among the illiterate and low-income people.

The impacts of the structural adjustment policies on the urban poor and their demographic consequences, are causing alarm in Africa. Economic stabilization measures usually include privatization of industries and elimination of jobs, wage reductions, trade liberalization, and removal of subsidies. Whatever their successes in achieving macro-economic goals, structural adjustment policies have caused economic hardships and aggravated the misery of urban poor.

The Economic Commission for Africa (ECA), cited the social consequences of the adjustment policies as "declining per capita GNP and wages, rising unemployment and underemployment, deterioration in the level of social services, falling educational and training standards, rising malnutrition and health problems, and rising poverty levels and income inequalities".⁹⁸

To counter these adverse effects on the urban poor, the structural adjustment policies should avoid social discrimination and ensure the livelihood of the lower-income groups. Evidence in Africa and elsewhere suggests that the effect of urban poverty, environmental degradation, and human deprivation on population growth are inextricably linked. Thus measures to tackle these chronic problems are mutually reinforcing. In many instances, improvements in women's health and skills contribute to economic growth and a reduced TFR. The resulting slowdown in population growth increases opportunities for deprived people, which in turn encourages their active participation in all aspects of city life.

98. United Nations Economic Commission for Africa, "African alternative framework to structural adjustment programmes for socio-economic recovery and transformation", ECA, Addis Ababa, 1989.

To this end, implementing simultaneous interventions to improve quality of life, enhance human and natural resources, and arrest environmental degradation, could break the vicious cycle of poverty and urban decay and may even turn it into a virtuous cycle.

In view of the rising demands of urban populations for natural resources, employment, education, and public services, city planners and decision-makers should integrate population issues into urban planning. Development policies should infuse population concerns in urban environmental planning to ensure city development on a sustainable basis.

A comprehensive demographic policy should have as its goals alleviating of poverty, improving livelihoods for the unprivileged segments of the society, ensuring universal access to a family planning education and services, improving the status and income of women, and fulfilling of community aspirations.⁹⁹

To meet these goals, African demographic policies should be people-centered and aim to improve the capacity of human resources to ensure a habitable, healthy and sustainable environment for all. A successful policy would in turn, ease existing demographic pressures. An effective demographic policy for African cities should address the following issues:

- Assessing the implications of population dynamics on gender inequalities, peoples' livelihood, cultural behaviour, natural capital, and life support systems.
- Devising proper interventions to ameliorate the adverse impacts of structural adjustment policies on the social and economic welfare of the urban poor and ensuring that the vulnerable sectors of the society are cushioned from the simultaneous impacts of falling real incomes and service cutbacks.
- Addressing specific needs of the low-income people for employment and economic development, including promotion of low-collateral credit, extension services, and human resources development,
- Promoting efforts to reduce illiteracy, addressing obstacles such as inadequate infrastructure for formal and informal education, and gender biases in work and education; and eliminating hurdles that discourage self-determination, affect earning power, and limit people's participation in the decision-making process.
- Accounting for the impacts of culture, traditions, and religious beliefs on family-decision dynamics and how to incorporating these concerns in family planning campaigns.

99. United Nations Conference on Environment and Development, "A guide to Agenda 21: a global partnership", UNCED, Geneva, March 1992.

C. Toward Regional Environmental Strategy on the Urban Environment

1. Justification

The undesirable impacts of rapid urbanization, exploding population growth, and uncontrolled industrial development in African cities, coupled with debilitating poverty and inadequacy of the administrative and physical infrastructures, are manifested in rapid environmental degradation and poor delivery of urban services.

Urban population growth in Africa is among the highest in the world. This results in excessive demands on resources which often exceed the carrying capacity of the natural environment and exert severe pressures on the physical infrastructure. Such pressures often create imperceptible damage to natural resources and serious health risks to urban inhabitants. The gravity of environmental deterioration in some African cities may render them incapable of assuming their role as engines of production.

Sustainable urban environmental strategy in Africa should, therefore, place emphasis on: (a) the unique characteristics of African urban settings, (b) population size and rate of growth, (c) the level of income and economic development, (d) the diverse spatial dimensions of environmental problems in cities, and (e) the role of major actors including public institutions, private businesses, and the people who contribute to a city's environmental problems and its solutions.¹⁰⁰

The basic premise of a functional urban environmental strategy, is that sector-specific management interventions should be always planned and developed within the broader context of a multi-sectoral, integrated city-wide plan. This is necessary, to ensure that the activity in question should have a positive impact on the citizens' well-being as well as reducing risk to their health.

The strategy, therefore, should aim to enhance coordination among the concerned institutions for purposes of achieving positive effects on quality and availability of environmental services, resolving potentially conflicting activities, and ensuring beneficial trade-offs.

Eventually, what counts in implementing an environmental strategy for a particular city are the economic and health improvement "returns" on a given investment at the macro and micro levels, and the impact of sectoral activities of a city development plan on the sustainability of local resources and accessibility of services to all.

100. Bartone, C., et al, "Toward environmental strategies for cities " UNDP/UNCHS/World Bank, Urban Management Programme Discussion Paper No. 18. 1994.

The strategy should lead to development of "tailor-made" action plans for major cities in Africa. A well formulated action plan should identify and prioritize activities needed to reverse, or at least control, the damages to the urban environment, and those needed to conserve and rationalize use of available resources.

Accordingly, the plan of action should focus on devising appropriate technical, economic, and administrative measures aimed to solve infrastructure problems; strengthening financial and technical capabilities of municipalities and public utilities; devising equitable systems to ensure achieving the objective of extending services to all sectors of the local community; recommending procedures to halt practices detrimental to urban environment; and most importantly, reducing potential human health risks.

2. Policy Principles of an African Urban Environmental Strategy

The following policy principles should be addressed within the framework of a strategy on urban environmental management in Africa:

- Planning of future urban improvement projects must be geared towards increasing understanding of the burdened capacity of both natural and physical resources. In the past, a multitude of improper development projects in African cities have produced devastating effects on the quality and sustainability of resources. Most of these projects were based solely on economic considerations without due regard to their negative impacts on the environment, making corrective interventions costly and difficult to implement.
 - An urgent need to protect public amenities from the rising levels of pollution emissions and their associated health hazards is apparent throughout urban areas in the continent. At the same time, it is essential to protect vulnerable natural resources from disruption by human activities.
 - Rational use of city resources and physical amenities should be given utmost attention. Future development should result in uses which are both sustainable and geared towards a multiple use strategy. This means that single, exclusive use of individual resources should be discouraged in favour of multiplicity of use to achieve compatibility between conservation objectives and long-term development goals.
 - The complexity of the existing urban problems and the fragility of resources require the application of rigorous environmental impact assessments to determine the repercussions of new urban development activities on the resources base, and to guide the selection of measures to manage and mitigate potential adverse effects.
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- Action responsibilities should be gradually decentralized and delegated to autonomous enterprises at the regional or local levels to stimulate community initiatives and to harmonize, and liberalize management systems;
- Building adequate community capacity to participate in the decision-making process. Such capacity includes developing mechanisms for communication and enhancing public awareness of the problems and their proper solutions.
- Cooperation among public utilities and local communities should also involve private organizations, clienteles, and others that have vested interests in city management. Cooperation should not be limited to soliciting views on specific actions but extended to defining issues and priorities, evaluating alternatives and helping in programme implementation.
- Knowledge and experience regarding appropriate practices and institutional mechanisms for managing urban environment should be freely shared and disseminated among concerned entities so as to upgrade existing administrative systems and operational procedures.

3. An Outline for a Plan of Action on Sustainable Cities.

Promoting inter-sectoral cooperation among local entities concerned with city management should be embodied in the action plan to avoid inadequacies, contradictions and inconsistencies which obstruct implementation of an integrated urban environmental management scheme. Effective implementation of action-oriented activities also requires capacity-building of tangible and intangible resources.

Tangible resources include facilities, equipment, supplies and personnel. Intangible resources include political commitment, explicit policy, effective planning, and clear relationships among concerned parties. An action plan to achieve a sustainable urban environment should incorporate the following measures:

- Integrated planning to define future city needs without risking overemphasis on certain areas or underestimation of others. Proper planning can also optimize use of resources available to public utilities.
- Ensuring adequate public services and expanding coverage of water and sewerage to the unserved populations to improve quality of life, and health conditions and to foster socio-economic development.
- Enacting legislation and regulations, backed by proper financial penalties, to protect physical infrastructure, ensure adequate management of utilities and operation of service delivery systems, and encourage positive consumer

behaviour. Regulations are most effective when based upon scientific knowledge and embody the principles of practicality, acceptability and affordability. National and local ordinances should delineate responsibilities of the enforcing agencies, basic rights of citizens to have access to dependable and adequate services, and proper sanctions on violators.

- Instituting proper economic instruments (incentives and disincentives) through pricing and marketing to discourage abuse and improper exploitation of services and encourage investment in public utilities, and hence improve their delivery of services.

One of the prime goals of sound urban development is to *attain ecological sustainability*. However, in attempting to achieve prosperous economies, African cities are likely to increase use of non-renewable resources, particularly when such development relies on expansion of industry, and use of energy-intensive lifestyles. To counter such wasteful practices, measures should be undertaken to ensure efficient use of resources such as use of fuel-efficient systems in households and mass-transport for easy access to employment and services.

Consideration of the sustainability of urban settings must also account for the ecological impacts from distant areas. Deforestation, is a case in point. Forest depletion may not only cause loss of employment and income, but may also result in floods induced by soil erosion, and reduced capacity of hydro-electric power stations.

Therefore, to achieve the long-term targets of urban development, city governments must infuse the *sustainability concept* in decision-making and programme implementation. The capacity of these institutions to plan and manage the area under their jurisdictions, to promote sustainable patterns of resource use and urban form and to invest in needed infrastructure and services, is central to sustainable city development.

Local governments must also promote cooperation with community organizations and the private sector, especially when the economic constraints limit the investment capacity of public institutions. Community initiatives, when effectively mobilized, can contribute to sustainable city development through recycling, waste minimization, and conservation of natural and physical capital.¹⁰¹

101. Hardoy, J., et al, "Environmental problems in the Third World cities" Earthscan, Earthscan Publications, London, 1992.

D. ECA's Role In Improving Management of the Urban

Environment in the Member States

Forward thinking about the long-term future of African cities requires devising *new policy initiatives* which may be different from those being implemented at present. Therefore, long-term planning is crucial for the success of ECA's policy on urban environment. To cite a few examples, growing scarcity of fresh water sources, spreading of urban slums, increasing shortage of food supplies, and rising pollution should alert decision-makers in Africa to the prospect of a difficult time ahead. This should be conducive to action at all levels to control environmental degradation and to reduce threats to human health and well-being of the people.

Therefore, *ensuring a harmonious transition from the present to the future should be central to ECA's strategy on urban development and environment*. Patterns of using natural resources and land in urban centres, demand reconsideration to meet the challenges of providing a sustainable future for African cities. Drastic changes in lifestyles and consumptive use of resources require adopting new approaches, and modifying societal attitudes to address the future challenges.

As urban environmental management problems are among the most controversial issues considered in development planning and decision-making, creative and innovative solutions should be explored. ECA should, therefore, situate itself at the leading edge of resolving these issues.

To meet future challenges, ECA should promote a new approach for the integration of natural and man-made environments in one interacting urban system. Such approach should be the corner stone for resolving future environmental and resource conflicts in a practical way to foster acceptable social and economic changes in African urban settings.

ECA's action programme on the urban environment should emphasize: (a) *selectivity*, as tackling all urban environmental problems in Africa is beyond ECA's human and financial resources. A focused approach, rather than a broad one can achieve the greatest development impact, (b) *target-oriented* activities for specific interventions with built-in flexibility to permit steering activities toward their intended destinations, and (c) *building on the synergy between people, environment and urban development* to achieve socio-economic development while ensuring sustainability of city development.

There is also a need to recognize the moral concept of sustainability, in order to bridge the inequality gap in providing services to urban dwellers. However, promoting social equality alone cannot achieve sustainability; it could, however, enhance efforts to alleviate pressures on environmental amenities.

E. Urban Environmental Management in Africa: An Agenda for Action

If present urbanization trends persist in the future, African cities will continue to become more populated, more polluted and more vulnerable to ecological disruption. 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. The following agenda highlights actions to conserve the quality of the urban environment and ensure sustainable development of African cities in the twenty-first century:

1. Urban development

- Suitable city 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 local economic potentials; establishing new centres to absorb rural people through the judicious location of new industries, and the development of services in a more decentralized pattern.
- In spite of dissimilarities in the level of economic growth, social structure, political organization and technological development among African countries, it seems that exchange of experience on urban management offers a unique possibility for formulating sound plans and implementing operational policy.
- Guidelines for management of urban environmental programmes should be developed in a cross-sectoral and cross-media manner to enable integration of sectoral interventions and links to urban development activities in major African cities.
- Policy interventions which rely less on regulatory instruments and more on economic incentives that influence public behaviour and encourage community initiatives should be developed.

2. Urbanization and public health

- Illness related to lifestyle in urban communities and links between environment and mental health should receive more attention.
- Effective programmes for primary health care in urban centres should be developed.
- Research and development on improved environmental quality and actions to combat environmentally induced diseases should be supported.
- Threshold values and acceptable daily intakes of potentially harmful substances should be established based on regional epidemiological studies in view of prevailing malnutrition, the spread of parasitic infections, and exposure to unhygienic environments among the urban poor.
- Health information systems and data on mortality and morbidity associated with environmental pollution should be developed. Such data are essential for carrying

out retrospective analyses of cause-effect relationships and for devising appropriate remedial measures.

- The assessment of health impacts, particularly risk assessment, should be incorporated along with environmental impacts into feasibility studies of major development programmes.

3. Management of environmental services

- An independent environmental management set-up must be created in major urban centres. Such an institution should have a clear perspective on priority environmental problems, and should be flexible and responsive in assigning priorities, researching remedies and devising appropriate environmental enhancement measures.
- Management should rely on environmental impact assessments, cost-benefit analyses and human perception studies, and should devise and enforce appropriate environmental regulations.
- Cheaper, cost-effective programmes adapted to the needs of the local community must be developed and implemented with maximum dependence on indigenous resources.
- External environmental costs should be internalized whenever feasible. Available options include restructuring pricing policies to reduce environmental stresses and wastage of resources, promoting environmentally sound practices through rewards (and penalties for undesirable activities) and imposing pollutant-effluent charges to encourage reduction of emissions.
- Strengthening institutional capabilities of local authorities in areas related to management, operation of services, municipal finance and city planning.
- Developing measures to monitor performance and delivery of environmental services, particularly municipal water supply, sanitation, refuse collection and public transportation.
- Setting appropriate measures to encourage private investments and competitive concessions in environmental infrastructure and management of services to improve accountability and minimize the role of local municipalities in management of these specialized services.
- Mobilizing community participation to establish partnerships for identifying, financing, and implementing environmental services' projects which meet the priority needs of the benefiting constituencies.

4. Housing

- As African countries face the challenge of providing adequate shelter for everyone, a greater use of traditional materials and the incorporation of new techniques in building methods should be advocated. The excessive use of cement, steel, and other scarce materials in luxury construction should be discouraged.

- Local housing boards should explore the potential for "core house constructions" in low-income areas where basic facilities and inexpensive materials are provided through construction agencies and future expansions are left to the occupants. Using appropriate building technology with self-help content and locally available materials fits well with the aspirations of the people.
- Land policy should aim at mobilizing the necessary financial resources for development; controlling land speculation; and increasing the area of usable land by utilizing sanitary landfills in the proximity of human settlements and reclaiming seashores to cater for multi-story construction for public housing.
- Construction of multi-story blocks in downtown areas as well as near work places should be intensified through cooperative organization.

5. Water supply, sanitation and liquid pollution

- The growing demands of the urban population coupled with scarcity of water supplies require increased reliance on water recycling in industry, improved metering and reduction of network losses.
- Sewerage master plans should be prepared to relate sewage management to land use, water consumption, transportation and industrial growth.
- Local governments and central planning agencies should promote the solution of sewerage problems on a city-wide basis rather than a local, piecemeal basis and should provide the needed financial and technical support to accomplish this task.
- Enactment of legislation to control pollution and development of appropriate emission standards should be appropriate for local socio-economic and technical conditions.

6. Industrial development and pollution

- The negative consequences of industrialization should be abated through setting suitable emission standards, installing pollution control equipment, implementing in-plant controls and effective monitoring of pollution sources.
- A concerted effort towards recovering the secondary materials would not only alleviate waste problems but could also provide a substantial source of raw materials. New impetus should be given to exploring the potential of recovering and recycling secondary products.
- Governments should promote cleaner production in industry, use of low or no-waste technologies, and water recycling.
- Development of an information network for industry and environment in Africa is needed, as is the establishment of guidelines on appropriate cleaner technologies.

7. Air pollution and the micro-climate of urban settlements

- Preventive and remedial measures should be implemented through controlling of existing sources of air pollution and physical planning of present and future areas,
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taking into consideration the quantity and location of sources and the means of disposal of high-load emissions.

- To reduce environmental impacts of traffic emissions, planning for public transport and land use should be geared to improve the efficiency of mass-transit systems and thus decrease use of private automobiles.
- Congested centres of population should be relieved by providing by-pass routes to divert unnecessary traffic and concentrate emissions in selected corridors separated from population centres.
- Research and monitoring of urban air pollution should be strengthened to enable assessment of sources, loads, and dispersion patterns into the atmosphere.

8. Management of solid wastes

- Master plans for urban planning should reserve sufficient areas for long-range refuse disposal needs.
- Future efforts should concentrate on programmes for material recovery and on-site disposal of refuse.
- Governments should promote recycling of solid waste by offering incentives for industries to use by-products and eliminating inequities between costs of transporting scrap and virgin materials.

9. Transport, tourism and recreation

- Actions are needed to limit noisy and polluting vehicles, and improve traffic systems and extension of services to suburban areas. Regulatory instruments should be devised where appropriate to carry out these tasks.
- Guidelines should be developed to reduce damage from tourism on fragile environments and on urban communities.
- Recreation should be regarded as an important aspect of metropolitan planning; local government should support private and public endeavors to provide recreational facilities in urban centres.
- Legislation should be enacted to provide a means of acquiring and preserving land and other natural resources for recreational use.
- Public awareness of the social, cultural and health values of recreation should be enhanced.

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APPENDIX 1

PROPOSAL FOR ESTABLISHING AN ENVIRONMENTAL MANAGEMENT UNIT IN MAJOR AFRICAN CITIES

1. Introduction

The management of environmental services in African cities is one of the most challenging issues confronting local government officials. The expertise needed is often spread among various functional departments and central ministries (e.g., the environmental protection agencies, and the ministries of public health, public works, water resources, and industry, to name a few), which weakens their ability to monitor local conditions, enforce regulations, and effectively plan and implement environmental improvement projects.

It is essential, therefore, to create a single, permanent, local entity to undertake tasks related to strengthening urban environmental management. The establishment of the environmental management unit (EMU) will require: (1) development of a mission statement that describes the purpose and role of EMU, (2) a clear definition of the relationship of EMU with other local and central agencies involved in environmental affairs; and (3) the formulation of a work plan to move the EMU from the conceptualization to the implementation stage.

2. Justification

The EMU will undertake activities to strengthen coordination and linkages among governmental units, relevant NGOs, business concerns, industry, academic institutions, and cultural and religious bodies within the city jurisdiction. The purpose of these efforts, is to involve all concerned entities in environmental matters and to mobilize the resources at their disposal to enhance the likelihood of success of pollution prevention and natural resources conservation programmes. Other efforts on the EMU advocacy and social agenda may include:

- advising local and Governorate public utilities on ways to expand their services and ensuring equity of service delivery, particularly in low-income areas;
- developing action programmes aimed at preserving the integrity of historical buildings and other aspects of the cultural heritage in the region;
- introducing balanced approaches to further the economic development and viability of the surrounding communities;
- integrating traditional knowledge and experience in activities related to development and environment;
- developing approaches to motivate public participation in urban sanitation and beautification campaigns; and,
- enhancing the capacity of local government units in conflict resolution among potentially conflicting communal, business and governmental environmental objectives.

3. Rationale

Experience has shown that when responsibility for planning, implementing, and managing environmental affairs at the local level falls under several jurisdictions, bureaucratic priorities and rivalries emerge as the organizational units in question have different missions, and are accountable to different hierarchies or audiences.

Most importantly, however, the inter-relationships of various environmental problems and the need for swift action on the part of environmental regulators and planners necessitate close working relationships among groups with different sets of expertise. The centralization of various environmental functions will also facilitate communication with local government units, industries, and the community at large. These constituencies will find it much easier to deal with a single entity whether the subject matter has to do with water, solid waste or air quality, effect on environmental health, or aspects of land use. To enhance performance and accountability, it is necessary to establish the EMU as an *autonomous* unit, reporting directly to the mayor or the city manager.

The EMU may be staffed with specialists from existing local departments and, possibly, or central government agencies. It may include experts from the departments of public health, public works, sanitation, as well as staff from the Governorate and from the local offices of such functional ministries as public health, irrigation, public works, industry, and agriculture, as well as the ministries of education and finance. Similarly, equipment and other resources could be loaned from local and central governmental agencies, or acquired through district funds and/or grants from the government and international development organizations.

4. Strengthening Local Environmental Programmes

The EMU will play a supporting role in enabling local governmental agencies to implement existing municipal rules and regulations pertaining to environmental management, including:

- instituting local guidelines for environmental impact assessment;
 - establishing environmental information databases to provide scientific, technical, situational and other information on environmental quality to facilitate policy decisions, planning activities, research and programme evaluation;
 - developing plans for better methods for managing municipal solid wastes and water and sewerage services;
 - monitoring air and water quality and adopting actions to control industrial emissions, effluent discharges, and hazardous wastes;
 - assessing urban development plans (including low-cost housing schemes) and proposed commercial and industrial projects;
 - devising regulatory measures to reduce damage from tourism on the fragile marine environment;
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- evaluating environmental impacts of transportation (e.g., rail and road systems); and;
- proposing measures to control population density.

5. Strengthening Coordination Among Local Environmental Bodies

The EMU should serve as a repository of existing environmental regulations, whether they pertain to municipal or industrial discharges into water canals, air and water quality, or urban planning and infrastructure development. The unit should be able to draw on the expertise of Governorate and central government specialists, who should be not only consulted on a regular basis, but brought periodically as experts to help solve problems beyond the capability of the staff of EMU.

Furthermore, local environmental plans and efforts to rehabilitate or expand existing infrastructure and services must be in congruence with regional and national plans. For instance, the decision to expand or rehabilitate potable water treatment or conveyance systems, although definitely a local prerogative, should fit into the pre-established designs of the city water authority. In summary, the standards followed by the EMU must comply with national standards and should consider the latter as a minimum when proposing to deviate from them.

6. Organization and Functions of the EMU

In view of the broad mission of the proposed EMU, it is suggested to organize the entity as a regulatory commission, directed by a manager who reports directly to the mayor. The EMU may consist of three branches, namely, a Planning and Policy Branch, a Public Services Branch, and a Monitoring and Enforcement Branch.

6.1. Planning and Policy Branch

This branch would have primary responsibility for land use and zoning, coordination of infrastructure plans, issuance of environmental and construction permits, and development and updates of the integrated environmental management plan. In addition, the branch would have the task of formulating special plans, when warranted, for location-specific environmental problems, in view of the difference in land use patterns, industrial development, and level of urbanization among the various settlements in the city.

The branch should also conduct public hearings in conjunction with industrial and urban development plans, as well as managing environmental awareness campaigns, as the active involvement of the public through dialogue on community environmental goals and aspirations is essential to the success of the EMU plans. Similarly, other means of mass communication and information dissemination, and the collection of feedback through public meetings, which will

enhance public participation and commitment, should be part of the branch's mission. This consensus building effort, which should include NGOs and industry representatives, will strengthen the process of planning and will improve its chances of success.

The Branch will also be responsible for

- developing and implementing the environmental impact assessment process. This includes: (1) review of various industrial and urban development plans in the region to determine their contribution to environmental degradation; (2) assessment of the proposed pollution abatement and mitigation plans in relation to local environmental protection goals; and (3) making necessary recommendations to the concerned parties in that regard;
 - formulating special guidelines to facilitate the implementation of a city-wide environmental management plan (EMP). These will cover regulations for urban growth and zoning, new processes for processing health and construction permits, sub-division and building codes, and other environmental, administrative processes;
 - designing the necessary (positive and negative) incentive systems to ensure the compliance of the local government units, and industrial and agricultural concerns with environmental directives, in general, and the EMP guidelines, in particular. These systems will include such instruments as special user fees and charges to discourage polluting activities and consumption of natural resources, as well as fines for violations of local ordinances and national laws. Effluent charges imposed on polluting industries should aim primarily at encouraging industries to switch to clean technologies and to use improved waste recovery processes. While the fees collected should be programmed by the branch for city-wide environmental rehabilitation activities, the environmental law enforcement function, would be vested in the Monitoring and Enforcement Branch (see below);
 - reviewing plans for treatment facilities and effluent discharges. Prior to new construction or expansion of existing facilities, local industries will have to submit detailed information on: (1) the processes and raw materials used (especially hazardous and priority pollutants); (2) water balance with schematics for points of use; (3) recycling and discharges; (4) characteristics and loads of pollutants generated in the raw effluent; (5) proposed wastewater treatment facilities and anticipated loads of pollutant discharges with treated wastes; and (6) layout of the plant and the waste treatment facility;
 - reviewing plans for emission controls and gaseous discharges. Prior to new constructions or modifications, industries should submit a report covering: emission sources; characteristics and loads of fugitive emissions; location of stacks at point sources, type of control equipment; efficiency at full and normal loads; and in-house monitoring programmes;
 - approving or rejecting proposed effluent discharge plans and issuing of provisional and permanent clearance certificates. (The receipt of the clearance certificate would not, however, absolve industrial concerns of their
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responsibility to complete permitting procedures required by other government agencies); and

- issuing of effluent discharge permits, which clearly highlight the effluent sources approved for discharge, pollutant parameters and their analysis frequency, applicable discharge standards, methods of reporting spills, periodic reporting requirements to the Monitoring and Enforcement Branch, and the expiration date of the permit.

6.2. The Public Services Branch

This branch of the EMU should be entrusted with coordination of environmental infrastructure and services. The management of water, sanitation and irrigation infrastructure will not be a prerogative of this branch. Rather, its main responsibility is to ensure cooperation and proper functioning of existing infrastructure, while operation and maintenance will remain under current management. The terms of reference of this branch would also include:

- performing regular water quality tests;
- maintaining public recreation grounds (e.g., parks and beaches);
- facilitating the private sector role in the collection of, and trade in, recyclable materials;
- developing terms of reference for the performance of environmental activities that do not fall under the jurisdiction of agencies entrusted with such tasks;
- advising local government units on the siting and technologies for water and wastewater treatment as well as on other issues related to wastewater and solid waste disposal; and,
- coordinating the development and implementation of a programme for off-site hazardous waste treatment, and supervising operation of centralized reprocessing facilities.

6.3. Monitoring and Enforcement Branch

The branch would be assigned the tasks of discouraging polluting practices by enforcing environmental laws, and on charging and collecting fees from polluters, and special fines from violators. While the fees should be commensurate with the potential cleanup and disposal costs, the fines should be punitive. Both fees and fines should aim at encouraging the reduction of excess waste generation, and at prompting industries to switch to cleaner processes and technologies.

Other responsibilities of the Branch include:

- monitoring effluent discharges and inspecting industrial sites;

- monitoring ambient air quality through data collected from the fixed stations network to establish an air pollution index (API), predict long-term trends, and correlate ambient concentrations with local meteorological data;
- mobile air quality monitoring to verify high impact areas and measure emissions from specific plants identified by public complaints and not detected by the stationary network;
- review reports submitted by industrial polluters and assess the nature and concentration of their gaseous pollutants, and their proposed plans for abating air emissions;
- enforcing regulations for management of solid wastes and codes of practices for collection and transportation activities undertaken by private contractors;
- inspecting industrial facilities and verifying methods used in disposing of wastes, residues, and construction and demolition debris, and ascertaining that no liquid or solid wastes are inadequately stored or disposed of with domestic refuse;
- working closely with local public health laboratories to monitor hazardous residues generated from industrial plants. The branch would review reports issued by generators on: chemical composition and characteristics of residues (ignitability, corrosivity, toxicity, radioactivity, mutagenicity or infectiousness); quantities generated; storage sites (climatic information, topographic, soil and hydrological characteristics, including anticipated impacts on water resources); and storage procedures (dikes, transfer areas, surface impoundments and tanks);
- assessing contingency plans prepared by local plant operators for emergencies and major spills. This will include review of procedures to be followed in the event of accidental releases of hazardous materials; equipment and material used in case of accidents; staff training and preparedness; and emergency notification systems;
- coordinating with the concerned local entities on hazardous waste management issues, and supervising and documenting hazardous waste disposal systems followed by local industries. The EMU may institute a manifest system to track the handling, transportation and disposal of hazardous waste. The manifest may contain the name of the generator, and a description of the wastes, quantities, and their hazardous properties. It may also detail the handling precautions and the designated disposal facility; and
- coordinating with the local health department in matters related to occupational health and exposure. A specialized unit usually provides on-site medical services for workers in major industrial plants in case of injuries and regularly monitors working conditions and potential hazards to occupational health. The branch will complement these activities by providing assistance in evaluating the sources of hazards, measuring of exposure levels, and setting controls to reduce exposure.

7. Provision of Technical Assistance to Local Government Agencies

Technical assistance to be provided through the EMU encompasses community and occupational health, water and air quality management, industrial and agriculture processes, and land use and management.

a. Occupational Health

- assessment of industrial hygiene risks;
- biological monitoring of workers exposed to chemical hazards;
- in-house training on work safety; and
- developing contingency plans for industrial emergencies.

b. Community Health

- evaluation of the quality of primary health care and the impact of primary environmental care initiatives in the region;
- implementation of affordable approaches for the provision of essential health services, including pertinent elements of traditional practices;
- education of women and children in internal and neighborhood hygiene and appropriate nutritional practices;
- identification of environmental factors implicated in the prevailing communicable diseases in the city; and,
- development of health information systems to associate data on morbidity and mortality with environmental pollution (such a system will permit the performance of retrospective analyses of cause-effect relationships and devise appropriate remedial measures).

c. Air Quality Management

- controlling existing sources of air pollution, identification of quantity and location of sources, and providing a means of reducing high-load and hazardous emissions;
- reducing adverse impacts of traffic emissions in the congested areas and coordinating public transport with land use planning; and
- operating a network of stationary and mobile stations for continuous monitoring of air quality in the region.

d. Water Quality Management

- controlling sources of industrial and institutional discharges;
- potable water treatment; and
- wastewater treatment.

e. Land Use Planning

- evaluation of existing land use patterns and proposed urban and industrial development activities;
- zoning and designation of remote industrial sites to ease the burden on the strained environment; and
- development of plans to provide adequate recreational facilities, and rehabilitate parks and beaches.

f. Industrial Environmental Management

- development of an information exchange network on cleaner technology, waste exchanges, appropriate end-of-pipe treatment and methods to conserve process inputs;
- investigation of practical options for recovering and recycling secondary products; and
- assessment of the feasibility of establishing a central waste reprocessing facility to serve industries in the city;

g. Socio-Economic Development

- strengthening linkages among government institutions, NGOs, and cultural, business and religious bodies in the city;
- promoting community involvement, optimizing use of community resources, encouraging participatory public programmes, and ensuring equity of service delivery, particularly in low-income areas;
- promoting cultural integrity and ensuring economic viability of the region;
- integrating socio-economic and public health considerations in the environmental decision-making process and developing clear indicators of need and effectiveness of benefits;

h. Tourism and Recreation

- devising regulatory measures to reduce damage from tourism on the city environment;
- supporting public and private endeavors to provide adequate recreational facilities, and banning illegal constructions in vulnerable areas;
- enhancing public awareness of the social and economic benefits of recreation and tourism.

8. Functions Related to Pollution Control

A scheme for issuing environmental permits by the EMU may comprise:

(I) *Preliminary review*: Prior to construction of new facilities or expansion of existing ones in the city, the applicant will be required to submit a detailed report which would include the following information: description of the process; raw materials used, especially hazardous and priority pollutants; material and energy balance; recycle and discharge options; characteristics and loads of pollutants generated in the raw effluents; descriptions of on-site emission control systems and the anticipated loads of pollutants discharged with the treated waste; layout of the plant and the waste treatment facility; and the anticipated date of operation.

(ii) *Clearance certificate*: Upon review of the report, the EMU may advise the applicant of one of the following decisions: (a) clearance for starting construction; (b) provisional acceptability pending the meeting of additional requirements; or (c) refusal to grant clearance based on the submitted

information. The receipt of the clearance certificate does not absolve the industry of its responsibility to complete procedures required by other government agencies.

(iii) *Discharge permit:* The discharge permit should include a description of pollutant sources approved for discharge, pollutant parameters and their analysis frequency, applicable discharge standards, periodic reporting requirements and the expiration date of the discharge permit.

(iv) *Monitoring violations:* Temporary violations should not be used as a regulatory tool as they provide only circumstantial evidence of pollution;. At the same time, they provide a valuable means of assessing chronic problems of a transitory nature, such as deliberate dumping of prohibited wastes and serve as a cross-check on incidents of major industrial leaks. A chronic violation, on the other hand, has a repetitive pattern. Periodic checks can determine if a violation from a specific source represents a temporary or a chronic event.

Activities of air monitoring may include:

- Monitoring ambient air quality through data collected from the fixed stations network to establish an API, to predict long-term trends and to correlate ambient concentrations with local meteorological data.
- Mobile monitoring, needed for hot spots (high-impact areas) identified through complaints and not covered by the stationary network, to measure the impact of specific industrial plants.
- Stationary polluting sources are required to submit an overall assessment of their gaseous pollutants and their proposed plans for abating air emissions. Actual or estimated API values above criteria set by the EMU or the national environmental agency may provide guidance for acceptance of proposed additional activities in the city.

A plan for monitoring compliance with regulations for collection, transport, reuse or disposal of hazardous residues may be undertaken by the EMU. Implementation of the plan may comprise the following:

- Enforcing regulations for management of solid wastes and codes of practices for collection and transportation activities undertaken by private contractors and the documentation data of the sanitation authorities (collection schedules, vehicles for pickups, vehicle maintenance, amount of trucked refuse, etc.);
- New and existing facilities should submit a statement to the EMU concerning the generated residues which are temporarily contained or disposed of with domestic refuse, and estimates of construction and demolition debris and methods of disposal.
- Generators should be requested to submit information concerning chemical composition and characteristics of the residues, quantities generated; storage location and procedure; industrial operations must formulate and implement contingency plans for emergencies and major spills which specify

a course of action in the event of an accidental release of hazardous materials, and describe equipment and material used to combat releases, and staff training and notification procedures.

As most of the hazardous wastes generated in the African cities are disposed of off-site, the EMU must institute a manifest system to track handling, transporting and disposing of hazardous waste.

The monitoring plan may also include a system for acquisition, reporting and interpretation of noise and occupational exposure data:

- Noise monitoring at emission sources (locations of industrial and construction activities) and receptor areas. Noise should be monitored at appropriate times such as periods of relaxation versus times of high-noise levels during rush-hours.
 - Occupational exposures include a host of sources: physical (noise, vibration, excessive temperatures, ionizing radiation); biological (insects, molds, fungi, bacteria); biochemical (monitoring, repetitive motion, fatigue); and chemical inhalation or skin absorption (mists, vapours, gases, dusts, fumes).
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APPENDIX 2

Table (1): TRENDS IN ECONOMIC GROWTH AND SPENDING ON PUBLIC SERVICES IN AFRICA

COUNTRY	Average annual growth rate (%)							
	GDP		Agriculture		Industry		Services	
	1970-80	1980-93	1970-80	1980-93	1970-80	1980-93	1970-80	1980-93
Mozambique	--	1.0	--	1.4	--	-4.4	--	3.4
Tanzania	3.0	3.6	0.7	4.9	2.6	2.5	9.0	1.6
Ethiopia	--	1.8	--	--	--	--	--	--
Sierra Leone	1.6	1.1	6.0	2.8	-3.2	-1.5	2.3	1.8
Burundi	3.1	3.6	2.2	2.7	10.5	4.4	2.5	4.9
Malawi	5.8	3.0	4.4	2.1	6.3	3.3	7.1	3.5
Chad	0.1	4.8	-0.4	4.0	-2.1	5.0	2.2	5.8
Rwanda	--	1.1	--	-0.2	--	0.6	--	3.5
Madagascar	0.5	0.9	0.4	2.4	0.6	1.0	0.6	0.3
Guinea-Bissau	2.4	4.8	-1.2	6.1	2.1	0.0	11.8	4.9
Kenya	6.4	3.8	4.8	2.6	8.6	3.8	6.8	4.7
Mali	4.7	1.9	4.2	4.2	2.0	2.8	5.9	-0.3
Niger	0.6	-0.6	3.7	--	11.3	--	1.4	--
Burkina Faso	4.4	3.7	1.0	2.8	2.5	3.8	19.7	4.8
Nigeria	4.6	2.7	-0.1	3.6	7.3	0.8	9.6	4.2
Togo	4.0	0.7	1.9	4.9	7.7	0.0	3.6	-2.2
Gambia	4.5	2.4	1.6	0.8	6.7	5.5	6.4	3.0
Zambia	1.4	0.9	2.1	2.5	1.5	1.3	1.2	0.0
Central Africa	2.4	1.0	1.9	2.0	4.1	2.4	2.4	-0.5
Benin	2.2	2.7	1.8	4.9	1.4	1.7	2.8	1.5
Ghana	-0.1	3.5	-0.3	1.3	-1.0	4.2	1.1	6.8
Mauritania	1.3	2.0	-1.0	1.7	0.5	3.6	3.6	1.3
Zimbabwe	1.6	2.7	0.6	1.5	1.1	2.8	2.5	3.0
Lesotho	8.6	5.5	0.2	-0.5	27.8	9.3	13.6	5.0
Egypt	9.5	4.3	2.8	1.3	9.4	1.6	17.5	6.9
Cameroon	8.0	0.0	4.0	-1.1	10.9	-0.3	9.9	1.0
Congo	5.8	2.7	2.5	2.6	10.3	4.3	4.5	1.6
Morocco	5.6	3.7	1.1	4.1	6.5	2.8	2.0	4.1
New Guinea	2.2	3.1	2.8	1.9	--	5.1	--	2.1
Algeria	4.6	2.1	7.5	4.5	3.8	0.8	4.8	2.7
Namibia	--	1.3	--	-0.1	--	-0.5	2.6	3.5
South Africa	3.2	0.9	3.2	1.8	2.7	-0.2	3.7	1.9
Mauritius	6.8	6.0	-3.3	1.9	10.4	8.8	10.9	5.5
Gabon	9.0	1.2	--	1.3	--	2.5	--	0.1

Source: World Development Report, The World Bank (1995).

Table (2): URBAN-RURAL GAP IN AFRICAN COUNTRIES

Country	Rural population (as % of total) 1992	Population with access to services (%)					
		Health		Safe water		Sanitation	
		Rural 1985-93	Urban 1985-93	Rural 1985-93	Urban 1985-93	Rural 1985-93	Urban 1985-93
Botswana	75	85	100	77	100	41	91
Tunisia	44	80	100	99	100	94	98
Algeria	47	80	1	55	85	60	96
Egypt	56	99	100	86	95	26	80
Namibia	66	60	92	35	98	11	24
Gabon	52	--	--	50	90	--	--
Morocco	53	50	100	14	92	38	95
Zimbabwe	70	80	96	80	95	22	95
Congo	44	70	97	2	92	--	--
Cameroon	58	39	44	43	57	64	100
Ghana	65	45	92	35	93	32	64
Kenya	75	40	--	43	74	35	69
Lesotho	79	--	--	45	59	23	14
Madagascar	75	65	65	9	55	3	12
Zambia	58	50	100	28	70	12	75
Togo	70	--	--	53	77	10	56
Nigeria	63	62	85	30	81	30	40
Guinea	61	--	--	--	--	--	--
Zaire	71	17	40	24	68	11	46
Sudan	77	40	90	43	55	65	89
Cote d'Ivoire	58	11	61	81	70	62	59
Tanzania	78	72	99	46	67	62	74
Cent. African	62	--	--	26	19	46	45
Mauritania	50	33	72	65	67	--	34
Senegal	59	--	--	26	84	36	85
Rwanda	94	--	--	62	75	56	77
Malawi	88	--	--	50	97	81	30
Uganda	88	42	99	28	58	52	94
Liberia	56	30	50	22	93	8	--
Chad	79	--	64	25	30	--	--
Guinea-B	79	--	--	35	56	32	27
Angola	70	--	--	20	71	15	25
Somalia	75	15	50	29	50	5	44
Mozambique	70	30	100	17	44	11	61
Guinea	72	70	100	56	50	10	84
Ethiopia	87	--	--	19	91	7	97
Mali	75	--	--	38	53	10	81
Sierra Leone	66	20	90	37	33	49	92
Niger	84	30	99	59	60	4	71

Source: Human Development Report, United Nations Development Programme (1995)

Table (3): URBAN GROWTH IN AFRICA

Country	Urban population (as % of total)			Urban population annual growth rate (%)		Largest city % of urban population 1990	Population Growth rate (%)	
	1960	1992	2000	1960-1992	1992-2000		1970-75	1990-95
Botswana	2	25	33	8.9	3.5	--	--	--
Tunisia	36	56	60	1.4	0.9	39	3.2	3.1
Algeria	30	53	60	1.8	1.4	24	4.2	4.0
South Africa	47	50	53	0.2	0.8	13	3.7	3.1
Egypt	38	44	46	0.5	0.6	35	2.6	2.2
Namibia	15	34	43	2.6	2.8	--	--	--
Gabon	17	48	54	3.2	1.5	--	--	--
Morocco	29	47	51	1.5	1.0	25	3.4	3.1
Zimbabwe	13	30	36	2.7	2.3	30	5.5	4.0
Congo	32	56	63	1.8	1.6	66	2.8	4.8
Cape Verde	16	49	63	3.5	3.1	--	--	--
Swaziland	4	29	36	6.3	3.0	--	--	--
Cameroon	14	42	49	3.6	1.9	22	5.3	5.6
Ghana	23	35	39	1.3	1.7	20	4.9	4.3
Kenya	7	25	32	4.0	2.8	27	4.9	6.3
Lesotho	3	21	27	5.8	3.2	--	--	--
Madagascar	11	25	31	2.7	2.5	--	--	--
Zambia	17	42	45	2.9	0.6	29	6.5	6.1
Togo	10	30	34	3.5	1.6	--	--	--
Nigeria	14	37	43	3.0	2.0	23	9.8	5.7
Guinea	25	39	48	1.3	2.8	--	--	--
Zaire	22	29	31	0.8	1.0	33	4.7	4.0
Sudan	10	23	27	2.6	1.9	35	6.0	4.5
Cote d'Ivoire	19	42	47	2.5	1.4	45	11.0	5.1
Tanzania	5	22	28	5.0	2.9	27	9.8	3.8
Cent. African	23	38	42	1.7	1.0	--	--	--
Mauritania	6	50	59	7.0	2.1	--	--	--
Senegal	32	41	45	0.8	1.2	55	5.0	4.2
Djibouti	49	81	84	1.6	0.5	--	--	--
Rwanda	2	6	7	2.8	1.9	--	--	--
Malawi	4	12	16	3.3	2.9	--	--	--
Uganda	5	12	14	2.7	2.4	38	3.2	4.7
Liberia	19	44	48	2.7	1.3	--	--	--
Gambia	13	24	29	2.1	2.4	--	--	--
Chad	7	21	23	3.6	1.1	--	--	--
Guinea-Bissau	14	21	25	1.3	2.4	--	--	--
Angola	10	30	36	3.4	2.3	63	7.5	5.9
Burundi	2	7	9	3.8	3.5	--	--	--
Somalia	17	25	28	1.2	1.4	37	7.0	4.6
Mozambique	4	30	41	6.8	---	41	7.2	7.1
Guinea	10	28	34	3.3	2.5	76	8.0	5.8
Ethiopia	6	13	15	2.2	1.9	31	4.8	4.0
Mali	11	25	30	2.6	2.4	--	--	--
Sierra Leone	13	34	40	3.0	2.1	--	--	--
Niger	6	16	19	3.3	2.3	--	--	--

Source: Human Development Report, United Nations Development Programme (1995)

TABLE (4): TRENDS IN IMPROVEMENT OF HEALTH AND WELFARE IN AFRICA

Country	Life expectancy at birth (years)		Infant mortality per 1,000		Population with access to safe water (%)		Adult literacy rate (%)		Real GDP per capita (PPPS)	
	1960	1992	1960	1992	1975-80	1988-93	1970	1992	1960	1992
Botswana	45.5	64.9	116	43	--	--	41	67	--	--
Tunisia	48.4	67.8	159	43	35	99	31	63	1.394	5.160
Algeria	47.0	67.1	168	55	77	68	25	57	1.676	7.870
South Africa	49.0	62.9	89	53	--	--	--	--	2.984	3.799
Egypt	46.2	63.6	179	67	75	90	35	49	557	3.540
Namibia	42.5	58.8	146	60	--	--	--	--	--	--
Gabon	40.8	53.5	171	94	--	--	33	59	1.373	3.913
Morocco	46.7	63.3	163	68	--	--	22	41	854	3.370
Zimbabwe	45.3	53.7	110	67	--	--	55	83	937	1.970
Congo	41.7	51.3	143	84	38	38	35	71	1.092	2.870
Cape Verde	52.0	64.7	110	50	--	--	--	--	--	--
Swaziland	40.2	57.5	157	75	--	--	--	--	1.182	1.700
Cameroon	39.3	56.0	163	63	--	--	33	60	736	2.390
Ghana	45.0	56.0	132	81	35	52	31	61	1.049	2.110
Kenya	44.7	55.7	124	69	17	49	32	74	635	1.400
Lesotho	42.9	60.5	149	79	17	47	--	--	346	1.060
Madagascar	40.7	56.5	220	93	--	--	--	--	1.013	710
Zambia	41.6	48.9	135	104	42	53	52	75	1.172	1.230
Togo	39.3	55.0	182	85	16	60	17	48	411	1.220
Nigeria	39.5	50.4	190	84	--	--	25	53	1.133	1.560
Guinea	36.8	48.0	188	117	--	--	--	--	--	--
Zaire	41.3	52.0	158	93	19	39	42	74	379	523
Sudan	38.7	53.0	170	78	--	--	17	43	975	1.620
Cote d'Ivoire	39.2	51.0	166	92	--	--	18	37	1.021	1.710
Tanzania	40.5	52.1	147	85	39	50	--	--	272	620
Cent. African	38.5	49.4	175	102	--	--	16	54	806	1.130
Mauritania	35.3	51.5	191	101	--	--	--	--	930	1.650
Senegal	37.3	49.3	172	68	36	48	12	31	1.136	1.750
Djibouti	36.0	48.3	186	115	--	--	--	--	--	--
Rwanda	42.3	47.3	150	110	68	66	32	57	538	710
Malawi	37.8	45.6	207	143	51	56 ^a	--	--	423	820
Uganda	43.0	44.9	133	115	35	31	41	59	371	860
Liberia	41.3	55.4	184	126	--	--	18	35	967	1.045
Gambia	32.3	45.0	213	132	--	--	--	--	411	1.260
Chad	34.8	47.5	195	122	--	--	11	45	785	760
Guinea-B	34.0	43.5	201	140	10	41	--	--	--	--
Angola	33.0	46.5	208	124	17	41	--	--	880	751
Burundi	41.3	50.2	153	102	29	57	20	33	473	720
Somalia	36.0	47.0	175	122	38	37	--	--	891	1.001
Mozambique	37.3	46.4	190	148	--	--	22	37	1.368	380
Guinea	33.6	44.5	203	134	14	55	14	33	444	592
Ethiopia	36.0	47.5	175	119	8	25	--	--	262	330
Mali	34.8	46.0	210	159	--	--	8	27	541	550
Sierra Leone	31.5	39.0	219	166	14	37	13	29	871	880
Niger	35.3	64.5	192	124	--	--	4	12	604	820

Source: Human Development Report, United Nations Development Programme (1995)

TABLE (5): HUMAN DEPRIVATION IN AFRICA

Human Development Rank	Population with access to			Daily calorie supply per capita 1992	GNP per capita (US\$) 1992	Refugees by country of asylum (thousands) 1992
	Health (%) 1985-93	Safe water (%) 1988-93	Sanitation (%) 1988-93			
Botswana 74	89	89	55	2.288	2.450	1
Tunisia 75	90	99	96	3.333	1.760	0
Algeria 85	88	68	79	2.897	1.850	219
South Africa 95	--	--	--	2.705	1.350	0
Egypt 107	99	90	50	3.336	650	6
Namibia 108	72	52	14	20120	1.670	0
Gabon 114	90	68	--	2.511	4.220	0
Morocco 117	70	54	65	2.985	1.050	0
Zimbabwe 121	85	84	40	1.989	580	137
Congo 122	83	38	--	2.297	1.110	10
Cape Verde 123	--	--	--	--	840	0
Swaziland 124	--	--	--	2.706	1.080	56
Cameroon 127	41	50	74	1.981	830	42
Ghana 129	60	52	42	2.206	460	12
Kenya 130	77	49	43	2.075	330	402
Lesotho 131	80	47	22	2.201	610	0
Madagascar 135	65	23	3	2.135	230	--
Zambia 136	75	53	37	1.931	370	142
Togo 140	61	60	23	2.243	400	3
Nigeria 141	66	36	35	2.125	330	5
Zaire 143	26	39	23	2.060	--	391
Sudan 144	51	48	75	2.202	--	726
Cote d'Ivoire 145	30	76	60	2.491	680	174
Tanzania, 147	76	50	64	2.021	100	292
Central Africa 149	45	84	31	2.019	220	19
Mauritania 150	45	66	--	2.685	540	38
Senegal 152	40	48	55	2.265	780	72
Rwanda 156	80	66	58	1.821	250	25
Malawi 157	80	56	60	1.827	230	1.059
Uganda 158	49	31	57	2.162	180	196
Liberia 159	39	50	--	1.640	--	100
Gambia 161	--	--	--	2.360	370	4
Chad 162	30	--	--	1.989	220	--
Guinea-B 163	40	41	31	2.556	220	12
Angola 164	30	41	19	1.840	--	11
Burundi 165	80	57	49	1.941	210	272
Somalia 166	27	37	18	1.505	--	1
Mozambique 167	39	22	20	1.680	70	0
Guinea 168	80	55	21	2.390	490	479
Ethiopia 171	46	25	19	1.610	110	432
Mali 172	--	41	24	2.279	310	13
Sierra Leone 173	38	37	58	1.695	160	6
Niger 174	32	59	14	2.257	290	4

Source: Human Development Report, United Nations Development Programme (1995)

Table (6): WEALTH, POVERTY, AND SOCIAL INVESTMENT IN AFRICA

Country	Income share		People in poverty (%)		Public expenditure on	
	Lowest 40% of household 1981-92	Ratio of highest 20% to lowest 20% 81-92	Urban 1990	Rural 1990	Education (as % of GNP) 1992	Health (as % of GDP) 1990
Botswana	10.5	16.4	30	64	8.4	--
Tunisia	16.3	7.8	16	31	6.1	3.1
Algeria	17.9	6.7	--	25	9.1	5.4
South Africa	--	--	--	--	--	3.2
Egypt	--	--	34	34	6.7	1.0
Namibia	--	--	--	--	4.7	--
Gabon	--	--	--	--	5.7	--
Morocco	17.1	7.0	28	32	5.5	0.9
Zimbabwe	10.3	15.6	--	--	10.6	3.2
Congo	--	--	--	--	5.6	--
Cape Verde	--	--	--	--	4.1	--
Swaziland	--	--	--	--	6.4	--
Cameroon	--	--	--	--	3.4	1.0
Ghana	18.3	6.3	59	54	3.3	1.7
Kenya	10.1	18.2	--	--	6.8	2.7
Lesotho	9.3	20.7	--	--	3.8	--
Madagascar	--	--	21	37	--	1.3
Zambia	15.2	8.9	--	--	2.9	2.2
Togo	--	--	--	--	5.7	2.5
Guinea	--	--	--	--	1.7	--
Zaire	--	--	--	--	0.9	0.8
Sudan	--	--	--	--	--	0.5
Cote d'Ivoire	19.2	5.8	--	--	--	1.7
Tanzania	8.1	26.1	--	--	5.8	3.2
Cent. African	--	--	--	--	2.8	2.6
Mauritania	14.2	13.2	--	--	4.7	--
Senegal	10.5	16.7	--	--	3.7	2.3
Djibouti	--	--	--	--	3.3	--
Rwanda	22.8	4.0	--	--	4.2	1.9
Malawi	--	--	--	--	3.4	2.9
Uganda	20.6	4.9	25	33	2.9	1.6
Gambia	--	--	--	--	3.8	--
Chad	--	--	--	--	2.3	4.7
Guinea-B	8.6	28.0	--	--	2.8	--
Somalia	--	--	--	--	--	0.9
Mozambique	--	--	40	70	6.3	4.4
Ethiopia	21.3	4.8	--	--	4.8	2.3
Mali	--	--	--	--	3.2	2.8
Sierra Leone	--	--	--	--	1.4	1.7

Source: Human Development Report, United Nations Development Programme (1995).

- No. 67 (Jan-June 1995)
- The Abidjan Workshop on the Dakar/Ngor Declaration and the Cairo Programme of Action
 - The Bamako Seminar/Workshop on population policies and programmes
 - Cairo Conference: Follow-up
 - Legislation on abortion in Africa
 - Female genital mutilation in Kenya and Sudan
 - Survey on the status of women and reproductive behaviour in South-East Togo
- No. 68 (July-Dec. 1995)
- Recommendations of the Abidjan Workshop
 - The quantitative goals of the Dakar/Ngor Declaration and the Cairo Programme of Action
 - The Fourth World Conference on Women
 - Rural-urban migration in Morocco
 - Economic activity, family environment and children's education in Ougadougou
 - Demographic research in Africa.
- No. 69 (Jan-June 1996)
- Population activities Jan.-June 1996
 - The second UN conference on human settlements
 - Announcements/News
 - Up coming events/Highlights
 - List of Publications of the Population Division, 1990-1995

REPORTS OF MEETINGS

EXPERTS AND NGOS WORKSHOP ON THE IMPLEMENTATION OF THE DAKAR/NGOR DECLARATION AND THE ICPD PROGRAMME OF ACTION, ABIDJAN (CÔTE D'IVOIRE), 6-9 JUNE 1995/

The Proceedings of the workshop consist in the following three parts:
Part I - Report of the Workshop

- Part II
- Following Activities
 - A Framework for Monitoring and Evaluating the Implementation of a National Population Programme;
 - National Experiences with Monitoring and Evaluation.
- Part III
- Background Papers
 - Implementation of the Kilimanjaro Programme of Action: A regional Analysis;
 - The Feasibility of Implementing the Dakar/Ngor Declaration and the ICPD Programme of Action;
 - Country Experiences with the Implementation of the Dakar/Ngor Declaration and the ICPD Programme of Action;
 - ADB's Experience on Population Projects and Programmes; Some Case Studies;
 - NGOs: Partners in the Implementation of the Dakar/Ngor Declaration and the ICPD Programme of Action;
 - The Role of the African Population Commission in the Implementation of the DND and ICPD-PA.