DEVELOPMENT OF AN ENVIRONMENTAL HEALTH PROFILE: KUISEBMOND, WALVIS BAY, NAMIBIA (JUNE, 1996)

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A dissertation submitted in partial fulfilment for the degree of Master of Philosophy in Environmental Science

June 1996

ABSTRACT

A four-step methodology was used as a research structure to investigate environmental health in Kuisebmond, a traditional black township in Walvis Bay. On completion of the Urban Environmental Profile (UEP) for Walvis Bay, to address issues in the exosystem, it was found that infrastructure services provided to Kuisebmond are of a high quality. An acceptable quality and quantity of water, electricity, sewage systems and waste removal services are supplied to residents by the Walvis Bay Municipality. The road and communication infrastructure is also acceptable and schools, health care facilities and recreational areas are available. These services appear satisfactory, however a few problems were identified:

- Infrastructure that was previously considered adequate in Walvis Bay has to be improved to cater for the expected population growth and to cope with current demand;
- Kuisebmond has a very high residential density, resulting in crowding and the increase of informal settlements. Social problems include poverty, unemployment, tuberculosis, AIDS, crime and alcoholism;
- Environmental hazards such as water and odour pollution are not adequately addressed and waste and litter creates breeding sites for vectors of disease.

To address factors in the micro- and mesosystems, an Environmental Health Survey for Poor Communities (EHSPC) was developed and applied to Kuisebmond. On completion of the EHSPC it was found that data was lacking with regard to: family health and hygiene behaviour (of major importance as the highest quality of services provided can be contaminated through unhygienic practices and behaviour); food safety and security; the level of health education; mental health, and occupational health and safety practices, especially in informal trading areas and multipurpose homes. Information regarding residential satisfaction, how people feel about their dwellings, available services, public facilities and their neighbourhood was not available. These factors, relating to quality of life (in accordance with the WHO definition where health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease) are often overlooked in poor communities.

An increased level of environmental health enjoyed by poor communities can contribute to the world strategy "Health for All by the Year 2000". To achieve this objective environmental health has to include more than just infrastructure, pollution control and exposure standards. The human component, the factor that determines how the infrastructure is used, has to be included to provide data from a holistic perspective. This dissertation addressed issues concerning environmental health, which are not normally considered, such as house design, family health and hygiene behaviour, family safety, multipurpose homes and quality of life. The unit of evaluation was the human-environment interaction, in accordance with the ecosystemic perspective.

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AIDS	Acquired Immunodeficiency Syndrome
CBD	Central Business District
CHDP	Community Housing Development Programme
EEU	Environmental Evaluation Unit
EHI	Environmental Health Indicator
EHSPC	Environmental Health Survey for Poor Communities
EIA	Environmental Impact Assessment
EPZ	Export Processing Zone
GDP	Gross Domestic Product
ha	hectare
HIS	Health Information System
IEM	Integrated Environmental Management
MAWRD	Ministry of Agriculture, Water and Rural Development
MFMR	Ministry of Fisheries and Marine Resources
MOHSS	Ministry of Health and Social Services
MW	Mega Watts
NAMPORT	Namibian Port Authority
NDP1	National Development Plan 1
NHE	National Housing Enterprise
NPC	National Planning Commission
p/ha	people per hectare
Pers.Comm.	Personal Communication
PHC	Primary Health Care
TB	Tuberculosis
UEP	Urban Environmental Profile
UMP	Urban Management Programme
UNCED	United Nations Conference on the Environment and Development
UNDP	United Nations Development Programme
WBIUP	Walvis Bay Industrial and Development Project
WBM	Walvis Bay Municipality
WBM	Walvis Bay Municipality
WHO	World Health Organisation

LIST OF DEFINITIONS

collective living quarters - structurally separate and independent place of abode intended for habitation by large groups of individuals or several household, for example, hostels, institutions, camps, or compounds(Leitmann, 1994b).

dwelling unit - a separate and independent place or abode occupied by one household, for example, house, flat, apartment, suite of rooms (Leitmann, 1994b).

ecosystem - a system formed by the interaction of all living organisms (plants, animals, bacteria etc.) with each other and with the chemical and physical factors of the environment in which they live, all being linked by the transfer of energy and materials (food chain). The boundary of an ecosystem is difficult to define (the whole world may be considered as an ecosystem), but the term is usually applied to a small system where the net transfer of energy and materials across the boundary is low, e.g. a pond, a forest, a small oceanic island. An ecosystem is never totally self-contained or closed; solar energy received crosses the boundary, as does a foraging animal (Clark, 1990).

ecosystemic perspective - a multi level perspective where the unit of evaluation is the person-environment interaction.

environmental hazard - a risk (usually to human beings) associated with the physical environment. Such a risk may be natural (e.g. flash-flood, landslide, volcanic eruption) or produced by human activity (e.g. pollution). (Clark, 1990).

environmental health - comprises those aspects of human health and disease that are determined by factors in the environment (Fuggle and Rabie, 1992)

exosystem - comprises the urban environment, conceptualised as the CBD, industry and neighbouring residential areas (see Chapter 1.3).

floor area - usable floor area of habitable rooms inside the dwelling, including bathrooms, internal corridors, and closets (Leitmann, 1994b).

hazardous materials - there are four main types of hazardous materials: flammable (those that can easily ignite); corrosive (those that dissolve metals or burn the skin); reactive (materials that dissolve violently with water or other substances); and toxic (substances that are poisonous and may contain high concentrations of heavy metals, pesticides, and other toxic chemicals (Naar, 1990).

hazardous waste - for example, hospital and medical wastes (Leitmann, 1994b).

health - a state of complete physical, mental and social well-being, not merely the absence of disease and infirmity (WHO, 1981).

individual household - inmates of a house collectively (McLeod, 1980). In this dissertation taken to include the interaction between the house or dwelling and the inhabitants, i.e. health and hygiene behaviour of family members.

informal sector - cottage industries, households with workshops, unregistered small factories, etc. (Leitmann, 1994b).

marginal dwelling unit - dwelling without water and sanitation facilities and constructed with inadequate or dangerous building materials, generally considered unfit for human habitation (Leitmann, 1994b).

mesosystem - comprises the interaction of more than one microsystem, conceptualised as the neighbourhood (see Chapter 1.3).

microsystem - conceptualised as an individual household, to include the physical home structure or dwelling, as well as family health and hygiene behaviour (see Chapter 1.3).

pollution - the direct or indirect process by which any part of the environment is affected in such a way that it is made potentially or actually unhealthy, unsafe, impure or hazardous to the welfare of the organisms which live in it, i.e. the results are harmful. The term is sometimes also applied, loosely, to such processes if they give rise to results which are merely objectionable (Clark, 1990).

population below the poverty line - those having less income than that needed to buy the minimum requirement of calories and protein, shelter, clothing and other necessities (Leitmann, 1994b).

room - a separate habitable space inside the dwelling used for living, sleeping, or eating (Leitmann, 1994b).

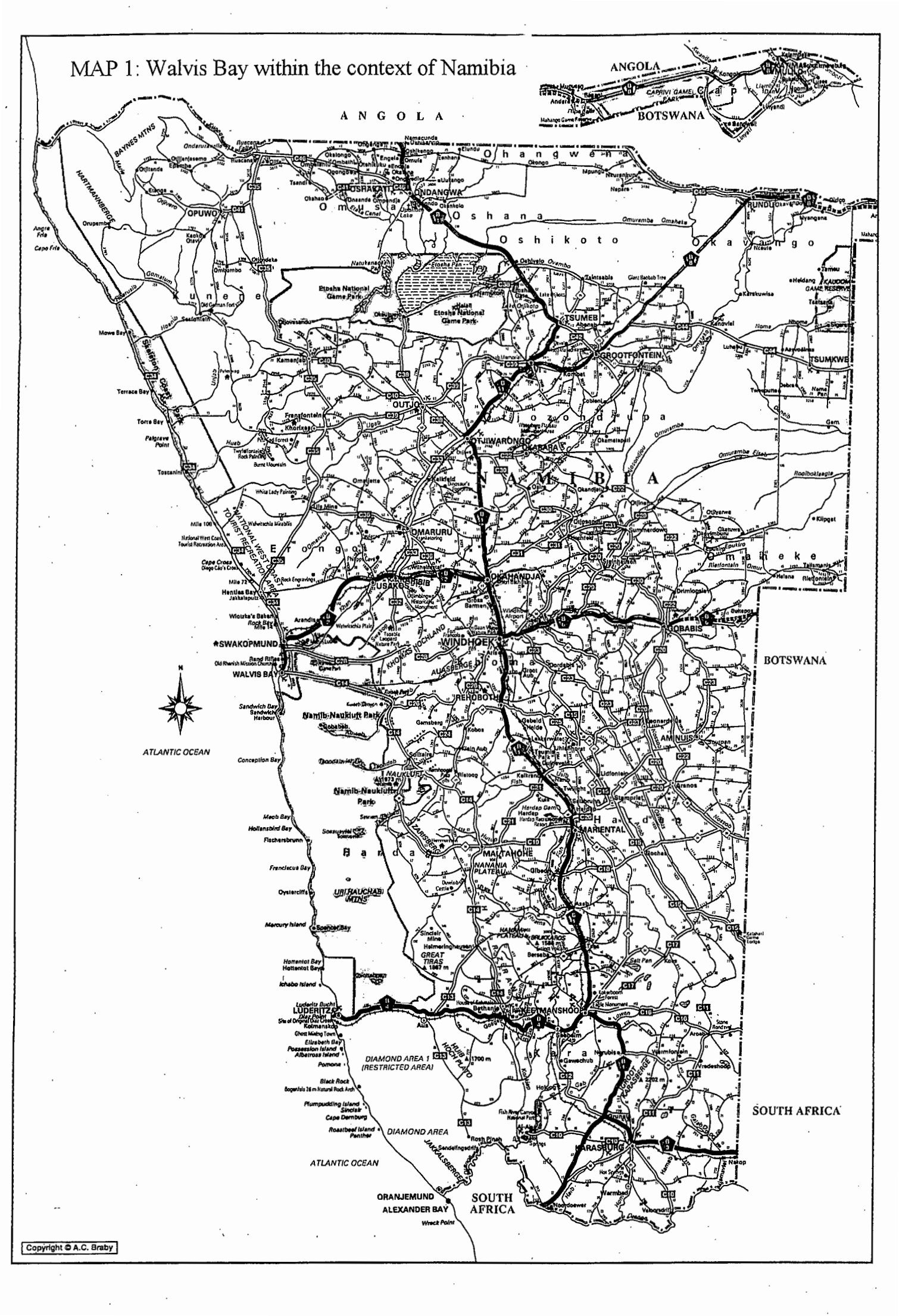
sewage - domestic wastewater collected by a piped system (Leitmann, 1994b).

ACKNOWLEDGEMENTS

A sincere thank you is extended to the following individuals who contributed their valuable time and assisted in this study:

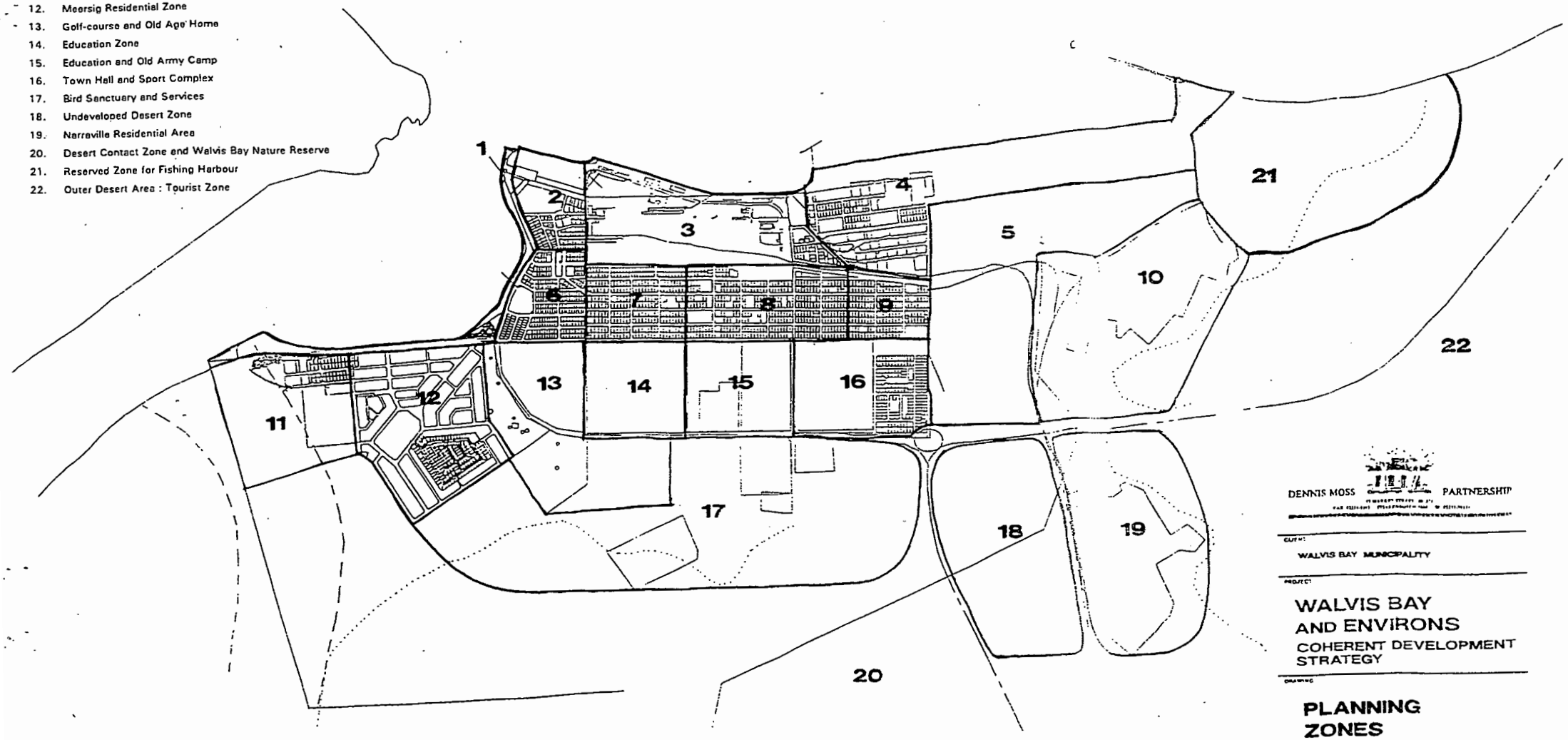
Farieda Khan	Supervisor
Richard Hill	Course Co-ordinator
Kerry Shroyer	My husband
Master Group 1995/6	Baseline Report: CZMP for the Erongo Region, Namibia

MAP 1: Walvis Bay within the context of Namibia



MAP 2: Walvis Bay and Environs
(Source: Dennis Moss, 1994)

2. Caravan Park and Holiday Housing
3. Commercial Harbour
4. Fishing Harbour
5. Industrial Area
6. Holiday Houses
7. Fringe of Central Business District
8. Central Business District (CBD)
9. Mix Use Zone
10. Kuisebmond Residential Area
11. Holiday Chalets and Desert Contact
12. Meersig Residential Zone
13. Golf-course and Old Age Home
14. Education Zone
15. Education and Old Army Camp
16. Town Hall and Sport Complex
17. Bird Sanctuary and Services
18. Undeveloped Desert Zone
19. Narraville Residential Area
20. Desert Contact Zone and Walvis Bay Nature Reserve
21. Reserved Zone for Fishing Harbour
22. Outer Desert Area : Tourist Zone



DENNIS MOSS PARTNERSHIP

CLIENT: WALVIS BAY MUNICIPALITY

PROJECT: WALVIS BAY AND ENVIRONS COHERENT DEVELOPMENT STRATEGY

DRAWING: PLANNING ZONES

PROJECT NUMBER: J 2459

DRAWING NUMBER:

SCALE: 1 : 30000

DATE: Sept. 1993

DRAWN: CHECKED:

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND TO STUDY

The Masters students (1995/96) in Environmental and Geographical Sciences at UCT were commissioned by DANCED to undertake a baseline study of the Erongo Region in Namibia. The Masters students spent one month in Namibia to familiarise themselves with the issues and collect data from personal interviews, observations and relevant literature. The output was a Baseline Report: Coastal Zone Management Plan for the Erongo Region, Namibia which was submitted on 31 March 1996.

Individuals from the Masters team were assigned different areas to investigate. The author focused on social issues, especially health and safety in the harbour and fishing industry, the administration of health related activities and urban environmental health hazards.

1.2 BACKGROUND TO STUDY AREA

Kuisebmond is located in the Greater Walvis Bay area, in the Erongo region in Namibia, therefore environmental health problems experienced in Walvis Bay also impact of the health of residents of Kuisebmond. Environmental health problems in Walvis Bay included air, water and land pollution, inadequate waste management from household and private industries, and the lack of a hazardous waste dump (DANCED, 1995). The main social problems experienced in Walvis Bay are the increase in migration of job-seekers, a fast-growing unemployment rate, housing shortages, increased crime and heightened AIDS and tuberculosis figures (UCT, 1996).

The cumulative effect of these problems appeared to be worse in Kuisebmond Residential Area (Zone 10) of the Walvis Bay Municipal Area (See Map 2), traditionally a primarily black township. This is in accordance with preliminary findings by Leitmann, (1994a), that urban environmental degradation has a disproportionate negative impact on the poor.

1.3 CONCEPTUAL FRAMEWORK

To address the health aspects of pollution and waste, as well as other environmental health problems Bronfrenbrenner's conceptual framework (O'Connor and Lubin, 1984) was used. Bronfrenbrenner identified four components in a system: microsystem, mesosystem, exosystem and macrosystem (see Model 1).

MODEL 1: CONCEPTUAL FRAMEWORK

MACROSYSTEM -
the context for micro-, meso-, and
exosystems (comprises politics,
legislation, economics and policy).

The **microsystem** is composed of the interpersonal relationships, goal-directed molar activities, and system-defined roles and role expectations a person experiences in a given setting, such as the school or family (O'Connor and Lubin, 1984). In this instance the focus of assessment is the health and hygiene behaviour of individuals in their house, dwelling or shack (home setting). The house design and infrastructure services (e.g. water, sanitation, waste removal and energy) are included as the environmental component of the home. Thus, the microsystem is conceptualised as an individual household, to include the physical home or dwelling, as well as family health and hygiene behaviour.

The **mesosystem** comprises the interrelationship between two or more microsystems in which an individual participates, such as the relationship between the school and family, or the family and work (O'Connor and Lubin, 1984). For example, children can be exposed to health hazards at home, which can cause diarrhoea and infect other children at school, or violence in the neighbourhood can affect the health and quality of life of other inhabitants. Thus, the mesosystem is conceptualised as the neighbourhood.

The **exosystem** is composed of settings that do not involve the individuals as active participants, but in which events occur that can affect what happens in the setting containing the individuals, such as the effect of the parents' work setting on the family (O'Connor and Lubin, 1984). For example, odour pollution or water pollution caused by fish factories in Walvis Bay affects environmental health in Kuisebmond. Thus, the exosystem is conceptualised as the urban environment, to include the Central Business District (CBD), industry and neighbouring residential areas.

The **macrosystem** refers to cultural consistencies in the other three systems and in their interrelationships, and to the social values and beliefs that underlie such consistencies (O'Connor and Lubin, 1984). In this instance the macrosystem will be expanded to include politics, economics, policy, and legislation relating to environmental health. For example, issues such as dumping of hazardous waste for economic gain for a few stakeholders can affect inhabitants living some distance away. The macrosystem is conceptualised as national and international policies, economies, legislation and politics.

Environmental health problems are linked to the larger problems of discrimination, poverty and powerlessness (Hammond and Gear, 1986), unhygienic lifestyles, as well as the availability of natural resources and infrastructure. Therefore, to address environmental health issues from a holistic perspective the micro-, meso-, exo-, and macrosystems need to be considered, however the macrosystem falls outside the scope of this study. Individual households in Kuisebmond, the Kuisebmond residential area, as well as the urban environment of Walvis Bay is the focus in this study, to address the micro-, meso-, and exosystems.

1.4 THEORETICAL APPROACH: ECOSYSTEMIC PERSPECTIVE

The ecosystemic perspective is founded on the principles of human ecology, cybernetics and systems theory, and can be applied on systems at the micro-, meso-, exo- and macro levels. It is a multiple level perspective focused on the context of interaction among individuals and their environment. The unit of evaluation is the **person-environment interaction,** taken as a whole (O'Connor and Lubin, 1984). An ecosystemic perspective would view health as a relationship between person and system that maximises the functioning of both. The healthy person interacts with an environment in which the requirements and resources of that system are congruent with the needs and abilities of the person.

From such a perspective, pathology or disease exists when group structures lack sufficient resources to meet the needs of all inhabitants or do not distribute resources in a fashion that allows all members of the ecosystem to meet their needs within the limits of expected behaviour. Both the individual and the environment can exert powerful influences, but they are always interactive (O'Connor and Lubin, 1984). For example, overpopulation leads to crowded living conditions and decreased environmental health, while crowded living conditions place higher demands on environmental resources such as water and fuel.

Underlying the ecosystemic perspective is a fundamental assumption regarding the process of problem formulation. The fundamental change is from interpreting events in terms of linear cause-and-effect sequences to conceptualising the same events as resulting from a reciprocally causal system of interaction (O'Connor and Lubin, 1984).

In a reciprocal causal cycle, each event both influences, and is influenced by other events in the system, i.e. a person both influences and is influenced by the environment. The urban environment can thus be seen as either potentially enabling and enriching, or as restricting opportunities and reducing satisfaction. The environment must therefore be evaluated in terms of how well it accommodates the person and meet his/her personal needs, as well as how it is influenced by the person. The focus of evaluation must therefore be the person in all his/her roles, as an individual, and as a member of a family, social group or community. Furthermore, these roles change throughout the development cycle. Thus the degree of success of an environment must be evaluated in terms of how well it enables the person to conduct activities of importance.

Symptoms are viewed as functional for the system in which they occur. However, by changing the process of interaction, symptomatic behaviour can be altered and redirected into a positive cycle serving the same maintenance function for the system. For example, indoor air pollution as a result wood fires to cook on contributes to respiratory problems (the symptom). By changing the energy source available to poor communities, such as solar power or electricity, indoor pollution is reduced, and so is respiratory problems. The symptom has no more functional use and is eliminated.

From an ecosystemic perspective, the person-environment context constitutes the totality of relationships among individuals and the environment. Each person-to-person and person-to-environment interaction forms a linkage in an interactive network of interconnections (O'Connor and Lubin, 1984). Therefore the person, the environment and the interaction between person and environment has to be considered, in the context of the socio-cultural, political or economic background. An example is the following: The best safe water system facilities for safe disposal of excreta (environmental factor) will do little to protect against the spread of communicable disease unless properly used for personal and domestic cleanliness (human factor) (Hardoy, Cairncross, and Satterthwaite, 1990), or no amount of land-use planning and zoning (environmental factor) can ensure a pleasant and safe neighbourhood if the residents allow it to deteriorate (human factor). The interaction between the human behaviour (adequate hygiene) and the environmental service (safe water system facilities) has to be the focus to ensure that the appropriate level of health is maintained.

Another principle from the ecosystemic perspective is that the observer is "part" of the ecosystem that is observed. For example, in psychotherapy, the therapist is always seen as part and parcel of the system he diagnoses and treats. "The goal of therapy is the establishment of new relationship networks within the ecological relationship system such that symptomatic communication is not necessary" (Keeney, 1979, p. 121). From this perspective the environmental health practitioner, doing an environmental impact assessment has the power to change the status quo in the system he/she is observing. In practical terms, where environmental health problems are experienced, the environmental health practitioner or environmental consultant can contribute to changing the symptomatic behaviour. Recommendations to improve environmental health can be made, for example, infrastructure can be improved, environmental standards can be put into place, or sewerage facilities can be upgraded.

1.5. METHODOLOGY

The critical and most immediate problems facing developing countries are the health impacts of urban pollution that derive from inadequate water, sanitation, and waste services, poor urban and industrial waste management and air pollution (the "brown agenda"). Brown agenda issues also related to social issues of urban areas such as poverty, overcrowding, unemployment and level of health education, as well as "green" issues, such as the depletion of water resources and the degradation of environmentally fragile land (Bartone, Bernstein, Leitmann and Eigen, 1994).

A four-step methodology, see Model 2, (Note: There is also a copy of Model 2 at the back of the document for easy reference) was developed as a research structure to investigate contributing conditions, impacting on social and environmental indicators concerning environmental health. This four step methodology was applied to Walvis Bay and Kuisebmond, to conclude with an Environmental Health Profile for Kuisebmond, the objective of this study. The research structure followed was the following:

Step 1:

An **Urban Environmental Profile**, based on Rapid Urban Environmental Assessment, a method often used by the World Bank, was completed for Walvis Bay. Kuisebmond falls within the Greater Walvis Bay Area, therefore environmental health problems in Walvis Bay can impact on the health of people living in Kuisebmond.

Step 2:

A general **Environmental Health Survey for Poor Communities** was developed to measure the following environmental health indicators:

- Socio-economic setting - conditions regarding population distribution, employment, health and housing;
- House design - conditions relating to the layout of dwelling, site of dwelling, ventilation and building materials;
- Quality of infrastructure services provided - conditions such as water supply, sanitation, energy supply, waste removal and disposal as well as transport;
- Family health and hygiene behaviour - including hygiene behaviour, family safety, food safety and security, crowding and privacy and mental health;
- Availability of community facilities - facilities such as schools, hospitals, sport facilities, shopping venues and green open space; and
- Quality of life - conditions concerning residential satisfaction, ease of access, security of tenure, appropriateness of delivery system and multipurpose homes.

Step 3:

The **Environmental Health Survey for Poor Communities** was applied to Kuisebmond and the results summarised, to provide baseline information regarding environmental health issues.

Step 4:

Information from the **Urban Environmental Profile** for Walvis Bay (step 1) and from the **Environmental Health Survey for Poor Communities** completed for Kuisebmond (step 3) was integrated and presented in the format of a **Summary: Environmental Health Profile: Kuisebmond, Walvis Bay, Namibia (June 1996).**

MODEL 2: METHODOLOGY

STEP 1:
COMPLETE URBAN ENVIRONMENTAL PROFILE FOR WALVIS BAY (EXOSYSTEM)

INDICATOR	CONTRIBUTING CONDITIONS
socio-economic setting	population profile
	share of GDP
	employment
	housing
	welfare profile
	health profile
natural environment	temperature & rainfall
	key ecosystems
	natural risks
infrastructure	water use
	sanitation system
	waste management
	power/energy supply
	transportation
	communication
environmental hazards	water pollution
	- maritime pollution
	- groundwater pollution
	air pollution
	- odour pollution
	hazardous waste
future development	community facilities
	CBD
	harbour area
	EPZ

STEP 2:
DEVELOP ENVIRONMENTAL HEALTH SURVEY FOR POOR COMMUNITIES (MICRO- & MESOSYSTEM)

INDICATOR	CONTRIBUTING CONDITIONS
socio-economic setting	population profile
	employment conditions
	housing conditions
	health conditions
house design	layout
	site of dwelling
	ventilation
	building materials
infrastructure	municipal services
	water supply
	sanitation
	waste removal and disposal
	energy supply
	transport
family health & hygiene behaviour	hygiene behaviour
	family safety
	food safety & security
	level of health education
	mental health
	crowding & privacy
community facilities	health facilities
	educational facilities
	shopping venues
	recreational facilities
	green open space
	cultural facilities
	communication & information
quality of life	residential satisfaction
	ease of access
	security of tenure
	appropriateness of delivery system
	occupational activities & multipurpose homes

STEP 3
COMPLETE THE ENVIRONMENTAL HEALTH SURVEY FOR POOR COMMUNITIES for KUISEBMOND

STEP 4
INTEGRATE DATA FROM MICRO-, MESO- AND EXOSYSTEMS TO PROVIDE AN ENVIRONMENTAL HEALTH PROFILE FOR KUISEBMOND, GREATER WALVIS BAY, NAMIBIA

The environmental health profile of Kuisebmond (step 4) is aimed at decision-makers and environmental health practitioners, with the objective to provide useful information regarding environmental health.

During each step followed in the methodology different components of the system was focused on. In step 1 the exosystem, conceptualised as the urban environment of Walvis Bay was investigated. In step 2 and 3 the micro- and mesosystems were investigated. The microsystem was conceptualised as individual households in Kuisebmond, to include the physical home or dwelling as well as health and hygiene behaviour of inhabitants, while the mesosystem was conceptualised as the neighbourhood, the interaction of more than one microsystem. In step 4 data from the micro-, meso-, and exosystems were integrated to contribute to an environmental profile of Kuisebmond.

As can be seen from Model 2, various environmental health indicators and factors contributing to these indicators were evaluate. The term "*contributing conditions*" was used for the different factors feeding into the main group of indicators. Many of the contributing conditions are indicators in their own right, but for the sake of clarity they were not used as such in this study.

1.6 TERMS OF REFERENCE

The Masters students were assigned the following tasks regarding individual dissertations:

- To develop a supplementary, "stand-alone" document to the "Baseline Report: Coastal Zone Management Plan for the Erongo Region, Namibia".
- To communicate findings along with the underpinning theory and methodology adopted.
- To develop logical arguments, that draw on relevant literature more heavily than conventional consultants' reports.

1.7 OBJECTIVE OF STUDY

This dissertation aims to contribute to the world strategy "Health For All by the Year 2 000" by expanding on methodology presently used by organisations such as the World Bank, World Health Organisation (WHO) and United Nations Development Programme (UNDP). The objective of this study is to develop a research structure (the four-step methodology, see Model 2) which can be applied to poor communities to investigate environment health issues. In the context of this study, to present an environmental health profile of Kuisebmond, located in the Walvis Bay area in Namibia.

1.8 DATA COLLECTION

Descriptive information and quantitative indicators relating to environmental health, community health, and the environment was collected from various sources, using the following techniques:

Literature review. A wide range of the literature relating to relevant topics and the study area was undertaken, as indicated in the reference list.

A field trip and personal interviews. Information was elicited in various interviews during two fieldtrips (Appendix A). These interviews were held with various stakeholders in government, parastatal, private and community organisations. Arrangements with the person to be interviewed were made in advance in some instances, while in other cases available people were interviewed spontaneously. The information collected during interview sessions is quoted in the document under personal communications (Pers.Comm.). In total one month was spent in Namibia.

Personal observations. Direct observations were made by visiting facilities such as fish factories, fishing vessels, hospitals, Rossing mine, Kuisebmond townships, the harbour, Walvis Bay lagoon, and Cape Cross.

1.9 LIMITATIONS TO THE STUDY

As a result of time and financial constraints, combined with pressure to complete the Baseline Report: Coastal Zone Management Plan for the Erongo Region, the time spent in Kuisebmond, the focus of this study, was very limited. This precluded the collection of some primary data needed for the environmental health profile of Kuisebmond. Secondary information was collected and synthesised, and predominantly relied upon as being accurate and complete. Furthermore, personal biases may have been conveyed by the interviewers and interviewees to contaminate results in the Baseline Report.

Information needed to complete the environmental profile for Walvis Bay, following guidelines from the Rapid Urban Environmental Assessment (Leitmann, 1994b) was in certain instances not available, as obtaining statistics and data in developing countries such as Namibia can be problematic.

Comprehensive studies require the participation of all the stakeholders. While efforts were made to solicit opinions from a broad base of interested and affected parties, due to time and budgetary constraints, the public participation process was curtailed.

Regarding the methodology, a research tool - An Environmental Health Survey for Poor Communities (EHSPC) - was developed and applied to Kuisebmond. Reliability and validity was not established.

1.10 STRUCTURE OF DISSERTATION

This dissertation comprises 6 chapters, the first of which contains introductory information to the study, the conceptual framework, theoretical perspective as well as the methodology followed throughout the study. By the very nature of this dissertation, it has to attempt a fine balancing act. On the one hand, the dissertation is intended to offer a

method to obtain environmental health information in a practical format. On the other hand, it is an academic exercise which has to meet certain scholarly standards and norms, particularly as far as an understanding of the relevant theory and practical application is concerned. As a result, information is repeated at certain stages of the document. For example, a variety of indicators are discussed and thereafter represented in tabular form, for easier and quick reference.

In Chapter 2 the scope of environmental health, common community health problems, and health hazards in the home and urban environment are discussed. Information relating to environmental health indicators, as well as the role of environmental health practitioners is also contained in this chapter.

In Chapter 3 information from the baseline study and other sources are used to complete an urban environmental profile for Walvis Bay, conceptualised as the exosystem in this study. Information regarding the following indicators are discussed: socio-economic setting, natural environment, infrastructure, environmental hazards and future development.

Chapter 4 consists of the development of an environmental health survey for poor communities. The objective of this chapter is to develop a research tool that can be used and re-used to investigate environmental health issues in poor communities. The following indicators, relating to the micro- and mesosystems are discussed: socio-economic setting, house design, infrastructure services, family health and hygiene behaviour, community facilities and quality of life. Human as well as environmental aspects of environmental health are addressed.

Environmental health in Kuisebmond is the focus of Chapter 5. The environmental health survey, developed in chapter 3 is applied in Kuisebmond, a traditionally black township. To conclude the chapter the results are briefly summarised.

In Chapter 6 information from both the urban profile of Walvis Bay as well as information regarding the environmental health in Kuisebmond are combined to contribute to the Environmental Health Profile: Kuisebmond, Walvis Bay, Namibia. The environmental health profile is presented as a summary. Recommendations are made for Walvis Bay and Kuisebmond, as well as for future research.

CHAPTER 2
ENVIRONMENTAL HEALTH INDICATORS AND HAZARDS

2.1 COMMON COMMUNITY HEALTH PROBLEMS

Quite often, what people think their health problems are, or what they think the causes of sickness are, are different from what they believe. According to the WHO (1987) people do not often connect their health problems with other common problems such as bad water supply, poor communications, or scarcity of fuel. However, community health problems are often connected with environmental factors such as water supply, fuel, or services such as transport and communication. Therefore, the following type of questions can be helpful in identifying environmental health hazards (WHO, 1987):

What are the different ways in which people get water for drinking, bathing, watering animals, and watering crops and gardens? Is the water safe to drink or wash with? Does it cause sickness? Is water available throughout the year?

What do people use for cooking and heating (electricity, kerosene, wood, gas, coal, cow-dung), and for light? Is it too expensive for poor families? Can households boil their water easily? Can they cook their food properly?

How do people get to markets, shops, schools, health centres, hospitals? How can messages be sent to places such as health centres? How can messages be received?

All the above questions affect health. However, the relationships between health, disease, development and environmental quality are interrelated, and one factor cannot be seen in isolation. Hammond and Gear (1986) supported this inter-relatedness by stating that environmental health cannot be studied in isolation from the social, economic and political contexts, as environmental problems are linked to the larger problems of discrimination, poverty and powerlessness.

Common causes of community health problems, related to the human-environment interaction, and linked to the relationship between poverty and health are the following: (The problems are adapted from WHO, 1987):

- there are too many people living close together (crowding), which contributes to the spread of tuberculosis;
- there is not enough water or the water is not clean (water quality and supply); which contributes to diarrhoeal diseases and infant mortality;
- there is not enough food of the right kind (malnutrition), which reduces energy levels, stunts growth, lowers resistance to disease and impair intellectual attainments;

- there are unclean houses in dirty surroundings (lack of family hygiene); which contributes to the spread of vectors of disease such as flies;
- there is no way to keep cool in the heat or to keep warm in the cold (house design), which contributes to pneumonia;
- there are no or too few latrines or the latrines are dirty (sanitation), which leads to diarrhoeal diseases;
- the people do not protect themselves from insects that carry disease (house design), which contributes to malaria;
- the people cannot get to health centres/clinics easily (transport network); which leads to high infant mortality and preventable deaths;
- the people cannot read and thus do not learn about health and healthy habits (health education); which leads to sexually transmitted diseases, or vaccine preventable diseases such as tuberculosis, measles, whooping cough, tetanus and polio.

If these health problems, which are mostly environmentally based, preventable and curable through relatively small investment, are not adequately addressed, poorer groups will continue to suffer disablement and premature death (WHO, 1987; Hardoy et al., 1990; World Commission on Environment and Development, 1987).

2.2 SCOPE OF ENVIRONMENTAL HEALTH

In its broadest context, *environmental health* comprises those aspects of human health and disease that are determined by factors in the environment. World Health Organisation (WHO) includes in this the study of both direct pathological effects of chemical, physical and some biological agents, as well as (often indirect) effects on health and well-being of the broad physical and social environment, which include housing, urban development, land-use and transportation (Fuggle and Rabie, 1992). Some environmental health problems may be of particular relevance at the local level, such as housing, while others may be important at the regional or global level, such as water or air pollution.

Currently, the critical and most immediate problems facing developing country cities are the health impacts of urban pollution that derive from inadequate water, sanitation, drainage and solid waste services, poor urban and industrial waste management, and air pollution (Bartone, Bernstein, Leitmann and Eigen, 1994). This set of problems is collectively dubbed the "brown agenda", and is closely linked to the poverty-environment nexus (Bartone, et al., 1994).

Brown agenda issues are also related to "green" and "social" issues of urban areas, such as the depletion of water and forest resources, the degradation of environmentally fragile lands, the occupation of areas prone to flooding or landslides, overcrowding, degradation or loss of historical and cultural property, noise pollution and other problems (Bartone et al., 1994).

Brown, green and social issues are all directly or indirectly linked to environmental health, as "human health depends on a healthy environment" (Keating, 1993). Therefore to assess

the environmental health in a township, such as Kuisebmond, a holistic perspective is needed, to include the microsystem (which include the physical dwelling as well as the health and hygiene behaviour of inhabitants), mesosystem (which comprises of the Kuisebmond neighbourhood) and the exosystem (the urban environment of Walvis Bay).

2.3 ENVIRONMENTAL HEALTH INDICATORS

Just as any therapeutic measure for an individual suffering from an illness should target the underlying cause of the illness if it is to result in recovery, so must an environmental health indicator (EHI) relate to an underlying cause of the disease in the population (WHO, 1995). However, establishing causal relationships between environmental health indicators and specific diseases does not fall within the scope of this study. Indicators related to environmental health are used in this dissertation to investigate factors that contribute to environmental health, beneficial or detrimental. Identified environmental health hazards can be eliminated or mitigated by design professionals, environmental consultants, community leaders, or other environmental health practitioners, and thereby contribute to the Health For All by the Year 2 000 strategy.

2.3.1 ENVIRONMENTAL INDICATORS WITH HEALTH LINKAGE

Environmental indicators have been described as a measurement, statistic or value that provides a proximate gauge or evidence of the effects of environmental management programs or the state or condition of the environment (WHO, 1995). In this study, conditions related to environmental health in Walvis Bay and Kuisebmond will be assessed, and EHIs are used as a measurement or gauge to provide data on the existing situation.

Issues relating to health are just a few of the many reasons for collecting environmental indicators. Other reasons include the impact of environmental pollution on agriculture, forests, rivers and lakes. Thus, the collection of data on air pollution emissions and concentrations, organic and inorganic water pollution, stratospheric ozone, natural resources, waste production, climate change, etc. is not performed specifically for health-related purposes and this makes the available information of limited value in the development of Environmental Health Indicators (EHIs).

In the context of EHIs the concern is with the degree of exposure to human beings, and the human health impact of such exposure (WHO, 1995). Environmental pollution without direct or potential human exposure, is therefore by definition not covered by EHIs. Indicators of exposure are those which measure the potential of a substance or microbiological organism to enter the human body through contaminated air, water, food and soil (WHO, 1995).

The difficulty with environmental indicators is that the presence of pollutants in the environment does not translate automatically into health outcomes. Similarly, the incidence of many environmentally related diseases cannot be easily traced back to specific

environmental exposures. Only individual-level epidemiological studies are able to establish reliable links between exposure and health outcomes. Such studies, however, defeat the purpose of using easily collected or available statistics from which to derive the relevant indicators (WHO, 1995).

2.3.2 HEALTH INDICATORS WITH ENVIRONMENTAL LINKAGE

Health indicators have been used extensively to monitor the health of population, however, the "health status" of a society is a complex concept that cannot be measured easily. Two widely available indicators that reflect at least some aspect of a given society's health are life expectancy and infant mortality rates (World Commission on Environment and Development, 1987). The scientific problem is that many factors can increase life expectancy and reduce mortality rates. For example, wealth that can buy health, or an increase in education, the establishment of primary health care clinics and programmes or the availability of drugs can improve the health status of a society.

The health and environment link is a prominent part of the Health for All strategy and important environmental health issues such as access to water and sanitation, acute and chronic exposures to chemicals, populations exposed to unacceptable levels of contaminated air, housing issues (and also environmental issues, such as loss of biodiversity, deforestation, soil degradation and global warming) are discussed in the *Implementation of the global stately for Health for All by the Year 2 000* (WHO, 1995).

The Swedish environmental protection agency has compiled a tentative list of environment-related diseases, which include the following (WHO, 1995): certain cancers (especially lung and skin, particularly in children); respiratory disease (chronic bronchitis, pulmonary emphysema, bronchial asthma, hyper-reactivity); allergic diseases (atopic allergies and symptoms occurring in connection with atopic diseases, namely asthma, hay fever, conjunctival catarrh and eczema); cardiovascular disease; effects on reproduction (miscarriage, late intrauterine death, neonatal and perinatal death, low birth weight, various malformations and chromosome abnormalities); and diseases of the nervous system (organic psychosyndromes and dementia - Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis, multiple sclerosis, peripheral nervous disease in combination with polyneuropathy). Not all these diseases are due to environmental exposures and the term "sentinel health event" has been applied to cases of disease that in a particular situation appears out of the ordinary, and can be potentially linked to an external factor (WHO, 1995). A sentinel health event serves as a warning signal that the quality of preventive or medical care may need to be improved.

The concept of sentinel health events has been adapted for use in occupational health, and include, for example, asbestosis and mesotheliomas (as indicators of asbestos exposure); silicosis; heavy metal poisoning; leukaemia (as an indicator of exposure to ionising radiation or benzene; methaemoglobinaemia; extrinsic asthma and pesticide poisoning (WHO, 1995). Some of the conditions of these diseases are clearly identifiable, while some potentially indicate exposure to environmental contamination or environmental

exposure. This is in line with what was mentioned in section 2.2, that environmental health is influenced by a plethora of factors.

2.3.3 THE TERM "SUSTAINABLE CITY" AS AN ENVIRONMENTAL HEALTH INDICATOR

Cities act as centres of population, production and consumption. At their best they embody all the positive advantages of economies of proximity, scale and concentration. At their worst they can produce a high degree of environmental degradation including air, water and noise pollution, land contamination, inappropriate energy consumption and the generation of considerable amounts of waste (OECD, 1990). These factors significantly diminish the quality of life and level of health experienced for urban residents and clearly indicate that cities are not making their full potential contribution to achieving global sustainable development.

In general, sustainable cities rely on three levels of interaction:

- policy, environmental standards, legislation, economics and politics
- services supplied, usually by municipalities
- sustainable behaviour of individual households, contributing to sustainable communities.

Although a sustainable city is a holistic and proactive indicator of urban environmental health, the concept of sustainable cities as healthy cities falls outside the scope of this dissertation. Therefore the compliance or deviation of Walvis Bay to a sustainable city model will not be evaluated in this study.

2.3.4 HOME AS AN ENVIRONMENTAL HEALTH INDICATOR

The principal reductions in mortality rates in the industrial world came before the advent of modern drugs - they were due to **improved nutrition, housing and hygiene**. Therefore, the author decided to use the term *home,* in its broad sense (to include the structure of the house, infrastructure services, community structures, health and hygiene behaviour of the inhabitants, and quality of life) as a method to investigate environmental health in a specific population (residents of Kuisebmond) within a given time frame (1996). According to Bartone et al,. (1994) health impacts are greater and more immediate at the household level and tend to diminish in intensity as the spatial scale increases.

In the home environment factors from the physical environment (air, water, light, space, temperature and land) are intertwined with social factors such as poverty, educational achievement, the role of women, the right to property, nutrition, migration and democratic governance Hardoy et al., 1990). Poor housing is always associated with high rates of morbidity and mortality (Hardoy et al., 1990), and WHO has estimated that if all housing

could be brought to minimum acceptable standards there would be five million fewer deaths and two million fewer permanent disabilities annually on a global basis.

From a holistic perspective, approaches to health in housing must always maintain a central focus on people, as the way in which people use their housing environment is intimately interwoven with both negative and positive influences on their health. For example, the best safe water system and facilities for safe disposal of excreta will do little to protect against the spread of communicable disease unless properly used for personal and domestic cleanliness. No amount of land-use planning and zoning can ensure a pleasant and safe neighbourhood if the residents allow it to deteriorate.

There are, however, limits to what people can achieve with good intentions and conscientious effort (Hardoy et al, 1992, WHO 1987, World Commission on Environment and Development, 1987; Hammond and Gear, 1996). Societal and government responsibilities are the other side of the coin. This is readily exemplified in such matters as refuse removal and provision of water supply in cities where large populations and high population densities make it impossible for individual residents and families to provide satisfactory services for themselves. In such situations, satisfactory services depend upon institutional arrangements.

Realising the complexities involved in establishing EHIs this study departs from interpreting events in a linear, cause-effect sequence to conceptualising the same events as resulting from a reciprocally causal system of interaction, to include the house or dwelling, infrastructure, community services, family health and hygiene behaviour as well as quality of life (see Chapter 4 for the development of an Environmental Health Survey for Poor Communities).

2.4 HEALTH HAZARDS IN THE HOME ENVIRONMENT

The environment in and around human dwellings offers an important habitat for a wide range of arthropods and other vectors of disease. Most common household pests are arthropods, a group which includes insects, spiders and mites. Some arthropods can carry diseases between one person and another, or between animals and humans and are called vectors of disease (Hardoy et al., 1990). The disease is not strictly caused by its vector, but by a micro-organism known as a pathogen which invades the body, usually when the infected vector bites its victim.

Some arthropods, such as lice and fleas, live on the body of their human or animal host, and are known as ecto-parasites. Before many types of insect emerge in their final, adult form, they spend some time as larvae, and then as pupae. (See Appendix B for List of arthropods of medical importance within the domestic environment or its immediate surrounds (known as the peridomestic environment) and the health problems with which they are associated). The arthropods are divided into four categories: those who breed on the body; those that breed in the house; those that breed peri-domestically and/or in

containers and sewerage; and those which are termed "adventitious" who enter the house to feed.

Factors which predispose the domestic and peridomestic environment to colonisation by arthropods of medical importance are the following (Hardoy et al., 1990):

- inadequate foundations, and inadequate protection of the base of the wall against water erosion, causing damage to footings of walls, allowing entry of crawling pests
- open, unscreened eaves, with no internal ceiling, allowing entry of flying insects into living space
- open, unscreened windows and/or doors allowing entry of flying insects
- cracked, uneven floors providing refuge for ticks, fleas larvae and other insects
- unrendered, cracked walls providing refuge for cockroaches, bedbugs, and triatomine bugs
- dark, poorly ventilated interiors favouring arthropods that rest during the day
- roofs of thatch allowing resting places for insects
- shrinkage cracks at junction between wooden frames and walls of other materials
- domestic animals offering food source for blood-sucking arthropods, and may also act as reservoirs for parasites and pathogens
- stored products in or near the house attracting rodents and other pests.
- unscreened water storage vessels providing breeding sites for mosquito larvae
- animal enclosures near house providing additional refuge and food source for insect pests
- shade trees maintaining roof fabric cool and more suitable for insects, and also offering refuge for some peridomestic insects
- inadequate roof overhang that does not protect walls from rain, causing erosion and cracking
- water-seepage providing moist breeding grounds for mothflies and other species
- organic refuse proving breeding grounds for houseflies etc.

Other vectors of disease in the micro- and mesosystems include rats, mice and domestic animals.

2.5 HEALTH HAZARDS IN THE URBAN ENVIRONMENT

In general health hazards in the urban environment constitute the following:

- Air pollution. Air pollution is a problem, mainly because of traffic and industry. Many national air quality standards, as well as recommended concentration limits set by the World Health Organisation (WHO), are still being exceeded (OECD, 1990).
- Water pollution. The main uses of water are for cooling purposes in power stations, various industrial applications and domestic supply. At present, water supply operations are substantial users of both space and energy, whilst the inadequate

treatment and disposal of urban waste water from domestic and industrial sources too often pose health risks to the public.

- Waste from cities. As cities grow and consumption per capita increased, many urban areas are running out (or have already run out) of sites for the disposal of solid wastes. In addition, more and more communities are unwilling to tolerate the creation of extension of waste disposal sites (OECD, 1990).
- Noise generation. The primary source of noise pollution in urban areas is road traffic, neighbourhood and aircraft noise. Approximately 15 percent (or more than 100 million people) in the OECD are exposed to potentially harmful urban noise levels. In some cases those level continues to rise, particularly as road traffic increases (OECD, 1990).
- Energy generation. The current supply of energy is mainly based on fossil fuels. Furthermore, nuclear energy is used for electricity generation. The adverse consequences of using fossil fuels and nuclear energy have been long recognised and should be tackled as soon as possible (Friends of the Earth, 1995).
- Pressure on land for urban development. The growth of urban areas has led to a significant conversion of land from agricultural to urban uses over the past few decades. In some OECD countries not only is more land being contaminated in cities and more intensively used overall, but more land is being demanded for low-density suburban expansion.
- Deterioration of quality of urban life. Large cities, in particular have become more congested and more polluted, making them less attractive and less efficient for both individuals and businesses.

When we think about health hazards, pollution mostly comes to mind. In general pollution can be defined as accumulation of wastes beyond the ability of nature to deal with them, such accumulation may or may not be harmful, and may affect air, water or land (Hammond and Gear, 1986). Sources of pollution are the following:

- Fumes (petrol and diesel fumes, industrial fumes)
- Noise pollution (traffic, barking dogs, machinery)
- Vibration and extremes of temperature
- Radio-activity

Air pollution is almost exclusively an urban problem, as far as production of pollution is concerned. Unfortunately pollutants can be transported in the atmosphere to remote areas, depending on geographical and climatic features.

TABLE 1: COMMON POLLUTANTS OF AIR AND THEIR EFFECTS ON MAN AND THE ENVIRONMENT (Source: Hammond and Gear, 1986)

POLLUTANT	CONSISTS OF	SOURCE	EFFECTS ON MAN	EFFECTS ON ENVIRONMENT
Smoke (smoke from domestic fires is a big problem in developing countries)	particles and gasses which include -sulphur dioxide (SO2) - carbon monoxide (CO) -carbon dioxide (CO2) - methane	- combustion of fossil fuels - domestic fires - incinerators - fires for garden refuse - diesel engines - industrial heating	**acute** effects: SO2 - increased airway resistance CO - acute hypoxia, vasodilation **chronic** effects: SO2 - chronic bronchitis, emphysema CO - coronary artery disease	SO2 - acid rain, which affects plants, animals and buildings CO2 - absorption of heat radiated by the earth, possible increase of air temperature (green-house effect)
Vehicle fumes	- benzopyrene - hydrocarbons - oxides of nitrogen Fumes react with ultraviolet light to produce ozone. In high concentrations this results in smog (photochemical pollution)	petrol engines, petrol refineries	**acute** effects: smog - watery eyes, upper respiratory symptoms, headaches, compromised lung functioning in predisposed individuals **chronic** effects: smog - chronic bronchitis, emphysema benzopyrenes - cancer	hydrocarbons - formation of photochemical smog, destruction of fruit, vegetables etc. nitrous oxides - catalyst in formation of photochemical smog
Industrial fumes	varies in different industries but include: SO2, CO, lead, zinc, arsenic	industrial and chemical processes	**acute** effects: SO2 - increased airway resistance CO - acute hypoxia, vasodilation lead - CNS and GIT disorders **chronic** effects: SO2 - chronic bronchitis, emphysema CO - coronary artery disease lead - behavioural disorders	SO2 - acid rain which affects plants, animals and buildings
Dust	varies, but can include asbestos fibres, silica particles, cotton fibres, soot ash	mines, foundries, factories, products of combustion	**acute** effects: upper respiratory irritation **chronic** effects: Pneumoconiosis asbestos - asbestosis, mesothelioma soot - cancer	particles pollute the environment when they settle

POLLUTANT	CONSISTS OF	SOURCE	EFFECTS ON MAN	EFFECTS ON ENVIRONMENT
Radioactivity	various radio-active rays	natural sources, X-ray machines, radiotherapy units, nuclear power stations, decay of radioactive elements	**acute** effects: radiodermatitis, acute radiation syndrome **chronic** effects: congenital defects, sterility, carcinoma	affects plant and animal life
Noise	sound waves	machines, traffic, dogs, blasting in mines, etc.	**acute** effects: irritability, loss of concentration, depression, etc. **chronic** effects: hearing loss	affects animal life

2.6 ENVIRONMENTAL HEALTH PRACTITIONERS

Although environmental health is generally administrated under primary health care (PHC), and is the responsibility of medical personnel, other professionals can also contribute to eliminating environmental health problems. Architects, planners, engineers and teachers, community leaders, local and national government departments concerned with housing, building, planning and public works, and environmental consultants can all contribute to supplying the physical infrastructure needed in residential areas for good health, or contribute to health education of communities.

According to Hardoy et al., (1990) it is often forgotten that the remarkable decline in mortality rates and improvements in health in Europe and North America in the late-nineteenth century and early twentieth century owe more to improved nutrition and improvement in water supply, sanitation and other aspects of housing and living conditions than they do to medical establishments.

To promote health and health promoting environments that contributes to sustainable communities, we need to consider two issues (Keating, 1993):

- We need to protect the environment for our own health's sake, and
- We need to protect and conserve the environment around us for the environment's sake.

2.6.1 THE ROLE OF ENVIRONMENTAL CONSULTANTS

To protect the environment, especially relating to impacts of developments various systems are in place. In South Africa, Integrated Environmental Management (IEM) is designed to ensure that the environmental consequences of development proposals are understood and adequately considered in the planning process. The term *environment* is used in its broad sense, encompassing biophysical and socio-economic components

(Department of Environment Affairs, 1992), to address the human-environment system as a whole. If it becomes clear that there will be significant impacts an Environmental Impact Assessment (EIA) has to be undertaken.

Impacts on one component in an environmental system can have repercussions for others which may be nearby (local) or distant (national or international) from the component immediately affected. Depending upon the structure and functioning of the particular environmental system being stressed by a development, an initial impact can result in further impact, it is therefore useful to consider the range of characteristics which impacts exhibit (Turnbull, 1992):

- Spatial dimension. Impacts can occur in the immediate vicinity of a project, for example, fluorosis caused by an aluminium smelter. Alternatively, they can occur at considerable distances from an installation. for example, hydrocarbon combustion in power plants in northern central Europe is considered to be a major cause of surface water acidification and tree deaths in Scandinavia.
- Time dimension: Some impacts can occur immediately, for example noise effects, while others are not apparent until a considerable time period has elapsed, for example, an ecosystem may be able to absorb wastes emitted from an installation for many years until, finally, a critical threshold is reached and a change in the system is observed.
- Reversibility. Some impacts are irreversible, while others can be reversed either naturally or artificially.
- Probability. As impact predictions refer to future effects there is a level of uncertainty associated with them. Each impact has a likelihood of occurrence. However, generally it is not possible to be deterministic and be certain regarding the occurrence of an impact and its likely scale.
- Beneficial/adverse. Some impacts are beneficial whereas others are adverse or harmful. It must not be assumed that all impacts are adverse.
- Environmental social distribution. This characteristic relates, in part, to the spatial dimension of impacts. Certain species, ecosystems or social groups may be affected by more than one impact, (for example, noise, air pollutants and odour) or be subject to a mix of adverse and beneficial consequences. Some social groups may gain employment at higher salary levels than previously and suffer no adverse impacts, while other groups may suffer only adverse impacts and gain no benefits.

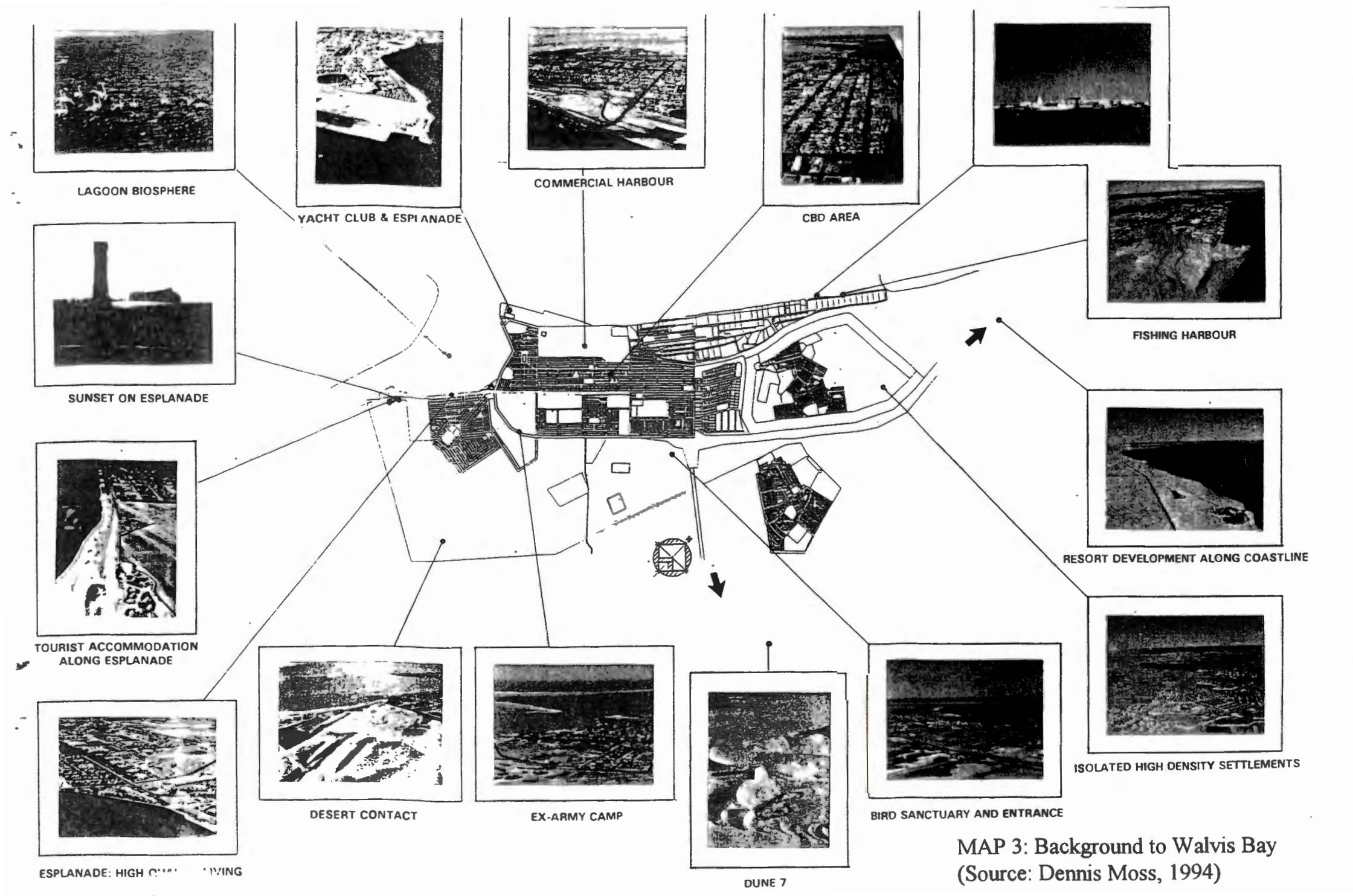
Therefore, the overall distribution of impacts and their cumulative consequences are important factors to be considered by environmental consultants to protect the health of the environment for the sake of people's health as well as for the sake of the environment, e.g. to maintain essential ecosystem functioning.

2.7 SUMMARY

A plethora of factors can influence environmental health negatively, and thereby impact negatively on the health of people locally, or even nationally or internationally. People often do not connect health problems with environmental health factors such as poor sanitation, inadequate water supply, or air pollution, however environmental health practitioners or environmental consultants can contribute to solving this problem.

Factors conceptualised as health hazards in the urban environment are air pollution, water pollution, waste generation and littering, noise generation, energy generation, pressure on land from urban development and the degradation of the urban landscape.

Contributing factors to a poor level of environmental health experienced in the home environment include the following: crowding, inadequate water quality and quantity, malnutrition, lack of family health and hygiene, layout of the house or dwelling, sanitation, waste management and power supply. Dirt, litter, waste products and stagnant water are ideal breeding places for vectors of disease and have to be avoided or mitigated where possible.



MAP 3: Background to Walvis Bay
(Source: Dennis Moss, 1994)

CHAPTER 3
URBAN ENVIRONMENTAL PROFILE: WALVIS BAY

3.1 INTRODUCTION TO THE ASSESSMENT METHODOLOGY

An Urban Environmental Profile for Walvis Bay is included in this study, as environmental impacts in the exosystem can affect environmental health in the micro- and mesosystems. The methodology used in Rapid Urban Environmental Assessment, as developed by the Urban Management and Environment component of the joint UNDP/UNCHS (Habitat)/World Bank Urban Management Programme (UMP), was used as a guideline.

As a methodology, Rapid Urban Environmental Assessment draws its inspiration from Rapid Rural Appraisal and Participatory Rural Appraisal (Leitmann, 1994a). The former, developed the 1970s, was a "fairly quick and clean" technique for development planning that sought to avoid unsuccessful agricultural projects that were linked to "top-down" and "blueprint" approaches to rural development. The latter, developed during the 1980s, is a participatory approach that involves data collection, analysis, problem identification, ranking of opportunities, preparation of village-level resource management plans, and follow-up (Leitmann, 1994a). However, urban assessment is much less anthropological and community focused than its rural counterparts, primarily because cities involve much larger populations and spatial areas.

The rapid urban environmental assessment approach, as used by the Urban Management and Environment component of the joint UNDP/UNCHS (Habitat)/World Bank Urban Management Programme (UMP), consists of a three-step process (Leitmann, 1994a):

1) completion of a questionnaire on urban environmental data;
2) preparation of an urban environmental profile (UEP), using data from the questionnaire and research assistance from local investigators; and
3) discussion of the results through a series of consultations, culminating in a priority-focused public workshop.

The methodology used in this dissertation will be adapted to include selected data from the urban environmental indicators of step 1 (the questionnaire), and step 2 (the preparation of an UEP). The questionnaire (step 1) will not be completed entirely as a result of time constraints as well as a lack of data in the Baseline Report: Coastal Zone Management Plan for the Erongo Region, Namibia (1996). Discussion of the results and public participation (step 3) was also not possible as a result of financial constraints. Furthermore, where possible summaries of environmental indicators were used to prepare the UEP for Walvis Bay. Complete profiles are usually very lengthy and outside the scope of this study.

3.1.1 DISCUSSION OF METHODOLOGY FOLLOWED FOR THE URBAN ENVIRONMENTAL PROFILE: WALVIS BAY

To place this chapter in perspective, the Urban Environmental Profile (UEP) for Walvis Bay is the first step in the overall methodology followed in this dissertation, and concerns the exosystem. The second step is the development of an Environmental Health Survey for Poor Communities (concerns the micro and mesosystems), while the third step is the completion of this survey for Kuisebmond, a suburb in Walvis Bay. Step four is the integration of the information from the micro-, meso-, and exosystems.

For **step 1**, the UEP for Walvis Bay five main groups of indicators were used: socio-economic setting, natural environment, infrastructure, environmental hazards and future development. As mentioned in Chapter 1, many of the contributing conditions are indicators in their own right, but for this study, the term contributing conditions applies. To complete the UEP for Walvis Bay, background information regarding Walvis Bay is mentioned, thereafter indicators and contributing factors are discussed. This chapter concludes with a summary of the Urban Environmental Profile of Walvis Bay (see Chapter 3.3).

The indicators and contributing conditions are the following:

INDICATOR	CONTRIBUTING CONDITIONS
socio-economic setting	population profile share of GDP employment housing health profile
natural environment	temperature & rainfall key ecosystems natural risks
infrastructure	water use sanitation system waste management power/energy supply transportation communication
environmental hazards	water pollution - maritime pollution - groundwater pollution air pollution - odour pollution waste management
future development	community facilities CBD harbour area EPZ

3.2 URBAN ENVIRONMENTAL PROFILE OF WALVIS BAY

(Unless otherwise stated, all sources of information in this section are attributable to the Baseline Report: Coastal Zone Management Plan for the Erongo Region, Namibia, UCT, 1996).

3.2.1 BACKGROUND TO WALVIS BAY

Namibia achieved Independence on March 21, 1990, however, Walvis Bay (town and harbour), as well as the 1 124 km^2 inclave remained under South African control until 1 March 1994. Walvis Bay is the second largest urban settlement in Namibia and situated in the Erongo region.

3.2.1.1 WALVIS BAY PORT

The deep water port of Walvis Bay is Namibia's most vital piece of infrastructure and together with the Namibian transport and cargo handling industry is a major national asset. The port of Walvis Bay is a key element in the transport industry, and besides diamonds and other high value commodities, the bulk of Namibia's trade goes through this port. Examples of such exported goods are minerals such as uranium, copper, lead, feldspar, and salt, as well as other cargo, such as beef and canned fish. Moreover, imports of general containerised cargo, plant and machinery, petroleum and bitumen also pass through the port facilities.

With the reintegration of Walvis Bay into Namibia, the state owned Namibian Ports Authority (Namport) assumed responsibility for the port, together with the commercial and fishing harbours. The role of Namport is to exercise general infrastructural and regulatory functions, together with navigational and other commercial activities. Although Namport is a commercialised parastatal, its primary aim is not to make a profit, but rather to provide cost effective port services at a minimal fee, (not only to the advantage of Namibian users, but to promote the use of the port by attracting businesses from the rest of southern Africa), to control the maritime pollution, the maintenance of maritime safety and the provision of a search-and-rescue service in territorial waters.

Currently the port is being under-utilised with some 1,2 million tons of cargo being handled annually, compared to an estimated capacity of 4 to 10 million tons. It is one of only three ports in southern Africa that has generated at a profit in recent years and is possibly the most efficient port on the African continent.

With the completion of the Trans-Kalahari and Trans-Caprivi Highways, Walvis Bay Harbour can expect to become a major regional gateway for Namibia's land-locked neighbours, particularly Botswana, Zambia and Zimbabwe. The Trans-Kalahari Highway

will provide a 500 km shorter route from Gauteng in South Africa to Walvis Bay With the use of this highway, the travelling time for goods, transported to and from Gauteng, will be seven days shorter if Walvis Bay harbour is used instead of South African ports. Consequently, Namport expects to receive about 5% of container cargo from South African ports, thus increasing Namport's present level of container handling from 22 000 containers in 1995 to 120 000 containers in the future (Van der Meer, Pers.Comm., 08/02/96).

Commercial fishing. Another component of the port is the fishing harbour and its associated fish factories, which contribute to the economic importance of the harbour as a whole. The contribution of the fishing and fish processing industries to Namibia's Gross Domestic Product is expected to increase from 3 % to 10 % within the next few years. This industry is forecasted to contribute N$ 2 billion to the Namibian economy by the end of the decade (Namibian Review, 1994).

Gas and oil exploration. Since 1993, the port has also become the supply-base to oil companies seeking to explore the Namibian coastal waters for oil and gas.

Walvis Bay and Lüderitz possess the only two harbours in the country, with Walvis Bay having the only deep sea harbour that can serve as a port along the west coast of the southern region of Africa. This aspect, combined with the fact that it has the highest potential income and employment rate in the country, supports the notion that Walvis Bay could evolve as the new economic node of the Southern African Development Community (SADC). In the southern African context, Walvis Bay's harbour will play an important role in servicing the needs of other States in the area.

3.2.1.2 TOURISM

Although Walvis Bay is an industrial town, it does have two strong tourism nodes which influence existing and future development. These are a recreation node in the northern area and places of unique natural interest in the southern area. Generally, however, the dependency of Swakopmund on tourism and Walvis Bay on its industrial function, means that the two municipalities have different and often incompatible visions for future development in the area. Swakopmund is often reluctant to accept industrial development proposed by Walvis Bay, due to the impact of such development on the environment and the tourism industry.

3.2.1.3 DEVELOPMENT STRATEGIES

The incorporation of Walvis Bay into Namibia in 1994, the recovery of depleting fish resources off the coast and the exploration for off-shore oil resources, have all contributed to high expectations for the rapid future expansion of Walvis Bay. In order to manage this development, various strategies, plans and projects have been devised by the Municipality, these include: the Coherent Development Strategy (referred to as Dennis Moss, 1994); the Housing Policy; the Densification Policy (1995); and the Business Policy.

Although the Council has not formally approved the proposals presented in the Coherent Development Strategy by the Dennis Moss Partnership study (1994), in the absence of a formal structure plan, this study provides a development framework for Walvis Bay. The structure plan, to be finalised next year, will probably merely involve the upgrading of the above mentioned study.

The Development Strategy was envisaged, as the basis for further planning, to be adapted and aligned with the policies of the Government of Namibia and the Town Council of Walvis Bay. In the report various 'key factors' were identified on a national, sub-regional and local level. These key factors are as follows: Population; Housing; Community Services; Central Business District; Harbour Development; Industry; Economic Base; Infrastructure; Nature Conservation and Tourism.

These key factors are used as a basis for the analysis and planning of future development in Walvis Bay.

3.2.1.4 ANNUAL REPORT OF THE TOWN ENGINEER (1994/95)

The Annual Report of the Town Engineer (WBM, 1994/95), highlighted the following statistical data concerning expenditure and development (As this is the first report in this format, most figures are not available for the previous financial year):

TABLE 2: ANNUAL REPORT OF THE TOWN ENGINEER (1994/95)

	1993/1994	1994/95
Departmental operating expenditure (actual) in N$		22,990 mill
Departmental capital expenditure (actual) in N$		13,9 mill
Water Consumption (m^3)		
- Walvis Bay Proper	2 265 582	2 420 416 (6.8%)
- NAMPORT	165 490	177 159 (7.1%)
- Fishing Industry	678 484	724 479 (6.8%)
- Kuisebmond	924 705	1 025 425 (10.9%)
- Narraville	419 051	432 282 (3.2%)
Total - Greater Walvis Bay	4 4 58 464	4 784 568
Wastewater Treatment (m^3)		
- Inflow at treatment works	1 888 795	2 141 226 (13.4%)
- Wastewater purified	1 427 657	1 713 681 (20,0%)
- Purified effluent consumed	1 026 075	1 108 792 (8.1%)
Cleansing Services (m^3)		
- Routine refuse removal		64 064
- Special cleaning actions		4 028
- Total refuse removed by WBM		68 074

	1993/1994	1994/95
- Refuse removed by business themselves		68 784
- Total volume of refuse generated		136 858
Developed erven within the Greater Walvis Bay		
- Residential (houses & flats)		
- Walvis Bay Proper		2 171
- Meersig		96
- Kuisebmond		1 660
- Narraville		970
- Langstrand		22
- Total		4 919
- Business, Industry & Institutional		
- Walvis Bay Proper		495
- Meersig		1
- Kuisebmond		37
- Narraville		32
- Langstrand		2
Total		567
Building statistics		
- Building Plans approved (N$ 48 274 mill)		457
- Buildings Completed (N$ 46 301 mill)		440
Length of road in Greater Walvis Bay (km)		
- Tarred		56.1
- Gravel		40.4
Total		96.5
Council owned vehicles		138
Staff on fixed establishment of Town Engineer		279

3.2.1.5 CURRENT AND PROPOSED DEVELOPMENTS

Apart from the EPZ going ahead, various other developments have been initiated and Environmental Impact Assessments (EIAs) are scheduled to begin during July 1996. The Environmental Evaluation Unit (EEU), UCT, Cape Town was appointed to complete impact assessments on the following proposed projects (all related to environmental health):

- Sewage Treatment Plant. The existing Walvis Bay sewage treatment infrastructure is currently operating beyond its present design capacity.
- Refuse Disposal Site. The existing refuse disposal site, located at the south-east of the town, is 35 years old and currently not operated according to modern waste disposal standards and operating procedures. The existing site also has only three to five years of life left.
- Hazardous Waste site. The current waste management plan for Walvis Bay does not deal effectively with hazardous or toxic wastes.
- Bulk Electricity Supply. Current demand for electricity in the district is exceeding earlier projections and supply is likely to be a constraint within the next two years without system upgrading and expansion.
- Low Income Housing. Greater Walvis Bay is experiencing a housing shortage, especially low-income housing and serviced plots, for example, there is a 2000 housing backlog in Kuisebmond.
- Shopping Venues. Only an informal market is available in Kuisebmond and a trading market, adhering to health and safety standards is needed.

A desalination plant has also been suggested to cope with the future water demand of Walvis Bay. Thus, some of the environmental health problems identified in this dissertation are already in the process of being addressed by the Walvis Bay Municipality.

3.2.2 SOCIO-ECONOMIC SETTING

No differentiation will be made in terms of ethnicity or race, however, due to the historic nature of research material, past tendencies and composition drawn from such data is included in this report. Available data on population composition is the following:

3.2.2.1 CONTRIBUTING CONDITION: POPULATION PROFILE

The total population of the Greater Walvis Bay during 1994 was estimated as 45 000 (WBM, 1994/95), while DANCED (1995) predicted a figure of 55 000 for 1995. Kuisebmond had an estimated population of 23 000 in 1991 and an estimated population of 30 000 in 1994 (WBM, 1994/95). Approximately 15 000 people immigrated to Kuisebmond between 1989 and 1993. Only 8 000 of this group settled with families. The growth rate especially increased rapidly since the abolishment of access control at the Swakopmund bridge in 1993.

TABLE 3: POPULATION COMPOSITION

Population Group	1985		1990		% Growth per year
	number	%	number	%	
Black	7 784	37	15 750	53	15.1
White	7 900	38	7 500	25	-1,0
Coloured	5 40	25	6 700	22	7.3
Total	21 084	100	29 950	1000	7.3

(Source: Dennis Moss, 1994)

The estimated population for Walvis Bay in 1993 was 38 000, concentrated mainly in three areas (see Table 4).

TABLE 4: POPULATION DISTRIBUTION: 1993

	Population	Area	Density
Historically white areas	7 500	400 ha	18p/ha
Narraville	7 500	105 ha	70p/ha
Kuisebmond	23 000	110 ha	210p/ha

(Source: (Dennis Moss, 1994)

Three population growth scenarios were set out in the Dennis Moss Partnership Coherent Development Strategy (1994). If the scenario with the highest growth rate (3%-4%) is assumed, the following total population numbers were predicted (This growth rate was predicted on the assumption that the fishing industry would recover and that natural gas would be discovered and processed in Walvis Bay).

TABLE 5: PREDICTED POPULATION NUMBERS (3% to 4%)

YEAR	POP. NUMBERS
2000	52 000
2005	60 000
2010	72 000
2015	85 000

(Source: Dennis Moss, 1994)

These figures were used as a basis for the proposals in the Dennis Moss Report (1994). It is important to note, however, that they are based on 1994 population predictions, while a figure of 55 000 was predicted by DANCED (1995). The exact current growth rate statistics are not available for Walvis Bay, however, the National urban growth rate for Namibia is 3.75% per annum. (The growth rate for Walvis Bay is likely to be even higher).

3.2.2.2 CONTRIBUTING CONDITION: SHARE OF GDP

Specific information for Walvis Bay is not available. However, between 1990 and 1994, real GDP for Namibia grew at an average of 3.5% per year (See Table 6). Despite a prolonged drought in 1991/1992, and a world and regional economic recession in the early 1990s which reduced commodity prices, the Namibian economy has performed better since Independence.

Since Namibia has a small economy, it can be expected that those sectors which are capable of serving a growing export market with labour intensive practices, will be targeted and stimulated with incentives. The National Development Plan 1 (NDP1) (1995)

Table 6: Annual Real GDP Growth Rates (1990-1994)

	Average 1981-89	1990	1991	1992	1993	1994	Average 1990-94
Real GDP growth	1.0%	0.3%	6.6%	7.5%	-1.9%	5.4%	3.5%
Per capita real GDP growth	-2.1%	-2.8%	3.3%	4.3%	-4.9%	2.2%	0.4%

identifies agriculture, fishing, manufacturing and tourism as sectors which have the greatest expansion potential and the ability to capture foreign markets. Namibia has thus realised that it cannot continue to rely on natural-resource intensive activities, especially in the medium to long term. From this it can be deduced that Namibia will try to stimulate the manufacturing and tourism industries, so as to increase their contribution to the GDP, while at the same time decreasing the country's dependency on primary goods. By diversifying the economy and focusing especially on export promotion, Namibia could improve its terms of trade.

The composition of the GDP since 1987 indicates a long term trend away from primary to tertiary industries (See Table 7), with the decline occurring in the mining industry, and an increase occurring in General Government services. A comparison of the GDP values for Government Services with the fixed capital formation for the various sectors provides further evidence of these trends (See Table 8).

This increase in General Government services could be a result of the restructuring of Namibian society after Independence. With the withdrawal of the South African Government, Namibia was left with the enormous task of addressing the inadequate provision of social infrastructure. This has required the employment of a large public works sector in order to tackle these inadequacies. Government plans to reduce poverty and restructure society, so as to bring about an improved standard of living for all its citizens, could see a continued growth in this sector.

The contribution from the secondary (manufacturing) industries, although small, has remained roughly uniform from 1987 to 1994 (See Table 7). This could possibly illustrate that in relation to the other industries, little growth has been occurring in manufacturing. Namibia's manufacturing industry is predominantly concentrated in the food and beverages sub-sector. Thirty-nine percent of these manufacturers are located in central Namibia (Windhoek, Rehoboth, Okahandja) and fourteen percent in the Erongo region.

Table 7: GDP by Activity, Percentage Contributions, Current prices - Percentages

INDUSTRY	1987	1988	1989	1990	1991	1992	1993	1994
Agriculture	11.9	11.8	10.7	10.1	10.4	7.4	7.8	10.4
Fishing	1.6	1.7	1.5	1.7	2	2.8	3.3	3.5
Mining & quarrying	23.1	26.8	28	21	19	16.5	12.1	15.9
PRIMARY INDUSTRY	**36.6**	**40.3**	**40.2**	**32.8**	**31.4**	**26.8**	**23.2**	**30.3**
Manufacturing	6.6	6	5.9	7.2	6.3	7.4	9.2	9.3
Elec. & water	1.6	1.9	1.8	2	1.8	2.4	1.4	1.4
Construction	2.4	2.8	2.9	2.7	2.3	2.9	3.1	2.7
SECONDARY INDUSTRY	**10.6**	**10.7**	**10.6**	**11.9**	**10.4**	**12.7**	**13.7**	**13.4**
Wholesale & retail	7.7	7.2	7.5	8.1	8.1	8.5	9	8.1
Hotels & restaurants	1.6	1.7	1.8	1.5	1.7	1.8	1.8	2
Transport & Comm.	5.6	5.1	5	5.5	5.3	5.2	5.6	4.6
Finance & real est.	9.8	9.7	10.1	11.5	11.8	12.1	12.8	11.6
Community, soc services.	1.2	1.1	1.1	1.3	1.3	1.2	1.4	1.2
Govt. services	24.4	21.8	21.3	24.7	27.3	29	29.5	26.1
Other producers	2.5	2.4	2.4	2.7	2.7	2.8	3	2.7
TERTIARY INDUSTRY	**52.8**	**49**	**49.2**	**55.3**	**58.2**	**60.6**	**63.1**	**56.3**
Industries at basic Prices	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 8: Gross Fixed Capital Formation by Activity, Constant 1990 Prices - N$ Million

INDUSTRY	1987	1988	1989	1990	1991	1992	1993	1994
Agriculture	69.4	67	72.9	71.5	70.3	70.3	64.3	63.7
Fishing	0.8	0.8	0.7	5.2	39.3	90.9	45.8	25.6
	137.4	222.6	227.6	307.9	91.8	164.8	195.2	199.1
Manufacturing	16.5	15.2	21.2	18.7	25.4	100.5	88.5	55.4
Fish processing	3.8	3.5	3.2	1.7	11.1	84.5	70.9	38.3
Other manufacturing	12.7	11.7	18	17	14.4	16	17.7	17.2
Electricity and water	9.3	14.3	45.8	48.9	53.9	58.9	42.3	37.5
Construction	11.3	13.3	15.2	16	15	14.7	14.7	16
Wholesale, retail, hotels, res.	29.8	32.9	48.6	58.6	29.8	31.8	30.7	87.2
Transport & communication	61.1	45.3	36.4	87.9	31.5	90.4	36	41.2
Finance, real estate, business	150.7	194.1	236.5	203.8	197.6	239.5	326.3	355.4
Community, social services	10	15.6	13.7	10.5	8.7	7.3	6.6	7.8
Producers of govt services	368.9	354.2	299.1	378.6	322.8	404	403	400.7
TOTAL	**865.1**	**975.5**	**1067.6**	**1207.5**	**885.9**	**1273.2**	**1253.5**	**1289.7**

In terms of contribution to the GDP, the agricultural and mining sectors are more dominant than the manufacturing industry. A major factor behind this scenario concerns the extent to which natural resources are exported as raw products, rather than being processed within Namibia. Value addition from most primary resources is therefore low. This forces Namibia into a high dependence on primary exports, and limits the growth of the manufacturing industry. According to the NDP1 (1995) manufactured products accounted for just 11% of merchandise exports in 1994.

A transition from a colonial economy to a developed, high-income economy is envisaged by the Government. In order to augment the growth and resilience of its economy, diversification of the economy through industry and trade is based on the following: a gradually revitalised mining sector; a more commercial and productive agricultural sector; a more sophisticated fisheries sector; a quality, commercialised tourism sector; a diversified and productive manufacturing sector; a versatile and competitive tertiary sector.

3.2.2.3 CONTRIBUTING CONDITION: EMPLOYMENT

In Walvis Bay the **fishing industry** is the main employer, accounting for 10 000 jobs. It is estimated that 70% of all the 600 industries in Walvis Bay are either directly or indirectly dependent on the fishing industry (DANCED, 1995). Besides the fishing industry, the salt mine at Walvis Bay creates fifty jobs and NAMPORT employs 400 people. Due to the absence of trained personnel the top structure of NAMPORT comprises of mainly South Africans, while Namibian citizens are employed mainly as labourers (DANCED, 1995).

A positive input of the fishing industry in Walvis Bay is thus employment generation, however, more people than the existing infrastructure can cope with are moving or migrating to Walvis Bay, to look for jobs in the fishing industry. The implications are increasing unemployment, escalation of crime, and an increase in the tuberculosis and HIV/AIDS figures.

The Namibian Food and Allied Union (NAFAU) represents 5 000 to 6 000 members in the Walvis Bay area. According to NAFAU, unemployment, lack of sufficient housing for employees in the fishing industry, and limitations of the **Labour Act 6 of 1992**, regarding work at sea, are problems that need to be addressed (Keib, Pers.Comm., 10/2/96). Health and safety issues as well as unfair dismissal of employees are also not adequately addressed (Keib, Pers.Comm., 10/2/96). Furthermore, the European Union (EU) requirements for export of fish products do not address the health of the workers.

Although the Labour Act of 1992, addresses issues such as basic conditions of employment and termination of service, it does not apply at sea. The Merchant Shipping Act of 1951 applies to fishing vessels at sea, and in terms of it a skipper can dismiss any employee at will. This leads to a lack of job security.

In the pelagic industry the payment of sea going staff varies and is commission based, related to the amount of fish caught. The skipper is paid per ton of fish landed and after deductions the crew is paid on an agreed scale (Wilson, Pers.Comm, 12/2/96). The pelagic industry only provides seasonal jobs from March to August and employs mainly male migrant workers. The majority of the workers in the white fish industry are local females that work in the factories, mostly on a permanent basis.

Regarding **safety**, the fishing industry is regarded world-wide as the most dangerous peacetime occupation (Stuttaford, 1995). Information on reported accidents in Namibia are not available from the Office of the Workmen's Compensation Commissioner. The Captain/Skipper is supposed to log injuries/damage at sea in his logbook, and report it to the Maritime Directorate under the Department of Transport (Ministry of Works, Transport and Communications). However, the Directorate is very short staffed and in need of a new organisational structure. The result is that duties that are supposed to be performed by the Maritime Directorate are not attended to. In an attempt to enhance the capacity of the Maritime Directorate and in order to find solutions to current problems, JEJ Consultants International AS, a Norwegian Limited Company has entered into a contract with the Ministry of Fisheries and Maritime Resources to work for (and at) Maritime Directorate.

With the national unemployment rate estimated at 40-50% (DANCED, 1995), it can be expected that people will migrate to urban centres. This movement is motivated by the perception that employment opportunities are greater in these areas. The 1995/96 **unemployment** rate is estimated to be 10% in Walvis Bay (DANCED, 1995) and increasing, as the absorption capacity of industries in the study area has been exceeded, and the ongoing arrival of job seekers is worsening the already severe unemployment rate. Unemployment and poverty leads to social instability and high levels of crime and violence (Dennis Moss, 1994).

Although **crime** statistics are presently unavailable for the study area, personal communications have indicated a sharp increase in crime since Namibian Independence in 1990. Although no official research has investigated the relationship between rising unemployment and increased crime, a possible correlation does exist, and is one which needs to be addressed. In the absence of statistical evidence, personal communications have indicated that the type of crime most common in the study area is theft and housebreaking. A response to this heightened crime has been the establishment of community-based anti-crime committees. These committees are comprised of volunteer community members who, with the help of the local police, patrol their respective residential areas. The impact of this approach has been significant, and crime levels are reported to have decreased since their establishment in 1994.

Approximately 60% of the urban population in Namibia live below the **subsistence** level (below the poverty line), estimated at N$ 570 per month. Specific data for Walvis Bay is not available.

3.2.2.4 CONTRIBUTING CONDITION: HOUSING

The provision of housing in Walvis Bay needs to be dealt with as a matter of urgency. If the highest growth rate (3%-4%) presented in the Coherent Development Strategy (Dennis Moss, 1994) is to be assumed, about **11 000 dwelling units** will be required by the year **2015**. This is due, not only to the increase in population numbers, but also to the current housing backlog - the waiting list for housing in **Kuisebmond** alone is about **2000.** Furthermore, if squatting is to be controlled and overcrowding alleviated, between 500 and 800 erven will have to be serviced per annum for the next five years.

The solution of the housing problem should, however, not be seen solely as catching up in numerical terms as the importance of housing surpasses that of simply providing shelter. In obtaining a dwelling space, a family gains access to land, to a location relative to other urban activities, to utility services, to an external social and physical environment and, depending on tenure, a capital asset (Dennis Moss, 1994). The quality of housing (or urban living environments) therefore has a direct effect on people's quality of life.

Various measures have, however, been employed in order to address the housing issue at all levels of planning. One of these measures is the development of a **National Housing Policy** (NHP), which was approved by the Cabinet in July 1991. In terms of this national policy, the Walvis Bay Local Authority has to ensure:

- that adequate provision of land is zoned for housing development
- that utility services (water, electricity and sewage) be provided
- that it be involved in housing project planning and implementation
- that site-and-service schemes for self-help and self-build be set up and managed
- that it partake as a member of the SDCG in the programming and planning for the implementation and success of the "Build-Together-Program" .

In addition to the obligations prescribed above, the Walvis Bay Municipality has established a Housing Policy in terms of Section 30 (1)(I) and Section 57 (1) of the Local Authorities Act 23 (1992). These sections allow the local authority to establish a housing scheme and to acquire, maintain, let or sell dwellings. The municipalities are further empowered to grant loans subject to conditions determined by the Minister. In order to take effective advantage of these powers, the Walvis Bay Municipality has not only developed a Housing Policy, but also assigned residual funds (left over after local authority land and service provision obligations in terms of the National Housing Policy are met) to be used for such locally initiated housing schemes.

The **local housing policy** for Walvis Bay involves:

- the establishment of a fund called the Walvis Bay Housing Fund;
- the allocation of money to this fund;

- the acquisition of financial contributions to benefit the funds from whichever source;
- the appropriation of funds on internal loans for the provision of serviced sites;
- if sufficient funds are available, then loans are to be granted to those low income and middle to low income households who have no access to or assistance from financial institutions or parastatals. The limits of these loans and income brackets in which they are granted, should be set in consultation with the Ministry of Local Government and Housing and should be regularly reviewed by the Council. The Council should regularly evaluate the maximum application for loans, the interest rates and the duration over which they are granted;
- the promotion of membership of the Community Housing Development Group;
- working in close cooperation with the Ministry of Local government and Housing to achieve national goals related to housing development.

The Residential Densities Policy (1995) is a further mechanism, developed by the Walvis Bay Municipality, to accommodate the need for shelter and to respond to the increasing cost of land and services. The policy aims to control pressures for increased densities, with its primary objective being to "properly control and manage the development of residential development within Walvis Bay" (Walvis Bay Municipality, 1995). The policy sets out certain criteria and principles to be applied in assessing applications for increases in residential density. As resources are limited, it is hoped that the density policy leads to a more compact and efficient town, in which urban sprawl is minimised.

When applying the above mentioned policy in Walvis Bay, it should be noted that the Municipality does not exhibit the typical density characteristics of an urban residential area Usually, high density residential development is located near the CBD, with a decrease in densities towards the outer suburbs. In Walvis Bay, however, high density residential development, which averages at 50 units/ha, is randomly scattered. Walvis Bay's highest density areas are found in the outer suburban areas of Kuisebmond and Narraville, with the lowest being adjacent to the town centre. Large tracts of existing vacant and underdeveloped land pose opportunities for residential development and densification. These are not concentrated in any part of Walvis Bay but are rather scattered throughout the town.

Furthermore, when implementing the Walvis Bay Housing Policy the following objectives, suggested by Dennis Moss (1994), should be considered:

- meet the basic need for decent housing to promote social harmony and the productivity of the workforce;
- address the current housing backlog and make provision for assistance in the delivery of an additional 11 000 dwelling units by the year 2015;
- promote the efficient utilisation of land and provision of infrastructure in the provision of housing;
- when designing the residential areas, the access of low income communities to employment and commercial areas should be considered and improved;

- make a choice of housing options and systems available.

South African rule in Walvis Bay (and the entire Namibia) has resulted in settlement patterns typical of **Apartheid cities**. The policy of separate development was not only applied at the national level but also at the municipal, town and village levels. All the towns and formal villages in Namibia are characterised by dual settlements: a well serviced modern part for the minority and inadequate houses and shacks for the majority. Furthermore, economic development was concentrated in the urban centres while the rural areas, where the majority of the population lived, were largely neglected. The restriction of the African population to the rural areas meant that they had to migrate to the urban areas to fulfil labour contracts. Given the nature of the South African Government's contract labour system, labourers were considered temporary sojourners. This resulted in a housing stock which was unsuitable for permanent family residence.

Hostels and single quarters accommodation were provided by the South African Government and various industries to house migrant labourers from the rural areas. Urbanisation increased after Independence as a result of the lifting of restrictions on movement. Following these changes, migrants brought their families to the urban centres. This lead to severe overcrowding in the single quarters, causing major social and health problems. Over the past five years a natural spill over from the single quarters has taken place and people have started to build shacks in the surrounding areas.

A large percentage (an estimated 60 % for Namibia) of the urban population cannot afford formal housing. Alternative building materials such as plastic, wood, cardboard and corrugated iron sheets are therefore commonly used to build temporary shelters. However, due to high levels of poverty these structures are used for permanent residence.

Presently, the lack of job opportunities and drought are still contributing to the rural push, while perceptions of better living standards, social and economic opportunities are contributing to the pull of urban areas. The resultant **housing crisis** is exacerbated by the following constraints: * inadequate access to affordable land; * high costs of credit and formal housing programs; * the adoption of standards which limit the options for affordable housing; * limited public participation in the housing process, resulting in inappropriate solutions.

The demand for housing in the study area outweighs the current supply. Given that neither the private sector nor the public sector can provide housing exclusively for low income groups, the Government has recognised the need to promote a housing process that harnesses resources from the two sectors and those from the informal sector. The Build Together Programme (a low cost housing initiative which combines the public and private sector) permits households to build according to their means, and places the responsibility for shelter with each household. The demand for houses is expected to be primarily addressed through this programme.

The WBM has a target of developing 1 000 residential plots per annum. The Walvis Bay Industrial and Urban Development Project (WBIUP) aim to support the provision of 3000 serviced plots for low income beneficiaries at Kuisebmond and 200 plots for middle income beneficiaries at Lot 79 within Walvis Bay. The EEU was appointed to start EIAs in July 1996.

3.2.2.5 CONTRIBUTING CONDITION: WELFARE PROFILE

The main social problems identified in the Greater Walvis Bay are unemployment, housing shortages, crime, alcoholism, tuberculosis and AIDS. Other prevalent social issues include wife battering, child neglect and drug abuse. Various community programmes have been implemented in order to deal with these issues, however financial and human capacity are constraints that curtail the effectiveness of these programmes.

3.2.2.6 CONTRIBUTING CONDITION: HEALTH PROFILE

A strength of Walvis Bay is the extent to which primary **health care facilities** are established. The following health services are available in Walvis Bay:

2 State Hospitals (North and South Hospital),
3 clinics situated in Narraville, Kuisebmond and Walvis Bay,
2 State Doctors, 2 District Surgeons and 1 Port Health Officer.

As a general norm, the Ministry of Health and Social Services (MOHSS) aims to provide three beds per 1000 of the population on a health district level and an additional one bed per 1000 of the population on a health regional level. For the Erongo Region, where the estimated population for 1994 is 94 000, the number of beds is well above the State requirement - 5 beds per 1000 of the population, compared to the national standard of 3 beds.

Importantly, the above scenario, while being extremely favourable, needs to be viewed in contrast to the high incidence of AIDS and tuberculosis prevalent in the study area - the spread of which has serious implications for the physical well-being of the available workforce and the community at large.

As a result of the high influx of people into Walvis Bay and Swakopmund, the local authorities' infrastructure is tested and stretched to the limit. The shortage of housing has prevented the adequate absorption of migrants into the study area, and has resulted in overcrowded and cramped living conditions. The average household size in the Erongo Region is very small - 3.8 people per household versus the national average of 5.2. This indicates that most of these unemployed migrants are without relatives and have to be housed in high density accommodation facilities, namely, hostels, single quarters and compounds, all of which are traditionally reserved for the workers. These accommodation facilities are characterised by very small rooms, minimal ventilation, communal ablution

facilities, and shared eating utensils all of which contribute towards the spread of tuberculosis.

Despite highly effective control medication and regular health education programmes, **tuberculosis** (TB) notification data from 1989 to 1993 indicates an alarming escalation of TB in Walvis Bay. The total number of notified cases during this time period are as follows (Els, 1995): 1989 : 148 cases; 1990 : 240 cases; 1991 : 213 cases; 1992 : 327 cases; 1993 : 369 cases.

Tuberculosis notification data increased by 149% from 1998 to 1993, an actual overall incidence of 600/100 0000 total population, which is 50% higher than the national average (Pers.Comm., Els, 08/02/1996). The cure rate of fully treated tuberculosis cases for 1994 was above 80% while the defaulter rate of all notified tuberculosis cases were 31,2%, which is an unacceptable high percentage. The number of annual TB cases in Walvis Bay has continued to escalate, with a high of 400 in 1994 and up to 420 in 1995 (Els, 1995). Other factors underlying the contraction of TB include alcohol abuse and HIV infection (MOHSS, 1995). Social workers, operating in the Walvis Bay townships, drew attention to the high incidence of alcohol abuse prevalent in these communities.

Walvis Bay adopted the Draft National Tuberculosis Policy of Namibia in May 1995. Diagnostic and treatment activities are conducted in Walvis Bay's North Hospital as well as in the Kuisebmond, Narraville and Walvis Bay Clinics. Other participants in the TB control programme include members from the Defence Force, Correctional Services, the Namibian Tuberculosis Association, the Walvis Bay Town Council and a few members of the Kuisebmond Community (Els, 1995).

Comprehensive statistics on **HIV and AIDS** are not available for the study area. Various deductions can, however, be made by reference to national statistics. Data recording the reported AIDS cases in January to September 1995 show a total of approximately 450 cases in North Eastern Namibia and approximately 400 cases in the North West. This can be compared with roughly 240 cases in the South (including Windhoek) and 90 cases in Central Namibia, of which the Erongo region is a part (National Aids Control Programme, MOHSS, 1995).

Given that a large percentage of migrants come from North Eastern and North Western Namibia, the present migratory patterns can be expected to have a significant impact on the number of AIDS patients in the Greater Walvis Bay. However, a major obstacle to the accurate assessment of the AIDS pandemic is the failure to regularly report HIV/AIDS cases. The result is a gross underestimation of the extent to which the HIV virus is prevalent on a national, regional and local scale. This **inaccurate recording** is well illustrated in the following example: The incidence of AIDS cases treated at Walvis Bay Hospital, from January 1995 to August 1995, totalled 98 (Pers.Comm., Kahele 06/12/95). In contrast, the Health Information System reported only 3 new cases of AIDS in the period January 1995 to December 1995 (HIS, 1995).

Numerous HIV/AIDS related dilemmas have emerged in the work place. This scenario has necessitated the compilation of guidelines and strategies to deal with the impact of HIV/AIDS in the work environment. These guidelines concern, *inter alia*, the terms of appointment and service, benefits and occupational transmission, compensation measures, information, education and communication (MOHSS, 1996).

An AIDS committee presently operates in the Erongo region. It is comprised of members of various ministries, especially MOHSS, as well as church members and others who may have something to contribute. Their prevention programmes include primarily the following activities:

- condom distribution;
- AIDS awareness through theatre;
- awareness programmes in the schools;
- 'Let's Talk About Sex' meetings .

The incidence of AIDS within the Greater Walvis Bay is a factor which cannot be treated lightly. People infected with the HIV virus and suffering from AIDS are mainly in the 20 to 50 year age group - the economically active part of the population (Burkhardt, Pers.Comm., 06/2/96). The spread of AIDS within this age group results in a "loss of employment and individual income, loss of employees without adequate availability of replacement, and a subsequent decline in production and national income" (MOHSS, 1996a). With the study area being a large employer and contributor to the GNP, this scenario poses a severe threat, not only to the social and economic stability of the study area, but also to Namibia as a whole.

According to the **Health Information System** (HIS), National Level, the statistics for the Walvis Bay District for the period January 1995 to December 1995 are the following (MOHSS, 1996b):

TABLE 9: DIAGNOSIS OF POPULATION UNDER 5 YEARS OLD (Outpatient Department)

RANK	DISEASES	NO of PATIENTS	% OF NEW PATIENTS
1	Ear, nose, throat, mouth	1189	23.1
2	Acute upper respiratory	1104	21.4
3	Skin disease	1036	20.1
4	Diarrhoea without blood	878	17.0
5	Other respiratory	523	10.2
6	Eye disease	281	5.5
7	Other gastro/endocrine	183	3.6
8	Pneumonia	148	2.9
9	Trauma	144	2.8
10	Other paediatric disease	94	1.8
11	Intestinal worms	57	1.1
12	Other diagnosis	54	1.0

TABLE 10: DIAGNOSIS OF POPULATION 5 YEARS AND OLDER (Outpatient Department)

RANK	DISEASES	NO of PATIENTS	% OF NEW PATIENTS
1	Skin disease	3 776	13.6
2	Musculo-skeletal/Neuro.	3 367	12.1
3	Acute upper respiratory	2 734	9.9
4	Ear, nose, throat, mouth	2 539	9.2
5	Other respiratory	2 457	8.9
6	Trauma	2143	7.7
7	Other gastro/endocrine	1 698	6.1
8	Vaginal discharge	1 283	4.6
9	Urethral discharge	1 261	4.5
10	Eye disease	1 134	4.1
11	Other diagnosis	916	3.3
12	Urinary tract infections	897	3.2
13	Obstetric/pregnancy-related	843	3.0
14	Other genito-urinary	777	2.8
15	Gynea-related	768	2.8
16	Diarrhoea with blood	637	2.3
17	Genital ulcers	543	2.0
18	Tuberculosis, new	521	1.9
19	Pneumonia	309	1.1
20	Asthma	307	1.1

New **AIDS** cases ranked 34 with only **3 cases** being treated at the outpatient department. As environmental health problems are often associated with poor people only the outpatient statistics were provided. The contribution of environmental health hazards to these diseases have not been researched. However, informal interviews with residents of Walvis Bay have revealed that asthma and bronchial problems occur on a regular basis, and even people who haven't experienced asthma before, suffer from asthma in Walvis Bay. Statistics for Walvis Bay are not available for life expectancy, infant mortality and the top three causes of morbidity (statistics quite often used in surveys and questionnaires).

3.2.3 STATUS OF NATURAL ENVIRONMENT

The arid conditions experienced along the Namibian coast are a result of several climatic factors, namely, the subtropical South Atlantic Anticyclone, diverging South East Trade Winds, the north flowing Benguela Current, and the absence of convection with temperature inversion in the lower atmosphere.

3.2.3.1 CONTRIBUTING CONDITIONS: TEMPERATURE AND RAINFALL

The climate of Walvis Bay is characterised by mild temperatures and a low, highly variable rainfall. Fog is the dominant form of precipitation within this coastal zone. Due to the climatic conditions, soil development is limited, and plants are highly adapted to harsh conditions. To monitor climatic conditions, a weather monitoring station is situated at Pelican Point, on the Walvis Bay lagoon. Annual **temperatures** for Walvis Bay are the following:

Average Temperature	16
Average Max. Temperature	20
Average Min. Temperature	11

The coastal zone of the Erongo Region is characterised by mild summers and cool winters. This is a result of the moderating influence of the cold Benguela Current. The Benguela current running along the coast generates an upwelling of cold water to the coastal zone from greater depth in the Atlantic Ocean. This water is extremely rich regarding nutrient content, and the basis for the production of plankton in the coastal zone, which in turn creates the basis for the wealthy coastal fishing waters.

The Benguela current and the associated cold water upwelling system has a profound effect on the climatology along the coast. The effect of the current is enhanced by winds blowing from the sea. Air saturated with moisture create banks of fog in the coastal zone for at least 160 days a year. The relative humidity on these days is about 80% in the coastal area and a precipitation of approximately 130 mm of fog during a year, eight times more than the average rainfall over most of Namibia.

The coastal area experiences little seasonal fluctuation in temperature compared to areas further inland. A temperature inversion typically occurs between 600 m and 1800 m above ground. This is due to variable upper air temperatures, and subsidence which occurs as a result. These inversions have serious implications for air pollution dispersal, as pollution is contained beneath the inversion layer. The climatic conditions of the study area inhibit air

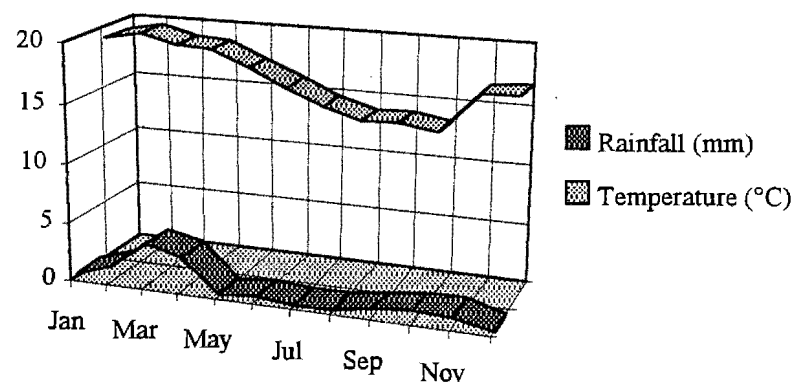
pollution dispersal, and must be considered when the expansion of any urban area is planned.

The **rainfall** in Walvis Bay is low, seasonal and highly variable. Rain originates from thunderstorms or showers of high intensity and short duration. In general, there are less than 30 rain days per annum, 90% of which occur during the summer months. The mean annual rainfall for Walvis Bay is 23 mm p.a.

During the spring and summer months, onshore winds blow from the Atlantic Ocean onto the mainland, and moves moist air onshore. This air rises due to turbulence, and forms a layer of stratus and strato-cumulus cloud at fairly low levels. This cloud is generally referred to as **fog,** and often result in heavy drizzle along the coast. However, during the winter months the development of fog is attributed to other factors, namely, advection caused by the movement of warm air over the cold Benguela current, radiation, and inversion caused by the presence of low cloud cover. This fog can extend inland for about 112 km, and is an important source of moisture to plants and animals in the desert. Fog regularly occurs throughout the year, with the resulting precipitation amounting to approximately 35-45 mm annually at the coast, and about 20 mm per year 40 km inland.

The dominant **winds** in are south-westerly and north-easterly winds. The south-westerly wind is predominant, causing a movement of desert sand in a northerly to easterly direction. Less prevalent winds include easterly berg winds, which result in high temperatures and dust storms; and land and sea breezes, which result in daily changes of wind direction and velocity. Land-to-sea breezes are significant because they blow polluted air offshore during the day, however, at night, sea-to-land breezes result in pollutants being blown back to land.

Figure 1: Mean Monthly Temperatures and Rainfall for Walvis Bay



(Source: Jackson, undated)

3.2.3.2 CONTRIBUTING CONDITIONS: KEY ECOSYSTEMS

Areas of conservation importance in Walvis Bay and surrounding areas include the following: Walvis Bay wetlands, Swakopmund salt works, lichen fields, gravel plains, dolorite dykes, sand dunes, rivers and archaeological sites.

The key ecosystems are the following:

Walvis Bay wetland (lagoon, mudflats and saltworks)
Walvis Bay (bay area)
inland dunes (desert)
coast and beaches

Walvis Bay lagoon, a saltwater wetland that is directly open to the sea, is one of the major wetlands in the Erongo region. The Walvis Bay Lagoon, historically, was formed by the Kuiseb River. Periodic flood events ensured that sediment build-up within the lagoon was cleared, and that the mouth of the lagoon remained open. However, due to natural climatic conditions and upstream impoundments, the lagoon has not been washed out for a long time. This is resulting in the silting up of the wetland and the nearby harbour in Walvis Bay.

Resident seabirds regularly visit coastal wetlands to feed and rest, for example, large numbers of Cape Cormorants and Black-backed Gulls are often sighted at the Walvis Bay lagoon. Guano platforms, along the Erongo coastline, are important breeding sites for many resident seabirds. Examples of such platforms are found between Swakopmund and Walvis Bay (Bird Rock platform), at the Swakopmund salt works, and at the Cape Cross lagoons. The significance of the platforms are highlighted by the Bird Rock platform near Walvis Bay which supports the only breeding population of Great White Pelican in Namibia, and up to 4% of the world population of Crowned Cormorants.

The Walvis Bay Sewerage Works is regarded as an ecologically important freshwater habitat for ducks and geese.

3.2.3.3 CONTRIBUTING CONDITIONS: NATURAL RISKS

Climatic conditions have serious consequences on development in the study area. As a result of the low rainfall of the area, the water supplies available for the expansion of towns and industries is limited. This forces authorities to consider expensive alternate options for the increasing of water supply. Moreover, the presence of an inversion layer, as well as the high occurrence of fog, cause problems for the dispersion of air pollution. Pollution particles are hydrophilic, and attract the water particles fog comprises of. As a result, fog concentrates pollution, and limits pollution dispersion. Even though the dominant winds in the region are regularly strong, and disperse air pollution, sea-to-land breezes can result in the pollution being blown back to land.

Specific information regarding flooding or seismic activity has not been researched, but floods do occur from time to time. Natural risks include the following: the arid desert environment; water-shortage; sand dune movement (northerly movement of wind-blown desert sand); sulphur eruptions (causing depletion of fish stocks) and red tides. Sulphur eruptions and red tides occur mainly in summer, between January and March, when the sea is particularly calm. Even though these events are seldom toxic to humans, they kill marine fauna as a result of oxygen starvation.

Natural risks must be kept in mind when any further industrial areas are planned, for example, the development of an Export Processing Zone in Walvis Bay. Sand dune movement may impact on the functioning of the port (currently being monitored by the CSIR), while sulphur eruptions and red-tide have a detrimental effect on the fishing industry.

3.2.4 INFRASTRUCTURE

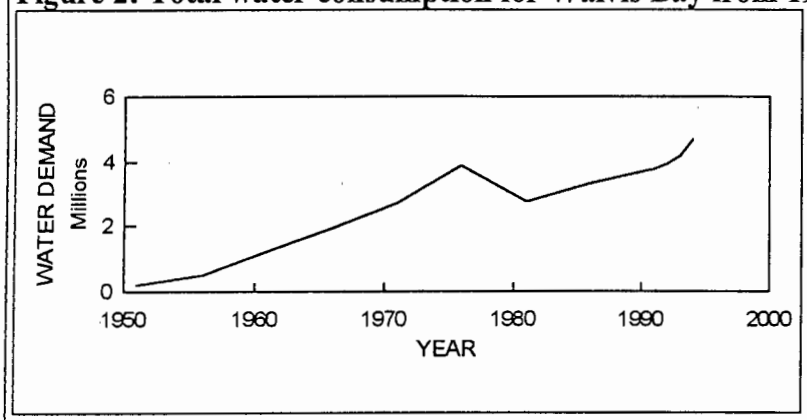
The local Authorities are responsible for the provision of municipal services such as water, sewage and electricity supply to the urban areas but do not have any jurisdiction outside their respective municipal areas. The local authorities generate their own income through rates and taxes on fixed properties as well as by the sale of water and electricity to the general public at large (DANCED, 1995). Additional funding may be requested from the government. The municipalities are responsible for solid waste disposal as well as for waste water treatment from residential areas and industry in general, but not the fishing industry (DANCED, 1995).

3.2.4.1 CONTRIBUTING CONDITION: WATER USE

The annual water demand in Walvis Bay (based on municipal figures) has risen from 3.15 million m^3 in 1984 to 4.67 million m^3 in 1994 which is a forty eight percent increase. It should be noted that the total water consumption in 1994 in Walvis Bay increased by about 11.4 percent when compared to the previous year.

From Figure 2 it can be observed that the water demand in Walvis Bay has increased quite substantially since 1991. This is largely attributed to the needs of the fishing industry and those of Kuisebmond. Kuisebmond and the fishing industry accounted respectively for twenty and fifteen percent of the total water consumption in 1994. The water demand of Kuisebmond increased by 57%, from 620 205 m^3 in 1991 to 990 889 m^3 in 1994, while those of the fishing industry increased by 76% from 1991, to reach a figure of 704 000 m^3 in 1994. The latter increase is attributed to the fact that production in the industry has nearly doubled between 1991 and 1994. The increase in water usage in Kuisebmond is as the result of an increase in population numbers.

Figure 2: Total water consumption for Walvis Bay from 1951 t o 1994



(Brummer, 1994/95 : 79)

The other major users of water in Walvis Bay are the port, Naraville and Walvis Bay Proper, which accounted for five percent, ten percent and fifty percent of the total water consumption respectively. According to the Walvis Bay Municipality, the cost of water is expected to triple over the next three years, which will result in a corresponding decrease in water consumption. This decrease is estimated at about twelve percent by 2005 and fourteen percent by 2020. As a result of these anticipated price increases, municipalities have already begun increasing the price of water which they are charging to consumers. Walvis Bay, for example, plans to increase its tariffs by 48%, to reach an average of 198 cents per m^3 for 95/96. The social consequences of the sharp increase in water prices, especially to poor and remote communities should be investigated.

Water management. The Water Management Section of the WBM is responsible for both the bulk water supply as well as the distribution of water within the jurisdiction of Walvis Bay. The water level in the monitoring boreholes used to be read on a three-monthly basis, but in this way fluctuations in the water levels after floods in the Kuiseb could not be observed. During 1993 it was decided to start with monthly monitoring.

The main sections of the Lower Kuiseb aquifers that are used are the Swartbank and Rooibank A and B areas, which became one source after the integration of Walvis Bay in March 1994. The water table is not very sensitive to the small floods experienced in recent years and virtually no increase in water tables was observed after floods. The water table, on the other hand is very sensitive to changes in production (abstraction). Production is the total volume of water abstracted from each individual borehole within the Kuiseb aquifers and supplied via the various reservoirs to the Mile 7 reservoir (WBM, 1994/95).

As the water demand has increased and is still increasing, and the sustainable yield of the Rooibank aquifers are 3,0 million m^3 on the short term and 2,0 million m^3 on the long term, it is clear that other water resources would have to be developed to augment the

supply to Walvis Bay. Desalination appears to be the best solution and should come into production not later than 1998 (WBM, 1994/95).

3.2.4.2 CONTRIBUTING CONDITION: SANITATION SYSTEM

The overall sector policy states that sanitation services have to be made available to all Namibians at an affordable cost. It also emphasises this should be done equitably with governmental and community participation so as to achieve mutually satisfactory solutions as well as environmental sustainability. Presently, the responsibility for treating sewage is vested on the local governmental organisations. However, no mention is made as to the quality of effluent to be discharged nor enforcing mechanisms put in place.

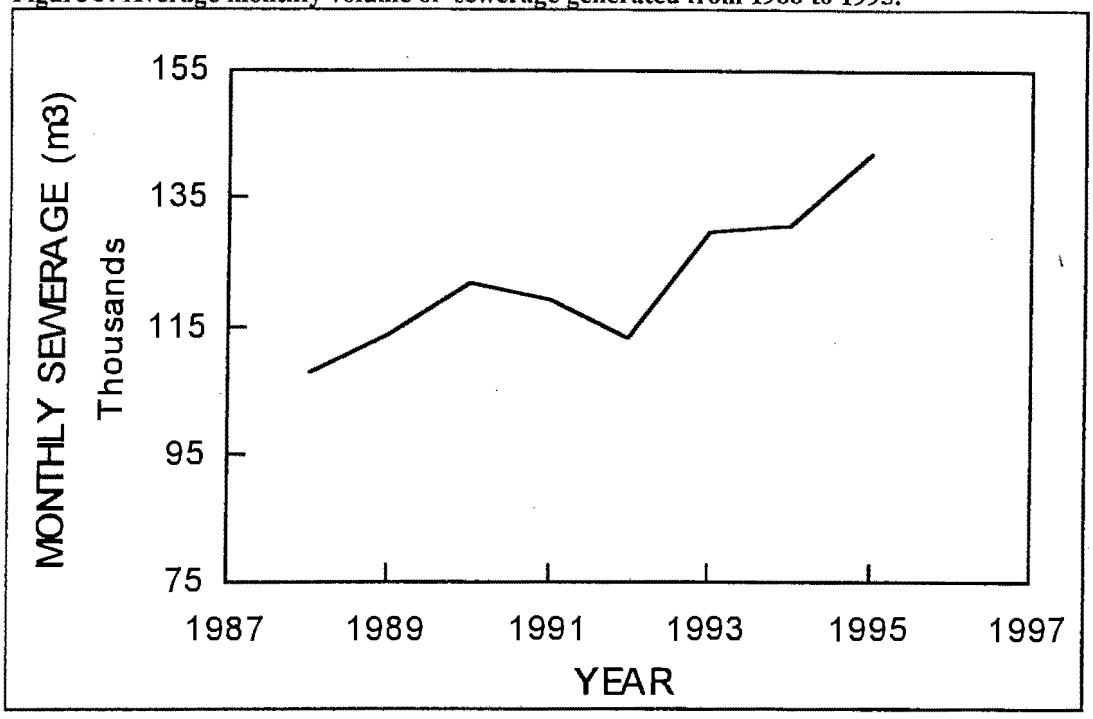
The Sewerage Branch of the Walvis Bay Municipality fulfil the function of conveyance and treatment of waste water as well as controlling and enforcing the Drainage and Plumbing Regulations of the Council. The functions of the Branch are divided into three distinct divisions (WBM, 1994/95):

- Reticulation system
- Waste water treatment works
- Purified effluent distribution

Walvis Bay is served by a trickling filter (biofiltration) sewage treatment facility with a design capacity of 5 Ml per day. Current flow to the works is approximately 5.5 Ml per day and is expected to be 8 Ml per day by the year 2000 and to at least 10 Mld by the year 2008. In March of 1995, the construction of an additional storage reservoir was commissioned. In addition, the existing Posveer ditch and secondary sedimentation tank (SST) were recommisioned to handle 3 Ml per day. An anaerobic digester, sludge drying beds and the refurbishing of a disused sedimentation tank for thickening waste activated sludge from the Pasveer ditch, and the construction of an additional storage reservoir for treatment effluent were also approved. The total cost of the project was estimated at N$ 4 881 000 (WBM, 1995).

The whole of the town is reticulated (including Kuisebmond and Narraville) and all have connections to the towns sewerage system. Approximately 60% (currently about 3.3 Ml per day) of the treated effluent is reticulated in a separate pipeline for watering road verges and open space with some to bulk consumers who pay for water received. In the water-scarce situation of the region this reduces the demand for potable water which would otherwise be used for such purposes. the treated water is metered at the consumers end. Effluent not reticulated is discharged to reed beds adjacent to the works together with the effluent from the primary sedimentation tanks. These beds provide a valuable wetland and greenbelt which offer protection to the eastern side of town from the desert winds.

Figure'3: Average monthly volume of sewerage generated from 1988 to 1995.



Due to the high water table, it is necessary to monitor the total dissolved solids (TDS) of incoming waste water on a continuous basis. For this purpose weekly samples are taken at various points in town and analysed. Combined with the inflow from Meersig (1400 mg/l), Kuisebmond (1750 mg/l) and Narraville (1800 mg/l) the average TDS at the inlet to the Treatment Works amounts to 2300 mg/l (WBM, 1994/95).

The total length of sewer lines constructed and maintained during 1994/95 was 6 196m, while a total of 152 new manholes were built and 28 were rebuilt. However, the existing Walvis Bay sewage treatment infrastructure is currently operating beyond its present design capacity and the WBM has identified six options for upgrading and expanding this infrastructure (WBM, 1996).

The sewage tariff rate consists of two components namely an annual "basic tariff" and a "treatment tariff" based on the water consumption for domestic purposes; floor area for business, hotels and guest houses; and gross area for industries.

Wastewater treatment works. The rapid expansion of Walvis Bay is placing an increasing demand on the Treatment Works and the and the 5,5 ml/d capability of the Woks was exceeded quite often. Although the capacity of the Works is currently 5,5 Ml/d, 6,5Ml/d can be treated for short periods of time. In spite of exceeding the capacity of the Works, a good purified effluent water quality could still be maintained.

During 19945/95 1, 713 million m^3 of purified effluent were produced of which 1, 108 million m^3 (65%) were utilised (WBM, 1995/96).

3.2.4.3 CONTRIBUTING CONDITIONS: WASTE MANAGEMENT

The functions of refuse removal and street cleaning were transferred from the then Health Department of the Department of the Town Engineer during January 1994. Together with this the equivalent function in Kuisebmond and Narraville were also transferred to this Department (WBM, 1994/95). The Cleansing Service Department (CSD) operates in the high income and CBD itself, while small private contractors operate in Kuisebmond.

There are currently close to 1 0000 business, industries, institutions etc. in Walvis Bay Proper, which all have some form of refuse cubicle, albeit brick cubicles, drums, 85l bins etc. The major problem identified is that few businesses clean their cubicles after refuse had been removed, resulting in ideal breeding grounds for flies (mostly the case at restaurants, hotels, butcheries and take-aways which generate wet refuse).

Currently all refuse generated in Walvis Bay is disposed of at a largely uncontrolled "tip" site, which is situated approximately 1,5 km from the eastern part of the town on a 5 ha site. According to the South African Department of Water Affairs and Forestry, this site has a Class II rating. This disposal site has been in operation for 36 years and is considered to have a remaining lifespan of about 3 years. The disposal operation has been privatised but there has been little or no monitoring of the contract by the Walvis Bay Municipality. There is no formal recycling, however, scavengers operate on the site.

One of the most serious problems associated with Walvis Bay's waste disposal site is the lack of a separate disposal facility for hazardous waste which is currently dumped together with the municipal waste, waste is not weighed or its composition checked. Another problem is the lack of facilities to collect and process the bunker oil from ships visiting the harbour (Van der Meer, Pers.Comm., 08/02/96). Car oil and other hazardous wastes produced by industry are also posing major problems as some of these wastes are put into containers and dumped in the desert (Van der Meer, Pers.Comm., 08/02/96). Moreover, the waste that is disposed on the site is not properly covered although machines operate at the site. This enables people who are scavenging on the site, to open the black plastic bags and other containers. As a result, litter is blown out of the site and into the desert. This problem is further compounded by the damage to the surrounding fence which controls access to the site and prevents the spread of wind blown litter. Furthermore the waste dump may also be polluting the ground water as the water table at the site coincides with the lower level of the dump (Van der Meer, Pers.Comm., 08/02/96).

The CSD operates two Tippack trucks and a conventional standard open tipping truck. The two Tippack vehicles are currently being fitted with 12 cubic meter compactor bodies. The service appears to operate effectively as the town is very clean and streets are frequently swept. However, as no monitoring is carried out quantities of waste are not known. Domestic waste generated is estimated at an average of about 27 tonnes per day

and industrial waste 25 tonnes per day of which about one-third is collected. Residents and business pay a tariff for the collection of solid waste dependent on the number of times (once or twice) containers are collected. There is also a special contribution from the General Property Fund (property tax) for maintenance of street litter bins. In addition for business, industries and institutions a "stepped" disposal tariff is also levied based on volume of refuse generated/removed to cover the cost of disposal at the landfill site. The annual revenues collected for the collection and disposal service (approximately N$ 2 million) cover the cost of the service and are exclusively used by the Cleansing Services Department for direct services and payment of small contractors and the contractors operating the disposal site (WBM, 1996).

The total volume of routine refuse removed by the Cleansing Branch during 1994/95 was as follows:

TABLE 11: VOLUME OF ROUTINE REFUSE REMOVED 1994/95

	Volume (m^3)	Loads
Walvis Bay Proper	38753	2361
Kuisebmond	16833	1828
Narraville	8460	760
Total	64046	4949

(source: Walvis Bay Municipality, 1994/95)

The payment of refuse removal levies is compulsory for domestic refuse, while business, industries, institutions, etc. have an option whether they want to make use of Council's service or not.

The Walvis Bay Municipality is aware of the waste management crisis and has commissioned consultants to investigate the problem. Thus far, it has been recommended that the Walvis Bay Municipality produce a draft terms of reference for the selection of a new waste disposal site and for the environmental impact assessment process that should accompany the site selection process.

Cleaning of beaches. Littering is a major source of pollution on the beaches and inland areas. This problem is a direct result of the lack of environmental awareness amongst local residents and tourists (DANCED, 1995). This is reflected in the figures of waste collected in annual beach clean-up campaigns at the popular angling sites south of Walvis Bay. In the 1991 clean-up, 365 kilograms of litter was collected from a 20 km stretch of beach, while in the 1990 and 1989 beach clean-ups, in the same area, 518 kilograms and 260 kilograms of litter were collected respectively. During November and December 1994 the Cleansing Branch used bulldozers and the front end loader for the burial of dead seals.

Beaches within the municipal town boundary as well as from the Namib Naukluft National Park border to the south of Walvis Bay to Dolphin Beach and from Langstrand to the Swakop River mouth is cleaned by the Cleansing Branch.

Garden refuse. Residents requesting the removal of garden refuse, first pay the required levy and after presenting the receipt to the Supt Sanitation of Foreman, they are then put onto a waiting list. Such special removals are only done on Wednesdays. Approximately 2917 m^3 of garden refuse were removed against payment in 1994/95.

3.2.4.4 CONTRIBUTING CONDITION: POWER/ENERGY SUPPLY

Currently Walvis Bay is supplied with electricity by the national electricity authority SWAWEK, via double 66 kV overhead lines which supply the town at two locations, Ruby and Paratus, where 66/11 kV switching stations are located. From Paratus the Walvis Bay Municipality (WBM) supplies electricity at 11 kV to four main switching stations, via double feeders, and then to distribution rings with approximately 102 11 kV/400V step-down transformers. Service to consumers is, other than a few major consumers who are supplied at 11 kV, either 3 phase 400 V supply or single phase 230 V supply. All distribution is now placed underground primarily because of corrosion and high maintenance costs to overhead equipment.

Electricity is purchased by WBM from SWAWEK and WBM is responsible for distribution within the whole Walvis Bay district (including Kuisebmond and Narraville). The electricity service operated by WBM has historically made a surplus of between 10% and 15% which is used to subsidise WBM non-remunerative services. In October 1995 a new "stepped" tariff structure was introduced to encourage conservation both by domestic consumers, small power consumers and bulk power consumers. The tariff makes available a basic 20 ampere maximum service for low income domestic consumers at a monthly charge of N$ 16 plus N$ 0.165 per kWh.

The bulk tariff paid by the WBM to SWAWEK is currently N$ 32.5 per kW of maximum demand and N$ 0.064 kWh and maximum demand charged by SWAWEK is 70% of peak demand if the maximum demand is less than or equal to the peak demand. With very high peaks occurring during the fishing season WBM attempts to keep a check on peak demand to avoid paying bulk charges which it considers do not reflect the "true maximum demand".

No development of the system in the town have occurred since 1971, and in 1992 (prior to reintegration of the town into Namibia) an electricity "master plan" was prepared by consultants which projected that the demand in year 2 000 would be approximately 23MW. This demand has already been reached with current demand at 23.2 MW in May 1995 and a current maximum supply of 30MW available at Paratus. Sale of electricity (approximately 6 000 domestic consumers plus port, industry and commerce) has been growing over the past three years at approximately 8% per annum in maximum demand (kW) as well as energy (kWh). Based on this growth WBM expect the current maximum supply will be fully utilised within the next two years and the demand in 2002 will reach 60MW.

Capital works and operation and maintenance of the 11 kV system in the town is carried out by the Town Electrical Department (direct labour) which has a total staff of 46. The department also provides electrical engineering services to others in the town. However, work on the 66 kV supply system is carried out by contractors.

Walvis Bay Municipality is responsible for the distribution and provision of electrical services within the Walvis Bay District and purchases its electricity from NAMPOWER. This electricity reaches the Walvis Bay Paratus substation through a 66 kV overhead line from Walmund distribution station. This translates into Walvis Bay having a firm supply of electricity from NAMPOWER of 30 M.

From Table 12 it can be seen that Walvis Bay will experience a shortage in the supply of electricity if the annual growth rate is assumed to be 4.35 %. However, if a growth rate of 8 % is projected, then an electrical shortage is expected as from 1998.

TABLE 12: PROJECTED MAXIMUM DEMAND GROWTH FOR WALVIS BAY

Year	4,35% Growth (MW)	8% Growth (MW)
1994/95	23,116	23,116
1995/96	24,122	24,965
1996/97	25,107	26,962
1997/98	26,265	29,119
1998/99	27,408	31,449
1999/2000	28,600	33,964
2000/01	29,844	36,682
2001/02	31,142	39,616
2002/03	32,497	42,786
2003/04	33,911	46,208
2004/05	35,386	49,905
2009/10	43,782	73.327
2014/15	54,170	104,749

Therefore, to cope with the projected growth in demand, two options for the upgrading and expansion of bulk electricity supply are currently being investigated.

3.2.4.5 CONTRIBUTING CONDITION: TRANSPORTATION

Road infrastructure. Walvis Bay and Swakopmund are linked to the national road network by a bitumen road (B2 Highway), which extends to Windhoek via Karibib and Okahanja. At Karibib, the bitumen road branches off northwards to Tsumeb and

Grootfontein via Otjiwarongo and Otavi. These routes link the Walvis Bay Harbour to the rest of country, facilitating the movement of goods. Simultaneously, the coastal area is made accessible to tourists, thereby promoting the tourism industry and the economy as a whole. These road are being used as extensions for the Trans-Kalahari and the Trans-Caprivi Highways, which are presently being constructed.

The Trans-Kalahari Highway will link Namibia, Botswana and South Africa. The Namibian section of this highway consists of 750 km of surfaced roads stretching from Walvis Bay to Gobabis via Windhoek. The remaining section from Gobabis to Buitenpos on the Botswana border is still under construction (upgrading from gravel to bitumen) and will be completed by April 1996. The upgrading of the Botswana section of the Trans-Kalahari Highway has not yet been started and it is hoped that it will be completed by the end of 1998. The Trans-Kalahari Highway will enable Botswana to utilise the Walvis Bay Port facilities, which will generate an income for study area. The highway also shortens the route from Walvis Bay to Gauteng in South Africa by about 500 km (The Investor, 1994). With the use of this highway, the travelling time for goods transported to and from Gauteng, is seven days shorter if Walvis Bay Harbour is used instead of South African ports. In this way the Walvis Bay Harbour hopes to attract a percentage of the imports and exports moving through South African harbours.

The Trans-Caprivi Highway stretches from Rundu in the Okavongo Region to Katimo Mulilo in the Caprivi Region and will link Namibia to Zambia, Zimbabwe and northern Botswana. This highway is being upgraded in stages and the Namibian section should be completed by the end of 1996.

For all countries concerned, an export route through Walvis Bay to Europe and America would save several days of sailing time, when compared to using the South African ports of Durban, East London, Port Elizabeth and Cape Town (The Investor, 1994). By enabling increased movements through the Walvis Bay Harbour, this transport route is expected to have a positive influence on trade and tourism in the region.

Apart from the bitumen surfaced roads, Walvis Bay is also connected by two good quality gravel roads, one from Windhoek to Swakopmund and the other from Windhoek directly to Walvis Bay. The section of road between Swakopmund and Walvis Bay is presently being re-routed, as the bridge on the section of the road was declared unsafe (reinforced concrete had started to corrode making the bridge unstable).

Although the road network appears to be a major asset to Walvis Bay there are a number of threats which may arise in the future due to increased traffic. Deterioration of roads is potentially the most serious threat, if present funding levels to maintain them, are not sustained. Another problem is that the roads and bridges forming part of the Trans-Kalahari and Trans-Caprivi Highways are extremely narrow, which may result in increased accident rates. Furthermore, the high incidence of fog conditions and wind blown sand on the road between Swakopmund and Walvis Bay, results in limited visibility thereby

increasing the accident rate. This is exacerbated by an increase in heavy duty vehicles to and from Walvis Bay.

Railway infrastructure. A railway network connect Walvis Bay and Windhoek via Swakopmund, Usakos and Okahandja. The railway line from Windhoek follows two routes namely one to South Africa and the other to Gobabis. Furthermore, from Usakos, there is a railway line heading northwards to Tsumeb and Grootfontein

The rail service is predominantly freight-orientated with a wide variety of services, such refrigerated transport and a comprehensive container service. International cross-border transport operations are increasing and will continue to increase with the completion of the Trans-Kalahari and Trans-Caprivi Highways. At the Grootfontein and Tsumeb Stations, the warehousing facilities for the transhipment of goods to and from road vehicles, enable Central African exports and imports to be routed through Walvis Bay Harbour.

Aerodromes. The military aerodrome in Walvis Bay forms a vital link to the harbour for the export of fresh fish. It is also utilised by neighbouring countries as a quick link to the harbour for the export of their goods. The Government will spend N$ 11,26 million over the next four years to upgrade the runway, taxiways and aprons and installing an instrument landing system, approach lighting and a stand-by generator. Swakopmund and Rooikop also have aerodromes which service regular flights from Air Namibia.

Public transportation. Unfortunately data on public transportation was not collected during the information gathering process for the Baseline Report: CZMP for the Erongo Region (1996).

3.2.4.6 CONTRIBUTING CONDITION: COMMUNICATION

Nampost and Telkom are responsible for the provision of postal and telecommunication services throughout the country. Since both of these organisations are parastatals operating on business principles, any investment by them has to be financially justifiable.

Walvis Bay is served by one post office in Walvis Bay. A secondary exchange at Swakopmund has end connections to Henties Bay, Arandis and Walvis Bay.

3.2.5 ENVIRONMENTAL HAZARDS

3.2.5.1 CONTRIBUTING CONDITIONS: WATER POLLUTION

Water pollution is discussed regarding maritime pollution as well as ground water pollution. In terms of the control of **maritime pollution**, the plans dealing with emergency situations, in the Walvis Bay Harbour, are insufficient and rehearsal procedures are not carried out on a regular basis. The sources of maritime pollution in the port, include oil spills, waste from ships and commercial activities.

Currently, Namport is unable to adequately cope with large **oil spills** and the following are examples of recent accidents, as supplied by the Namport's Risk Manager:

- 1993 - there were 6 recorded minor oil spills.
- 1994 - there were 12 recorded minor oil spills.
- 1995 - there were 9 recorded minor oil spills and 1 major oil spill.

These figures highlight the importance of an adequate oil spill contingency plan, as well as the necessity of having the correct equipment for oil spill emergencies. As a result, a consignment of equipment to aid in the training of oil spill containment is arriving in March 1996 from Norway. Moreover, Walvis Bay does not have adequate facilities for the storage and processing of bunker oil. This causes a major problem as ships tend to dump their bunker oil out to sea (Van der Meer, Pers.Comm., 08/02/96).

Another source of maritime pollution, is the **dumping** of waste from ships in and near the harbour. This problem is aggravated by the lack of a waste collection service for all ships in the harbour, as well as for those anchoring in the bay. Ships within the bay area are charged for this service irrespective of whether they make use of it or not (Van der Meer, Pers.Comm., 08/02/96). Unfortunately substantial amounts of waste are still thrown over board, resulting in waste being washed ashore on the beaches between Swakopmund and Walvis Bay. Sewage from ships is also let out into the bay and harbour, thereby polluting the water.

Commercial activities in the harbour occasionally cause minor oil spills and heavy metal pollution of the sea water in the harbour. Other sources of pollution, include the anti-fouling paints from the dry docks and the high organic pollutants in effluent water from the fish factories (DANCED, 1995). Waste water from the fish processing factories is also let out directly into the sea in the vicinity of the harbour (DANCED, 1995). The effluent from the factories is not currently monitored and no formulated quality standards to reduce environmental pollution are in place. Furthermore, waste oil is only received by Wesco Scrap for recycling, (they don't accept oil of a poor quality) or by the Works

Department of the WBM to be used for spraying the sand over the water supply pipelines. No appropriate mechanisms are thus in place to cope with waste oil from ships.

Marine pollution is of major concern, as it not only threatens the natural systems of the lagoon, but also the clean water required for fish processing in the fishing industry. As the trade through Walvis Bay Harbour increases and the port expansion plans are executed, the threat to the natural surrounding environment will increase correspondingly. In addition to threats in the form of oil spills and waste from the ships visiting the harbour, the absence of a bunker oil storage and processing activities will greatly increase the chances of oil pollution as more bunker oil will be dumped into the sea. Another threat to the ecology of the lagoon will be high silt level generated from the increased dredging of the harbour.

Groundwater pollution. Leaching to ground water resources from the solid waste dump site in Walvis Bay is a potential problem which needs further investigation (DANCED, 1995). Monitoring of seepage from the waste dump is currently not taking place.

3.2.5.2 CONTRIBUTING CONDITIONS: AIR POLLUTION

Climatic conditions in Walvis Bay inhibit air pollution dispersal, and must be considered when the expansion of any urban or industrial area is planned. As a result of temperature inversions, pollution is contained beneath the inversion layer. Air quality is not currently monitored and no emission control standards are in place.

Air pollution in Walvis Bay is mainly created by the fish factories, in the form of **odour pollution.** The Municipality of Walvis Bay and other key affected parties maintain that odour pollution in Walvis Bay due to the fish factories is damaging the town's prospects of development as a tourist attraction. There have also been many letters of complaints by inhabitants of Walvis Bay to newspapers and the Municipality as a result of offensive smells.

Fish processing in Walvis Bay can generally be classed into two categories: processing for human consumption, or conversion of fish catches to a dry meal that is destined for animal feed (fish-meal). In the latter case, there are no chilling facilities on trawlers or at the process plant, to control rotting of material prior to processing. Technical tours of some fishmeal factories, conducted for the Walvis Bay Municipality by CSIR-Watertek identified problem areas regarding offensive odours as follows (Clark, 1993):

- As a result of depleted marine resources, fisherman have to travel further for catches, or may take longer to fill a hold, and without refrigeration facilities on their trawlers, the catch rots before unloading from the trawler at the wharf. On other occasions, heavy catches can lead to bottle-necking and delays at the wharf, again giving rise to rotting fish.

- Unloading of rotten fish at the wharf gives rise to odour emission which is difficult to control because containers are not covered. However, unloading is over short periods, and is thus only a sporadic source of odour, and only if catches are not fresh.
- At present, there appears to be no mechanism whereby fisherman are encouraged to try and control rotting of their catches. Processing rotten fish is a prime source of offensive odour, and the meal from it, having a poor protein value, fetches a reduced price.
- Oil-free direct-flame dryers, which are less expensive than indirectly heated steam units (technically preferred as heat damage of product is reduced and efficient recovery of condensables is possible) are used.

After analysing substances found floating on top of stickwater in a concentrator from a fish meal factory, the Fishing Industry Research Institute (UCT, 1984) concluded that the high nitrogen and sulphur contents reported could be primary factors in the production of malodours. Currently emissions from some scrubber stacks drift over the town, accompanied by an odour distinct of pyrolysis products. This situation is worsened by sea breezes that carry the emissions through the town. As a result of climatic inversions, the emissions are not effectively dispersed.

3.2.5.3 CONTRIBUTING CONDITIONS: SOLID AND HAZARDOUS WASTE

The existing refuse removal site is 36 yeas old and not operating according to modern waste disposal standards and operating procedures. The site receives mainly domestic refuse and no facilities are available for waste oil. Shortcomings that exist at the dumpsite are the following (WBM, 1994/95):

1. No weight bridge is available and therefore there are no real statistics available on volumes of refuse disposed of to be used for proper planning purposes.
2. No facilities are available for the dumping of hazardous and toxic waste.
3. No facilities are available for the dumping of sensitive waste.
4. The dumped material is not always adequately covered by the contractor, resulting in favourably fly breeding conditions.
5. The site was not properly designed from the start and no definite demarcated areas exist for different types of waste.
6. No proper fence exists around the terrain (stretches of fence was put up on the north eastern side to catch windblown material, but was stolen within a couple of days).
7. Scavengers are a problem: * nearly every bag that is dumped is torn open, resulting in the contents being blown all over the place; * no sensitive waste can be dumped on the site, as scavengers jump into the holes created after the waste is dumped and prevent the front-end loader from covering the waste; * scavengers create health hazards, not only by unhygienic conditions on the site, but they often recover discarded wet waste and take it back, mainly to Kuisebmond for re-use or to sell it; * dumped building rubble is recovered by scavengers to erect squatter shacks; * some scavengers actually stay in unhygienic conditions in squatter shacks amongst the dunes behind the disposal

site; * due to the fact that scavengers live in the area, they have fires to keep them warm at night, and it often happens that big fires are started, burning for days.
8. No proper recycling is done at the disposal site.
9. The scrap metal that is recovered from the site is kept on site for too long a period before it is recovered by the scrap dealer.

Littering is a major source of pollution on the beaches and inland areas and creates breeding sites for vectors of disease. Littering appears to be a direct result of the lack of environmental awareness amongst local residents and tourists (DANCED, 1995). This is reflected in the figures of waste collected in annual beach clean-up campaigns at the popular angling sites south of Walvis Bay. In the 1991 clean-up, 365 kilograms of litter was collected from a 20 km stretch of beach, while in the 1990 and 1989 beach clean-ups, in the same area, 518 kilograms and 260 kilograms of litter were collected respectively.

3.2.6 FUTURE DEVELOPMENT

3.2.6.1 CONTRIBUTING CONDITION: COMMUNITY FACILITIES

Rapid population growth is increasing the demand for community facilities in Walvis Bay. Dennis Moss, (1994) suggests the following objectives, when addressing this demand:

- the need for additional health, education and welfare services should be addressed. The provision of such services should address the imbalance in the present distribution of community facilities;
- the sharing and multi-functional use of public facilities should be facilitated to maximise the benefits gained from public investments;
- in the allocation of space to social facilities, the efficient utilisation of land and infrastructure should be promoted;
- support should be given to the informal sector and to the small business community in the provision of social infrastructure, in order to increase opportunities for income generation and thus the welfare of the population.

In achieving these objectives, Dennis Moss (1994) anticipates the spatial requirements outlined in the sections which follow:

Health - The standard for the provision of sites for health and medical facilities in Walvis Bay are as follows: 2ha per 6000 people for hospitals and 1 clinic per 1000 people. This implies that for the estimated population projection of 85000 by the year 2015, 28ha of land will be required for the development of hospitals and 8 clinics will be needed. In general, five to six sites of 2-3ha each will be required for the future development of Walvis Bay's health facilities.

Education - Although Walvis Bay has 10 schools, there are still inadequacies in the provision of educational facilities. Walvis Bay cannot provide overnight accommodation for visiting schools and there is a need for a hostel as well as a site for education and training camps. Moreover, in order to accommodate the projected population growth, approximately 37ha of land is required for the development of primary schools and 53ha for high schools.

TABLE 13: SPATIAL REQUIREMENTS FOR COMMUNITY SERVICES

Facility	Standard	Quantity
Sport facilities	0.5ha/1000 people	12ha
Cemeteries	1ha/1000 people	30ha
Churches	1 Church/300 units	about 46 Churches
Waste Disposal	15-20ha/70 000 people	20-25ha
Open Spaces	4ha/1000 people	about 340ha

(Source: Dennis Moss, 1994)

3.2.6.2 CONTRIBUTING CONDITION: CENTRAL BUSINESS DISTRICT (CBD)

At present, approximately 10ha of land, zoned for commercial use, is developed. In terms of future land requirements, the Development Strategy (1994) predicts the need for a further 7-10ha of land for CBD purposes until the year 2015. This prediction takes into account the existing CBD zoned land, the planning norm of 2,0 m^2 per person and an assumed a population growth rate of 3%-4%.

The Walvis Bay Development Advisory Committee's report highlights several issues which emphasise the linkage between the CBD, the people of Walvis Bay and the financial and commercial sectors of the economy. These include the following:

- local demand for services has been the most important reason for businesses to establish themselves in Walvis Bay. Many of these are, however, service industries, such as financial institutions, which are susceptible to decreases in population numbers;
- the financial services sector is the single largest sector in the Walvis Bay economy, contributing 17% to the total economy;
- commercial sectors name the fishing industry as the most important factor for its establishment. This industry generates employment and demand for services.

Promotion of the fishing industry and sustaining the population numbers of Walvis Bay, are therefore two factors essential to the continued survival of the CBD. The Dennis Moss Partnership Study (1994) objectives which relate to the development of the CBD include:

- improving the physical connection of the CBD with the sea;

- improving the aesthetic appearance of the CBD;
- promoting user friendly and small tourist orientated businesses;
- identifying an appropriate construction technology and a sense of urban coherency.

More specifically relating to businesses within the CBD, a policy was developed in 1995 with the objective of establishing criteria and principles to be applied in assessing applications for business rights (Policy on Business Rights in Walvis Bay, 1995-1997). The policy states that Walvis Bay, in terms of its population size, purchasing power and catchment area, can only support a town centre and local business centres situated in the catchment residential area. This implies that the town centre must remain the primary business and retail focus of Walvis Bay, with suburban businesses keeping their supportive role.

3.2.6.3 CONTRIBUTING CONDITION: HARBOUR AREA

The Walvis Bay Harbour is primarily divided into two sections: the fishing harbour to the north (110ha) and the commercial harbour to the south (120ha). According to research the growth in the fishing industry is expected to be 5% up to 1998, and 7-10 % for a few years thereafter (Dennis Moss, 1994). Based on these growth rates, the expected demand for land for the fishing harbour could double within the next 10-15 years. This means that about 100ha of land is needed for the future physical development of this sector.

The spatial requirements of the commercial harbour will double within the next 20-25 years. The preliminary plan developed by Portnet indicate extensions seaward and the establishment of a bulk cargo area. When developing the harbour, Dennis Moss (1994) states that the following needs to be considered: the harbour and the CBD needs to be integrated more appropriately; limited extension of the commercial harbour is required; there is a significant need for the extension of bulk handling facilities; it is envisaged that there would be a need for additional land for the fishing harbour in both a seaward and landward direction.

In addition to the Dennis Moss (1994) strategies discussed above, the World Bank has proposed six projects for the development of Walvis Bay. The EEU (UCT, Cape Town) has been commissioned to commence with EIAs in July 1996 for the following projects:

- The siting and operation of a new refuse disposal site, to deal with hazardous and toxic wastes.
- The development of infrastructure for the EPZ;
- The upgrading and expansion of the sewage treatment works;
- Increasing the electricity supply;
- Servicing of plots for residential development;
- The development of a market for informal traders in Kuisebmond

Furthermore, light industrial Export Processing Zones (EPZ) are planned for Walvis Bay. These will be located adjacent to the low-income residential areas, while the heavy industrial sites will be situated beyond the dunes, 7 km away (DANCED, 1995). It is important to note that the success of the EPZ will depend largely on the upgrading of the dump site in Walvis Bay to a Class I rating, and the proposed desalination of seawater to augment fresh water supplies. The environmental consequences of both of these projects need to be carefully evaluated and managed.

3.2.6.4 CONTRIBUTING CONDITION: EXPORT PROCESSING ZONE (EPZ)

An Export Processing Zone (EPZ) is a set of legal and administrative regulations adopted in countries with a restricted foreign trade sector. One benefit of adopting an EPZ Regime is the foreign and domestic investment which it encourages. The Export Processing Zone Act 9 of 1995 distinguishes between an EPZ industrial park and a single-enterprise EPZ. The said Act defines an EPZ industrial park as a geographically zoned area within which the fiscal incentives apply. EPZ industrial parks usually contain a variety of different enterprises, each independently performing diverse operations. A single-enterprise EPZ is an individually situated industry, the location of which depends on the economic viability of an area. The Namibian EPZ Regime includes both types of EPZ's mentioned above.

Although Namibia's EPZ policy is applicable country-wide, Walvis Bay is the only area where a specific zone for concessions has been planned. For the development of such an area, property previously zoned for industrial use will be designated for industrial park EPZ sites. Single-enterprise EPZ's will be located elsewhere in the country (outside the above EPZ zones) and will also benefit from the concessions granted.

Namibia's EPZ Regime is still in its infancy and at present the emphasis is on marketing the strategy abroad. This is being done by emphasising the political and labour stability which the country offers potential investors. Furthermore, as a member of the Southern African Development Community (SADC) and a signatory to various trade agreements, such as the Lome Convention, Namibia offers the EPZ applicant increased access to foreign markets. Moreover, investors are attracted to the EPZ by a package of tax and other incentives which make their production competitive on the international market. More specifically the Namibian EPZ Regime grants the following incentives:

- exemption from corporate tax;
- exemption from import duties on imported, intermediate and capital goods;
- exemption from sales tax and stamp and transfer duties on goods and services required for EPZ activities;
- a 75% wage subsidy for all EPZ enterprises until no longer required;
- a subsidy on 75% of the direct costs of on-the-job and institutional training

Apart from certain mandatory services which are offered to EPZ industries, for example, the supply of water and electricity, other accessory services provided by the EPZ Management Company include: employment, catering, health care, construction and security services. In turn, the EPZ Regime provides the recipient country with foreign currency earnings, employment opportunities, technology and skills transfer, industrial development and the promotion of the manufacturing industry.

Namibia's EPZ Regime is designed to encourage manufacturing enterprises as well as other high-value export-orientated businesses. Typically EPZ activities are labour intensive and are involved in the manufacture and export of garments, as well as the assembly of electronic and electrical goods. Other typical EPZ activities include: value-added processing in the agro-industry, mineral beneficiation, storage and warehousing, and break-in-bulk activities.

The type of activities likely to take advantage of the Namibian EPZ Regime are those industries catering to markets already existing in the country. To date (30/11/95), approximately 40 applications for involvement in the Namibian EPZ Regime have been received. The applicants include operations relating to domestic appliances, mineral processing, bicycles, shipping, automobiles, textiles, warehousing and property development. It is important to note that these operations are not expected to cause extensive environmental degradation and should have a minimal impact on pollution levels.

Given the potential environmental degradation posed by the introduction of industrial zones and single-enterprise industries, the following procedure has been put in place: an evaluation of each EPZ applicant in terms of its environmental performance, with a decision then being made as to whether or not an Environmental Impact Assessment is required. However, no guidelines exist for this environmental evaluation, thus undermining the provision in the Export Processing Zone Act of 1995 which is aimed at refusing EPZ status to those industries which have a detrimental effect on the environment .

The main impact of an EPZ Scheme is likely to be the increased demand placed on social services and physical infrastructure. Of particular concern in Walvis Bay, where the main EPZ Zone is to be located, is the shortage of water and lack of sewage facilities. At present, Walvis Bay does not have waste disposal facilities capable of handling hazardous waste substances. However, a project funded by the World Bank is planned for the upgrading of some of the infrastructure in Walvis Bay. The security of water in Walvis Bay is another issue requiring attention in terms of the Export Processing Zone Act of 1995. Potential EPZ companies will therefore be evaluated in terms of their water requirements and made aware of what the limitations are.

Concerns regarding the treatment of labour in an EPZ Regime are alleviated by the fact that the Namibia's Labour Act 6 of 1992 is applicable to the EPZ Regime. The Labour Code was originally excluded from application in EPZ's, with labour regulations initially to be promulgated by the Minister of Labour and Human Resources Development in consultation with the Offshore Development Company. Following concerns over this

decision, expressed primarily by the South West African People's Organisation and the National Union of Namibian Workers, a compromise was reached. This agreement entailed the applicability of the Labour Code to the EPZ's, coupled with the introduction of a new section into the Export Processing Zone Act of 1995 which serves to ensure the rapid settlement of labour disputes.

A final problem which warrants attention is the failure of the Export Processing Zone Act of 1995 to deal with issues concerning the quick and unencumbered access to foreign currency. This omission needs to be corrected in order to attract investors.

3.3 SUMMARY: URBAN ENVIRONMENTAL PROFILE of WALVIS BAY

Walvis Bay was integrated into Namibia on 1 March 1994. The fishing industry is the main employer and Walvis Bay port is an important piece of infrastructure as well as a National asset.

Walvis Bay, being an industrial town, receives a large percentage of **migrant labourers**, specially from the Northern regions in Namibia. The implication is that an increased pressure is placed on the provision of social services and housing, on existing infrastructure and on natural resources. This influx of people, particularly young unemployed males, has significant ramifications. The most critical of these are as the following: fast growing unemployment rate; housing shortages; heightened AIDS and tuberculosis figures and increased crime.

The **climate** of Walvis Bay is characterised by mild temperatures and a low, highly variable rainfall. Fog is the dominant form of precipitation. The climatic conditions exacerbate pollution and must be considered when planning and siting new developments.

Infrastructure that was previously considered adequate has to be improved to cater for the expected population growth. It is forecasted that Walvis Bay will no longer be able to supply **water** on a sustainable basis from 1998, and the construction of a desalination plant has been recommended. The existing **sewage** treatment infrastructure is currently operating beyond its present design capacity. The current **waste** management plan does not deal effectively with hazardous or toxic wastes, and a new landfill site to accept domestic refuse as well as hazardous and toxic wastes has been earmarked by the Municipality of Walvis Bay. Current demand for **electricity** in the district is exceeding earlier projections and supply is likely to be a constraint within the next two years without system upgrading and expansion.

The **transport** infrastructure is well-developed with tarred as well as gravel road and an asset to the Walvis Bay district. The rail infrastructure is predominantly freight orientated,

while the military aerodrome in Walvis Bay forms a vital link to the harbour for the export of fresh fish. Nampost and Telkom are responsible for the provision of postal and telecommunication services.

The most important **environmental hazards** are water pollution, air pollution and hazardous waste management. Sources of **maritime pollution** include oil spills, commercial activities, as well as waste and sewage from ships. Other sources of marine pollution are the anti-fouling paints from the dry docks and the high organic pollutants in effluent water from the fish processing factories. Leaching to **ground water** resources from the solid waste dump site in Walvis Bay is a potential problem which need further investigation as seepage from the waste dump is currently not being monitored. Air quality is currently not monitored, however, **odour pollution** from fishmeal factories is perceived as a nuisance by residents and tourists. Health hazards related to the existing **waste disposal** site include the following: no facilities are available for the dumping of hazardous and toxic waste, scavengers are operating at the dumpsite, waste is not sorted or covered properly, uncontrolled fires often burn for days and no proper fence exist around the terrain. Littering of beaches and inland areas is a further hazard that creates breeding sites for vectors of disease.

As a result of the rapid **population growth** the demand for community facilities are increasing in Walvis Bay, and a need exists for additional health, education and welfare services. The promotion of the fishing industry and sustaining population numbers in Walvis Bay (to support and maintain existing service industries) is essential to the survival of the **Central Business District**. According to estimates the spatial requirements of the commercial harbour will double within the next 20 to 25 years.

With the **EPZ** (Export Processing Zone) the Government aims to promote foreign currency earnings, create employment, benefit from technology and skills transfer, and promote foreign and local investment. Although the scheme is still in its infancy, over forty applications have already been received for EPZ status. The main impact of the EPZ Scheme is likely to be an increased demand placed on social services and physical infrastructure (where existing demand is already pressurising the system).

Of particular concern is the shortage of water, lack of adequate sewage facilities, the need for a new refuse disposal site which can handle hazardous waste, the upgrading and expansion of the bulk electricity supply and the provision of housing for low and middle income residents. Various **new developments** and upgradings have been initiated for Walvis Bay. The EEU was commissioned to do EIAs on six proposed developments to evaluate the environmental impacts and implications. The EIAs are for the following projects: upgrading and expansion of sewage treatment plant, new refuse disposal site which can handle toxic and hazardous wastes, upgrading and expanding of bulk electricity supply, servicing of plots for residential development (3000 serviced plots for low income beneficiaries in Kuisebmond and 200 plots for middle income beneficiaries at Lot 79) and a market at Kuisebmond. The construction of a desalination plant was also recommended and is scheduled to start soon.

PLATE 1: Living conditions in Kuisebmond

CHAPTER 4
THE DEVELOPMENT OF AN ENVIRONMENTAL HEALTH SURVEY FOR POOR COMMUNITIES

4.1 METHODOLOGY

In terms of the methodology followed , this chapter contributes to **Step 2**: Development of an Environmental Health Survey for Poor Communities. The output of this chapter is a practical tool that can be used to assess environmental health hazards in poor communities in the Southern African context.

To place this chapter in perspective, Step 3: Assessment of Environmental Health in Kuisebmond (Chapter 5) is based on the completion of the Environmental Health Survey for Poor Communities and the interpretation of the results. Step 4: An Environmental Health Profile of Kuisebmond (Chapter 6) is based on the integration of data from Step 1 (Urban Environmental Profile of Walvis Bay) and Step 3 (Assessment of Environmental Health in Kuisebmond) to provide decision makers and environmental health professionals with useful baseline information.

In this chapter indicators impacting on environmental health in the home environment were divided into categories to assess the micro- (family health and hygiene behaviour in the physical home dwelling) and mesosystems (the impact of the neighbourhood on family environmental health). However, the boundaries between the microsystem and mesosystem or within the microsystem are not always clear. In certain conditions it is difficult to categorise when a problem is in the microsystem, when in the mesosystem, and when both micro- and mesosystems are involved. For example, a child can suffer from diarrhoea as a result of drinking contaminated water at home, at school, or at a public place.

According to O'Connor and Lubin (1984) an exclusive preoccupation with any particular system [whether it is the individual household (microsystem), the community (mesosystem), or some aspect of the environmental context (exosystem)], narrows one's understanding of the problem, thus limiting approaches for adequate intervention. By failing to deal with the relatedness of the parts, that is, the relationship between individuals and the family, between the family members, between the family and the community, and between the larger urban environment and households, we often just patch a system that can only break down again later (O'Connor and Lubin, 1984). For example, environmental health problems in the exosystem (see Chapter 3), such as odour pollution caused by fishmeal factories in the Walvis Bay industrial area, can impact on the quality of environmental health experienced in micro- and mesosystems in Kuisebmond. Therefore, the process followed to develop this survey took into account **people** (socio-economic setting), **the environment** (house design, infrastructure and community facilities) and the

interaction between people and environment (health and hygiene behaviour and quality of life) as components of the micro- and mesosystems. To include the exosystem, the data is interpreted against the backdrop of the larger urban environment, in accordance with the ecosystemic perspective. The inter-relatedness between part of the system was acknowledged to provide a holistic perspective.

On a practical level, environmental health indicators used to develop this survey were developed from theory, literature review, personal observations and case studies (referenced in the text). The aim of investigating these indicators were to identify health hazards in the environment that can be reduced or eliminated through appropriate action. A framework of the indicators and factors contributing to this chapter are the following :

TABLE 14: FRAMEWORK OF INDICATORS AND FACTORS CONTRIBUTING TO ENVIRONMENTAL HEALTH

INDICATOR	CONTRIBUTING CONDITIONS
Socio-economic setting	population profile employment conditions housing conditions health profile
House Design	layout of dwelling site of dwelling ventilation building materials
Infrastructure Services	municipal services provided water supply sanitation waste removal and disposal energy supply transport
Family Health & Hygiene Behaviour	hygiene behaviour family safety food safety and security level of health education mental health crowding and privacy
Community Facilities	health facilities educational facilities shopping venues recreational facilities green open space cultural facilities communication and information

Quality Of Life	residential satisfaction ease of access security of tenure appropriateness of delivery system occupational activities/multipurpose homes

The above-mentioned environmental health indicators and conditions contributing to them are discussed in this chapter. To conclude each section, a summary of the indicators, contributing factors and conditions are provided in a table.

4.2 SOCIO-ECONOMIC SETTING

To improve life in a community, baseline information about the community is recommended as a starting point (WHO, 1987). Population, employment -, housing - and health conditions of the community based on a questionnaire generated by a technical working group (UN Fund for Population Activities, Centre for Human Settlements, WHO, OECD and World Bank) over a one-year period (October 1898 - September 1990) was used to obtain baseline information in this survey [referred to in this document as the Urban Management Programme (UMP), Leitmann, 1994].

4.2.1 CONTRIBUTING CONDITIONS: POPULATION PROFILE

Concerning population the following baseline data was required:

- annual population growth (% per year);
- population density (people per hectare);
- population distribution (according to age and sex);
- population below the poverty line (those having less income than that needed to buy the minimum requirement of calories and protein, shelter, clothing and other necessities).

4.2.2 CONTRIBUTING CONDITIONS: EMPLOYMENT

Concerning employment conditions the following baseline data was required:

- employment by manufacturing industry;
- employment by major economic sector to include: food industry; textiles and clothing; wood and wood products; paper and paper products; chemical/coal, petro/plastic products; non-metallic mineral products; basic metal industry; fabrication of machinery and equipment, retail or trade; recreational and cultural services; personal and household services;

- employment by informal sector, for example, cottage industries, households with workshops, unregistered small factories;
- unemployment figures;
- adult literacy rate.

4.2.3 CONTRIBUTING CONDITIONS: HOUSING CONDITIONS

Concerning housing conditions a dwelling unit was defined as a separate and independent place of abode occupied by one household; for example, house, flat, apartment or rooms. The following baseline data was required (Leitmann, 1994):

Ownership of occupied dwelling unit,
- - owner-occupied
- - rented
- - other

Facilities in dwelling:
- kitchen
- lighting
- water supply inside
- fixed bath or shower
- any type of sanitation system

Size of dwelling unit:
- average number of occupants per room (in no.), where room was defined as a separate habitable space inside the dwelling used for living, sleeping, or eating.
- floor area per person (in m^2), where floor area was defined as usable floor area of habitable rooms inside the dwelling, including bathrooms, internal corridors and closets.

Marginal dwelling units were defined as dwelling units without water and sanitation facilities and constructed with inadequate or dangerous building materials, generally considered unfit for habitation. Baseline data concerning marginal dwelling units were:

- total number of marginal dwelling units;
- population living in marginal dwelling units;
- annual number of new marginal dwelling units;
- number of collective living quarters, where this was defined as a structurally separate and independent place of abode intended for habitation by large groups of individuals or several household, for example, hotels, rooming houses, institutions, camps, compounds or other living quarters.

4.2.4 CONTRIBUTING CONDITIONS: HEALTH CONDITIONS

Concerning health conditions the following baseline information was required (Leitmann, 1994):

- life expectancy at birth (in years) defined as the average number of years new-born babies can be expected to live if health conditions stayed the same;
- infant mortality rate, defined as the number of deaths per 1 000 infants born alive aged less than one year;
- child mortality rate, defined as the number of deaths per 1 000 infants born alive aged one to five years;
- productive days lost due to illness;
- productive years lost due to early death;
- mortality rates as a result of the following major groups of diseases: diarrhoeal, gastrointestinal, infectious and parasitic (measles, worm infections, hepatitis, insect-borne diseases), respiratory (acute respiratory infections, pneumonia, tuberculosis), genito-urinary diseases, gynaecological, obstetric, perinatal, sexually-transmitted (AIDS), cancer, cardio-vascular, cerebro-vascular, trauma, malnutrition and skin diseases.

4.2.5 SUMMARY for INDICATOR: SOCIO-ECONOMIC SETTING

CONTRIBUTING FACTOR	CONDITIONS/BASELINE DATA
POPULATION PROFILE	• total population • annual population growth (% per year) • population density (no. per ha) • population distribution (according to age and sex) • population below the poverty line
EMPLOYMENT CONDITIONS	• employment by manufacturing industry • employment by major economic sector: food industry; textiles and clothing; wood and wood products; paper and paper products; chemical/coal - petro/plastic; non-metallic mineral products; basic metal industry; fabrication of machinery/equip; retail & trade; recreational and cultural services; personal and household services. • employment by informal sector, for example, cottage industries, households with workshops, unregistered small factories • unemployment figures (in %) • adult literacy rate (in %) • Are health and safety regulations in place in the work-place? • Are health and safety regulations enforced in the work-place? • Are labour unions in place? • Does the labour Act adequately protect workers?

HOUSING CONDITIONS	ownership of occupied dwelling unit (in %): • - owner-occupied • - rented • - other type of dwelling house apartment hostel single quarters shack facilities in dwelling: • kitchen • lighting • water supply inside • fixed bath or shower • any type of sanitation system size of dwelling unit: • average number of occupants per room (in no) • floor area per person (in m^2) marginal dwelling units: • total number of marginal dwelling units • population living in marginal dwelling units • annual number of new marginal dwelling units • number of collective living quarters
HEALTH CONDITIONS	• life expectancy at birth (in years) • infant mortality rate, • child mortality rate, • productive days lost due to illness • productive years lost due to early death • mortality rates as a result of major groups of diseases: diarrhoeal gastrointestinal, infectious and parasitic respiratory genito-urinary gynaecological, obstetric perinatal sexually-transmitted cancer cardio-vascular cerebro-vascular, trauma malnutrition skin diseases. • incidence of tuberculosis • incidence of HIV/AIDS

4.3 HOUSE DESIGN

A healthy house need not be a big house made of modern materials. Traditional houses often suit people's needs and activities and the local climate better than "modern" houses (WHO, 1987).

4.3.1 CONTRIBUTING CONDITIONS: LAYOUT OF DWELLING

The fundamentals of a healthy residential environment should consist of a safe and structurally sound, adequately maintained, and separate self-contained dwelling unit for each household, with each dwelling unit providing at least the following (Hammond and Gear, 1986):

- a sufficient number of rooms, usable floor area and volume of enclosed space to satisfy human requirements for health and for family life consistent with the prevailing cultural and social pattern in that region, and so used as to avoid overcrowding of living or sleeping rooms;
- at least a minimum degree of desired privacy, both between individual persons within the household, and for the household against undue disturbance by external factors;
- suitable separation of rooms, providing separate bedrooms for adolescent and adult members of the opposite sex, except husband and wife, and for domestic animals to be housed apart from the living area of the dwelling unit;
- a potable and palatable water supply in quantities large enough to provide for sanitation, comfort and cleanliness;
- a safe and sanitary means for the disposal of sewage, garbage and other wastes;
- sufficient facilities for washing and bathing;
- appropriate facilities for cooking, dining, and the storage of food, household goods and personal belongings;
- appropriate protection against excess heat, cold, noise and dampness;
- adequate ventilation and internal air free of toxic or noxious agents;
- sufficient natural and artificial illumination.

4.3.2 CONTRIBUTING CONDITIONS: SITE OF DWELLING

The site of a dwelling is important for health. For example, a house should not be sited closer than 100 meters to a place where people dump waste, as vectors of disease such as flies, other insects and rats are present near waste dumps, and these animals spread disease (WHO, 1987). There are four key features of the domestic environment that promote access or multiplication by arthropod pests and vectors of disease (Hardoy, et al., 1990) which have to be considered when siting a dwelling. These factors are the following:

- Position of the house within areas where a given pest species is known to occur. Siting a house close to known or potential breeding-sites of mosquitoes or other vectors of disease will clearly increase the risk of house invasion by these species, and will therefore require more careful measures to avoid them. Similarly, siting a house distant from any potential source of vectors implies that less rigorous measures may be adequate.
- Likely mode of entry of vectors. Entry can be by crawling or flying, which may be inhibited by physical barriers such as window screens, or it may involve being carried passively into the house on humans or animals, or on materials brought into the house such as food or furniture.
- Restriction of vector access to potential food-sources. For scavenging insects, it is particularly important to disallow access to stored foodstuffs and to provide adequate disposal for organic wastes, because scavenging insects, especially houseflies and cockroaches, can readily transmit disease pathogens from one to the other. Pathogens from faeces carried by houseflies and cockroaches probably contribute significantly to health problems such as childhood diarrhoea. In more affluent communities hygienic measures can be achieved by the use of refrigerators and screened foodstores with insecticidal fumigation where appropriate, and the provision of closed refuse containers, protected from physical damage by rats, mice and other animals.
- The physical elimination of potential resting and breeding sites. Eliminate resting and breeding places in the domestic and peri-domestic environment. Domestic animals should be kept in a separate area so as to avoid bringing dirt into the house where people live. A fence should keep out hens, goats and other animals (WHO, 1987).

Other important factors to consider when siting a dwelling includes drainage, and local climatic conditions.

Drainage systems must be available to drain away waste water, (which is full of harmful bacteria), as well as rainwater. If rainwater floods the site, or if groundwater seeps into the walls, the house will be damp and unhealthy (WHO, 1987). In those areas where schistomiasis (bilharzia) is endemic, poorly drained urban areas present ample opportunities for transmission of the disease. Contamination of standing water with the faeces of infected persons (or, for one species of the disease, their urine) enables the schistosomes, the microscopic parasites which cause this infection, to reach the small aquatic snails in whose bodies they multiply (Hardoy et al., 1990). From every infected snail, thousands of parasites emerge each day and swim in the water. Local residents become infected when they enter the water and the parasites penetrate their skin.

Another important group of diseases related to poor drainage is transmitted by mosquitoes. Different diseases are transmitted by different species of mosquito, and each chooses different bodies of water in which to breed. Some prefer water which is heavily polluted, others prefer it clean; some breed in flooded areas, some in the drains themselves if they are blocked by rubbish or vegetation or are laid to an uneven level so that there is standing water in them.

Local climatic conditions should be considered, for example, the exposure of the site to sun and wind should be considered. In a cool or cold climate the sun can heat the walls, while in a hot climate the site should be shaded from the sun as much as possible, for example by choosing a site which is surrounded by trees, or the walls can be protected from the sun by sunshades or a simple veranda (WHO, 1987). Barriers can be erected to protect dwellings from the wind.

4.3.3 CONTRIBUTING CONDITIONS: VENTILATION

It is important to have fresh air blowing freely through the house so that smoke and stale air clear quickly (WHO, 1987). This can be done by positioning doors and windows in such a way that air can pass freely through the rooms of the house. If the windows have to be kept shut in the cold season, then the house should have a chimney or a hole in the roof to let out the smoke from the fire. In general a well-ventilated house has windows that permit cross-currents of air so that fresh air may enter and stale smoky air may be drawn or blown out, and the place for a fire or cooking stove positioned under a chimney or opening in the roof to let the smoke out (WHO, 1987).

4.3.4 CONTRIBUTING CONDITIONS: BUILDING MATERIALS

The so-called "modern" ways of building houses are not always better than the old ways. Local materials and local construction can often be very good and healthy. Bricks, cement and corrugated iron sheets are not necessarily better than traditional materials (WHO, 1987). Whenever possible building materials that do not burn easily should be chosen instead of materials that catch fire easily.

A healthy house is neither too warm nor too cold, people should feel comfortable in it. In general minimum requirements are the following (WHO, 1987):

- A good roof to keep out the rain. Rainwater should flow from the roof into a gutter that leads into a drain or container to keep the walls and ground dry.
- A floor of wood, stamped clay, bamboo, concrete, tiles, or similar material so that people do not have to walk on the bare earth and so that the floor can be easily cleaned.
- Walls with a smooth hard surface so that they can be easily cleaned and with no holes or cracks in which insects, rodents or other carriers of disease can live.

4.3.5 SUMMARY for INDICATOR: HOUSE DESIGN

CONTRIBUTING FACTORS	CONDITIONS
LAYOUT	• a sufficient number of rooms, usable floor area and volume of enclosed space is available to satisfy human requirements consistent with the prevailing cultural and social norms; • at least a minimum degree of desired privacy is possible between individuals in the household; • at least a minimum degree of privacy is possible for the household from disturbance by external factors; • there is a suitable separation of sleeping quarters for inhabitants (except husband and wife) not to have to share sleeping mats; • a potable and palatable water supply in quantities large enough to provide for sanitation, comfort and cleanliness is readily available; • a safe and sanitary means for the disposal of sewage, garbage and other wastes is available in close proximity; • sufficient facilities for washing of clothes and utensils are available; • sufficient facilities for washing and bathing is readily available; • appropriate facilities for cooking, dining, and the storage of food, household goods and personal belongings are available; • sufficient natural and artificial illumination is available in the dwelling
SITE OF DWELLING	• the house is at least 100 meters away from a place where waste is dumped • the walls are not damp • no standing water or puddles are present • domestic animals are kept in a separate area • provision is made for drainage of water/storm water • the house is suitable to local climate • noise levels are acceptable during day and night time.
VENTILATION	• windows and/or doors are positioned to permit cross-current (adequate ventilation) • internal air free of toxic or noxious agents (stale smoke does not "hang" in the air in the dwelling)
BUILDING MATERIALS	• building materials that do not burn easily are used for the structure of the dwelling • there is a gutter for rainwater to drain from the roof • the dwelling has a floor (not bare earth) • the walls have a smooth, hard surface • windows and door openings are adequately screened • good quality roofing and walls are in place to eliminate vector entry

4.4 INFRASTRUCTURE SERVICES

An important aspect of housing conditions with far-reaching implications for the health status of dwellers in low-income settlements is the basic services and facilities in houses. These include toilet facilities, bathrooms, kitchens, water supplies, electricity, type of cooking fuel and provisions for drainage and sewerage. Availability or non-availability of these, their current state, the pressure on them in terms of number of users and whether they are adequate in number, are all central to the existence and maintenance of basic hygiene and consequent prevention of diseases and ill health (Hardoy et al., 1990).

4.4.1 CONTRIBUTING CONDITIONS: MUNICIPAL SERVICES PROVIDED

The questionnaire used to generate a database used by the Urban Management Programme (UMP) included the following under municipal service provided: water supply, sewerage, drainage, solid waste collection, street cleansing, street lighting, electricity, gas, telephone, parks and recreation, education, health care and other (Leitmann, 1994). The municipal services provided for this survey will be the same, however, a more in-depth investigation was undertaken for water supply and quality; sanitation; energy supply; waste removal and disposal and transport. The other municipal services, such as telephone, parks and recreation, education and health care were discussed in the category community facilities (see Section 4.6).

4.4.2 CONTRIBUTING CONDITIONS: WATER SUPPLY

It is well known that contaminated drinking water can cause water-borne epidemics and diseases. However, it is by no means the only hazard, and probably not even the greatest of the health risks to which the urban poor are exposed by shortcomings of the water supplies in most Third World nations. There is good reason to believe that difficulty in obtaining enough water is at least as prejudicial to health as water contamination. First, the lack of sufficient water to maintain adequate hygiene can promote transmission of any of the diseases which are potentially water-borne, and secondly, the high price urban poor have to pay for water diminishes the amount they have to spend on food, and so undermines their often precarious nutritional status (Hardoy et al., 1990).

Those not serviced with water are obliged to use water from streams and other surface sources, which in urban areas are often little more than open sewers, or to purchase water from insanitary vendors. It is little wonder that their children suffer frequently, often fatally, from diarrhoeal diseases, which world-wide kill a child every 20 seconds (Hardoy, et al., 1990).

The major categories of water-related diseases are the following (Hammond and Gear (1986):

- Water-borne: gastro-enteritis, dysentry, cholera, typoid, infectious hepatitis, ascariasis.
- Water-washed: gastro-enteritis, typhoid, scabies, tracoma, skin sepsis, lice.
- Water-based: bilharzia, guinea worm infection.
- Water-related insect vector: malaria, yellow fever, tryanosomiasis.

According to a WHO report, in many cities each person uses about 600 litres of water daily (Hammond and Gear, 1986). This may sound a lot, but if you consider one bath is about 80 litres, then you have to include washing machines, dishwashing, food preparation, flushing toilets, handwashing, drinking, housework, gardening and so on. Conversely, in a study in Lesotho, the study population were using only 10 litres per person per day while a minimum of 50 litres are recommended by the WHO (Hammond and Gear, 1986).

Factors that influence the amount of water used by a rural dweller includes proximity of water supply (the closer it is, the more water is used), time taken to collect water (even it the source is close and the water trickles slowly, less water will be used than if there is a steady flow) and household size (the larger the family, the less water per person tends to be used) (Hammond and Gear, 1986). Intermitted water supply has been found to encourage vandalism, as a result of frustration of those trying to obtain water. Conversely, vandalised taps make it more difficult to provide a constant water supply.

One of the reasons for the shortfall in capacity of many city's water supply is the high rate of leakage from the distribution system. Leaky distribution mains present an additional hazard with intermittent supplies, or where there are low pressures, pollution from drains and sewers may enter through the leaks when the pressure drops. The leakage is frequently exacerbated by the numerous unauthorised connections to water mains made by private individuals.

The responsibility for water quality lies clearly with those who supply the water (see chapter 3: Water pollution). When water-borne transmission of disease is suspected, the first to be questioned are the operators of the water supply. It is not so clear who is responsible when a poor family does not have enough water for its needs, and it is easier to blame the victims. For example, they should have installed a house connection, one might argue, or bought a bigger bucket, and spent less on alcohol, tobacco or television (Hardoy, et al., 1990).

4.4.3 CONTRIBUTING CONDITIONS: SANITATION

The health problems that result from the lack of sanitation facilities among the urban poor living in overcrowded, cheap rental accommodation or informal or illegal settlements, are greater than either in the rest of the urban areas or in rural areas. A variety of intestinal parasites is usually present in poor urban populations, with roundworms and whipworm

often observed at higher levels than in corresponding rural populations (Hardoy et al., 1990).

While the fundamental reason for undertaking sanitation is to promote health, the extent to which sanitation can influence health varies considerably, depending on other factors such as personal hygiene and levels of water supply. While it is intuitively believed that improved provision for sanitation will reduce the spread of diseases and result in a number of social, environmental and other benefits, it has proved very difficult to demonstrate this causal relationship in practice (Hardoy et al., 1990).

Concerning sanitation systems, the geology of the area has to be taken into consideration. Adverse ground conditions can increase the cost of certain sanitation options and make others technically unfeasible. For instance, under adverse conditions such as shallow rock, high groundwater table or low soil permeability, sanitation systems that rely on the ability of the soil to absorb waste-water and require some form of excavation can probe technically unfeasible or too expensive. Under such conditions there is always scope for ingenuity in design such as raising latrines above groundwater level and laying pipes at shallow depths. Social factors also influence sanitation system choice. Some sanitation systems may prove unfeasible if they are incompatible with social customs. For example, low-volume pour flush toilets might become blocked if used in communities that use bulky anal-cleansing materials (Hardoy et al., 1990).

4.4.4 CONTRIBUTING CONDITIONS: WASTE REMOVAL AND DISPOSAL

Waste generated by communities include household refuse, industrial wastes, scrapped vehicles and commercial wastes like packaging boxes and paper. Major sources of liquid waste include water from flushing toilets; sewage; water used for washing hands, bodies, clothes and dishes; water used for food preparation and cooking; water used for cleaning floors and windows; and industrial waste water (Hammond and Gear, 1986). Solid waste generated by communities can be placed into five categories:

- Domestic - refuse (foodstuffs, tins, glass, ash, packaging, garden refuse)
- Commercial - wastes discarded by shops, offices and markets, including paper, boards, metal and textiles.
- Industrial - wastes produced and discarded by industry, like rubble, metal and toxic substances.
- Agricultural - wastes from production and processing of food and crops, and waste from slaughtering cattle.
- General community - demolition and construction debris, street refuse, old cars, and litter from parks and open spaces.

If litter or solid waste generated is uncollected, health problems result, especially in poor communities (Hammond and Gear, 1986). Piles of garbage are scattered by scavengers or animals and serve as food or breeding grounds for disease vectors - primarily flies and

rats. Dangers to health arise both from pathogens in the refuse itself and from disease vectors which breed and feed there. Furthermore, uncontrolled refuse or litter can clog drainage channels which then become stagnant pools which may overflow (if the drainage channels are carrying liquid wastes which include exceta, commonly in poor settlement). Most low-income households' problems are further compounded by a lack of space within their homes to store garbage, or the space and means to have dog- and rat-proof dustbins outside their homes.

Part of the reason for inadequate service to poor households is that they throw away less waste which can be profitably reclaimed by the staff collecting the garbage, or the scavengers or recycling businesses with which the staff deal (Hardoy et al., 1990). Another reason for inadequate service is the fact that so many people live in settlements regarded as illegal by the public authorities, so that there is no recognition of their right to public services. Furthermore, garbage collection is usually the responsibility of local municipalities, but as most poorer households are in the poorest municipalities, resources to pay for public services are not always available. An additional problem is that poorer areas are often more expensive to service, as many poor settlements develop on terrain, for instance, on steep hills of flood plains, to which access by motor vehicle is difficult. Many houses are also built close together with access to them only by pathways. As such, conventional garbage-collection trucks cannot get close to them (Hardoy et al., 1990).

Uncollected garbage and litter thus is a serious health-hazard for all inhabitants, perhaps most especially for children who play on streets or open ground contaminated with refuse, as well as a fire hazard.

According to The World Commission on Environment and Development (1987) the problem of nuclear waste disposal remains unsolved. Although nuclear waste technology has reached an advanced level of sophistication, it has not been fully tested or utilised and problems remain about disposal. There is particular concern about future recourse to ocean dumping and the disposal of contaminated waste in the territories of small or poor states that lack the capacity to impose strict controls - Another potential health hazard for poor communities in remote areas.

4.4.5 CONTRIBUTING CONDITIONS: ENERGY SUPPLY

Energy is necessary for daily survival. Energy provides "essential services" for human life - heat for warmth, cooking and manufacturing, or power for transport and mechanical work At present the energy to provide these services comes from fuels - oil, gas, coal, nuclear, wood and other primary sources (solar, wind or water power) - that are all useless until they are converted into the energy-services needed, by machines or other kinds of end-use equipment, such as stoves, turbines or motors (World Commission on Environment and Development, 1987).

The primary sources of energy used today are mainly non-renewable: natural gas, oil, coal, peat and conventional nuclear power. There are also renewable sources, including wood,

plants, dung, falling water, geothermal sources, and solar, tidal wind and wave energy, as well as human and animal muscle-power. Nuclear reactors that produce their own fuel ("breeders") and eventually fusion reactors are also in this category (World Commission on Environment and Development, 1987). But each has its own economic, health and environmental costs, benefits, and risks factors that interact strongly with other governmental and global priorities.

Many forecasts of recoverable oil reserves and resources suggest that oil production will level off by the early decades of the next century and then gradually fall during a period of reduced supplies and higher prices. Gas supplies should last over 200 years and coal about 3 000 years at the present rates of use. In terms of pollution risks, gas is by far the cleanest fuel, with oil next and coal a poor third. But they all pose three interrelated atmospheric pollution problems: global warming, urban industrial air pollution and acidification of the environment. The fossil fuel emissions of principal concern in terms of urban pollution, whether from stationary or mobile sources, include sulphur dioxide, nitrogen oxides, carbon monoxide, various volatile organic compounds, fly ash, and other suspended particles (World Commission on Environment and Development, 1987).They can injure human health and the environment, bringing increased respiratory complaints, some potentially fatal (see Chapter 2.7.1).

Seventy per cent of the people in developing countries use wood and depending on availability, burn anywhere between an absolute minimum of about 350 kilograms to 2 900 kilograms of dry wood annually, with the average being around 700 kilograms per person. Rural woodfuel supplies appear to be steadily collapsing in many developing countries, especially in sub-Saharan Africa. Wood is being collected faster than it can regrow in many developing countries that still rely predominantly on biomass - wood, charcoal, dung, and crop residues - for cooking, heating their dwellings and even for lighting. Furthermore, smoke created by wood or coal in dwellings may lead to respiratory diseases, such as tuberculosis.

4.4.6 CONTRIBUTING CONDITIONS: TRANSPORT

As the human population increases, under present trends, the number of people needing transport is also increasing as a consequence of urban design of many cities (White, 1994). A reliable transport system is necessary for people to commute to and from places of employment, to reach hospitals, clinics, shops, and schools (if these are not within walking distance) as well as for recreational and social purposes. Furthermore, the inefficiency or lack of urban transport services and infrastructure is a major impediment to economic growth and urban productivity in developing country cities (Bartone et al., 1994).

Increasing motorisation, poorly operating public transport services, inadequate road maintenance, insufficient bikeways and walkways, poor traffic management, and lack of enforcement and education are contributing factors to road congestion, accidents and air pollution. In many cities, traffic congestion leads to lost work and leisure time, increased fuel consumption and emissions as well as high accident rates (Bartone et al., 1994).

According to the WHO (1989) the cost of road accidents in developing countries, two-thirds of which occur in urban areas, is as high as 1 - 2 percent of GDP, taking into account high fatality, injury rates and property damage.

Other transport related problems experienced by poor communities include expensive transport services, dirty and unhygienic bus stations and taxi ranks, insufficient available parking facilities and unpaved or untarred roads (contributing to breeding places for vectors of disease, such as helminth eggs).

4.4.7 SUMMARY for INDICATOR: INFRASTRUCTURE

CONTRIBUTING FACTORS	CONDITIONS
MUNICIPAL SERVICES PROVIDED	• water supply • sewerage • drainage • solid waste collection • street cleaning • street lighting • electricity • gas • telephone • parks and recreation • education • health care • other
WATER SUPPLY	• a minimum of 50 litres of water is available daily, per person • water supply is reliable and continues • no taps or pipes are leaking • clean containers are available for storing of water • water pipes are not visible above ground
SANITATION	• a well-kept latrine is available in or close to the house • sanitation facilities take cognisance of the geology of the area • blocked sewers or overflowing septic tanks are not present • raw sewage is not discharged into rivers or sea
WASTE REMOVAL AND DISPOSAL	• solid waste is removed on a regular basis • waste products and litter are not observed in the environs of the dwelling • waste is not perceived as a fire hazard • a separate container to store waste in is available in the home • a dust-bin with a lid is available outside • waste is not disposed of within 100 metres of the house

ENERGY SUPPLY	• source of energy: electricity fuel oil gasoline diesel kerosene natural gas coal gas coal soft coke charcoal firewood other • reliable energy supply is available for heating or cooling
TRANSPORT	• reliable transport is available to hospitals, clinics, schools and employment opportunities • roads are well-maintained (for safety) • roads are tarred/paved (an inhospitable environment for helminth eggs) • transport services are affordable for poor people • sufficient parking facilities are available

4.5 FAMILY HEALTH AND HYGIENE BEHAVIOUR

First in public health importance are the many faeco-oral infections transmitted by consumption of contaminated food and drink, often as a result of poor environmental health. The micro-organisms that cause these diseases are found in the excreta of infected people and animals. Surface water becomes contaminated with these micro-organisms from sources such as blocked sewers and overflowing septic tanks, and often from defecation in the open by livestock and by people who have no toilet (Hardoy et al., 1990). This contaminated surface water can then infect people in many ways. It can contaminate their hands, their utensils, or their drinking water supply. Children are particularly exposed to infection when playing or bathing in the water.

The faeco-oral diseases include well-known water-related diseases with a high mortality rate such as cholera and typhoid fever, as well as the many diarrhoeal diseases which particularly affect young children in the Third World, contributing to malnutrition and often killing more children than any other cause. Virtually all the homes and neighbourhoods of poorer groups share two characteristics with serious impacts on health (Hardoy et al., 1990): the presence in the environment of pathogenic micro-organisms (especially those in human excreta) and crowded, cramped housing conditions - Both

these conditions can be reduced or eliminated through appropriate hygiene behaviour and improved environmental health practices.

4.5.1 CONTRIBUTING CONDITIONS: HYGIENE BEHAVIOUR

According to WHO (1995) data relating to *access to water*, e.g. proportion of the population served by public tap, yard tap, house connection and vendor, or distance to nearest tap; *hours/day of available piped water supply*; *excreta disposal type and use*, e.g. proportion of households with each main type, including whether they are shared or public facilities, and used by different household members; *the price, demand for and use of soap; proportion of community streets with paving* (an inhospitable environment for soil helminth eggs); *person/room of housing*; *elevation*, where flooding is a suspected problem; *proportion of houses entered by floodwater* and approximate frequency of flooding; *E.coli/100 ml of water* as consumed by residents for each source; and *disposal practices for children's faeces*, seem relatively **straightforward to collect** as baseline data. However, **hygiene behaviour**, which is a critical mediating factor is rarely if ever monitored (WHO, 1995).

The way people use their house can also affect their health. Every house, no matter how small or what materials it is made of, can be made more healthy by regular cleaning, removal of refuse, timely repairs, and conscientious use of latrines (WHO, 1987). Neglect to maintain the house creates an environment for vectors of disease to move in and multiply.

For hygiene in the house WHO (1987) recommends the following:

- Barriers should be in place to keep animals out of eating and sleeping quarters. It is suggested that animals be kept in a fenced-off area, at least 10 meters from the house and from outdoor living areas (for goats, sheep, pigs, cows, or other domestic animals).
- Separate places for bathing and washing household utensils and clothes, with drainage of waste water to plants in the garden or into the sewerage system.
- Every dwelling should have a latrine of its own or a communal latrine in close proximity that is well-kept.
- Drainage of waste water should be adequate not to form puddles where vectors of disease can breed.
- A place to store food and water which can be reached easily but can also be kept very clean and safe from rodents and other vectors of disease.

Family hygiene behaviour recommended by the WHO (1987) comprises the following:

- Wash hands before touching or preparing food, before and after meals and keep fingernails short and clean;
- Wash hands after using the latrine;

- Kitchen instruments and utensils should be well washed before being used;
- Never leave left-over food that cannot be chilled;
- Keep the house clean and free from dust and dirt and remove refuse timely;
- Wash or bath regularly (with soap);
- Brush teeth after meals;
- Never urinate or defecate anywhere on the ground or in water;
- Do not spit on the ground or cough on other people (risk of spreading tuberculosis);
- Wear shoes or sandals to prevent hookworms from entering the body through the feet;
- Keep the floor clean from dirt and dust by sweeping regularly;
- Boil, filter or chlorinate water if you are unsure about the quality;
- When a person has a fever, a bad cough, diarrhoea, blood in faeces or sputum or other symptoms of tiredness and listlessness, take the person to a clinic or hospital.

4.5.2 CONTRIBUTING CONDITIONS: FAMILY SAFETY

Health and safety goes hand in hand. The house should be safe for all inhabitants, especially for young children. Anything that might hurt or injure children such as knives, fire, medicines, or chemicals used in the garden, should be kept out of their reach (WHO, 1987).

For safety in the house WHO (1987) recommends the following:

- Situate the fire or cooking stove under a chimney or opening in the roof to let the smoke out.
- Separate the cooking area from the other areas to minimise danger of burns and scalds, especially to children.
- Store dangerous substances and objects out of the reach of children.
- Use fire resistant materials for the structure of the house if possible.
- Situate stoves or fires away from wood or curtains that can catch fire.
- Repair broken doors or windows.

For safety outside the house consider the following:

- Fire hazards, such as litter, waste paper, or dry leaves should not be present in the surrounds of the house.
- There should be a light outside the house to light up the surrounding area.
- Vehicular access should be controlled in accordance with road safety regulations.
- Steep slopes should be protected by a fence or barrier.
- Stormdrains and sewers should be covered.
- Broken bottles or sharp objects should not be left lying around.

4.5.3 CONTRIBUTING CONDITIONS: FOOD SAFETY AND SECURITY

Chemical fertilisers and pesticides have played a large role in the increase of food production since the Second World War, but clear warnings have been raised against over-reliance on them. The run-off of nitrogen and phosphates from excessive use of fertilisers damages water resources, and such damage is spreading (World Commission on Environment and Development, 1987).

Using chemicals to control insects, pests, weed and fungi enhances productivity, but overuse threatens the health of humans and the lives of other species. Continuing, long-term exposure to pesticides and chemical residues in food, water, and even in the air is hazardous, particularly to children. A 1983 study estimated that approximately 10 000 people die each year in developing countries from pesticide poisoning and about 400 000 suffered acutely (World Commission on Environment and Development, 1987).

Food can also be contaminated by careless use of household insecticides or through accidental contamination during storage and transport (WHO, 1987). To avoid contamination of food at home, grain needs to be stored in a container with a lid that close the container properly; when faeces have been used as fertiliser vegetables should be well washed and properly cooked before they are eaten; instruments and utensils should be well washed before being used; milk that has to be stored without refrigeration should be boiled before drinking, and fish should be gutted as soon as possible, kept away from direct sunlight, and kept as cold as possible (WHO, 1987).

Food animals should be slaughtered hygienically. They should be hanging during slaughter and after that they should be fully bled. the abattoir or place of slaughter should be fenced off and kept clean (WHO, 1987). Cows should further not be fed with sheep's offal to boost the protein in their diet, as it could result in Mad Cow Disease (Bovine Spongiform Encephalopathy), which kills cows and is potentially dangerous for humans (Wiesner, 1992). Another food safety problem that has caused recent concern, results from the fall-out of testing nuclear weapons, and the accident at Chernobyl nuclear power station in 1986 heightened public awareness of the potential problems (Wiesner, 1986). The most important foods acting as vehicles of transmission of radionuclides to man are those from milk and plants. However, there is considerable uncertainty about the nature of radiation-induced cancers and diseases. Therefore the monitoring of food products entering countries, especially poor countries should receive priority to eliminate the chance of "dumping" taking place.

Household food security depends primarily on the ability of the household to secure enough food to ensure an adequate dietary intake for all of its members at all times for a healthy and active life. The extent to which a household has achieved food security can be measured by the nutritional status of its members, particular children under five, whose nutritional status changes most rapidly in response to inadequate food intake. The quality of foodstuffs is as important as the quantity (Wiesner, 1992). A balanced diet that supplies

all the constituents needed to meet a person's individual energy requirements and the raw materials for body building and replacement must include carbohydrates, proteins, fat, vitamins and minerals.

Different minimum daily intake has been set by different authorities, for example in the case of protein, a low value of 30 grammes per day (London School of Hygiene and Tropical Medicine, 1986) and a value of 70 grammes (US Department of Health, 1985) while requirements for fat are significantly dependent on climate and level of activity (Wiener, 1992). Particularly important in poor communities are proteins, the materials which build and repair the body and body tissue. Medical survey conducted under the auspices of the WHO found that nearly 20 percent of the world's children show clear signs of protein deficiency and malnutrition (Wiener, 1992). Fish, beef, milk products and soy beans are foods with the highest protein content. However, diets have to be investigated in the context of prevailing cultural and climatic conditions, and a balanced diet is what is recommended by the WHO.

4.5.4 CONTRIBUTING CONDITIONS: LEVEL OF HEALTH EDUCATION

In poor communities a person's level of health is influenced by three groups of variables:

- Background - the national economy and government. The strength of the national economy, national political structure, policy and laws (and the ways and means by which these are enforced) and the distribution of income and capital assets within society sets the background for opportunities to enjoy health (Hardoy et al., 1990).
- Underlying factors - the physical environment, infrastructure services, socio-economic characteristic of the person concerned and age and gender (see Chapter 4.2;4.3;4.4).
- Intermediary factors - Health and hygiene behaviour. This includes knowledge of health-enhancing behaviour at the individual/household level, knowledge of health enhancing behaviour at community level and level of community organisation, as well as use made of the health-care system and other public services and facilities.

Knowledge of health-enhancing behaviour (health education) can contribute to the maintenance of health and the control of communicable disease. Health education should be aimed at school children, adolescents, teachers and community members and include topics such as health promotion, sexuality and safer sex practices, immunisation against infectious diseases, nutrition, hygiene, women's health problems (related to pregnancy and child feeding), health care of children, the disabled and old people, the prevention of accidents and first aid, vectors of disease and how they can spread disease and environmental health. Priorities that need to be addressed in the Southern African context are the following (ANC, 1994):

- Control the spread of tuberculosis by establishing strategies to improve diagnosis, treatment management, compliance and effective follow up.

- Reduce the incidence of Hepatitis B and its spread in communities by immunisation campaigns
- Reduce incidence of moderate and severe dehydration in children under five years of age
- Reduce mortality from acute respiratory infections
- Control the HIV epidemic by developing counselling and support services
- Reduce the incidence of sexually transmitted diseases (STDs)
- Reduce the level of malnutrition and malnutrition related diseases

Unfortunately, most research into health problems to date has been done by health professionals that gave little attention to health impacts of many underlying and intermediate factors, including those relating to housing conditions (Hardoy et al., 1990)

4.5.5 CONTRIBUTING CONDITIONS: MENTAL HEALTH

To be in good health is to be healthy in body and mind (WHO, 1987). In general people are mentally happy when they are happy to be alive, like living with other people, try to solve their own problems, receive help when needed, and can help other people to solve their problems. The identification of mental disorders falls outside the scope of this study, however WHO (1987) gives the following guidelines to identify behaviour that can be easily recognised and treated by professionals.

- violent, angry or shouting behaviour without any reason;
- physically harm or injury to others or self without reason;
- quiet or anti-social behaviour;
- inability to wash, dress and work;
- sadness and crying without reason;
- suicide attempts;
- persistent threats to kill others;
- loss of memory;
- alcohol or drug abuse;
- leaning and concentration problems.

The importance of housing is sometimes questioned, taking into account that there is no human function that requires a house for its performance (Hardoy et al., 1990) and mental health and housing are only indirectly linked. However, in the context of the WHO definition of health - a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity (Carson, Butcher and Coleman, 1987) - the significance of the home environment to health assumes much greater importance.

According to Hardoy et al., (1990) a home is essential as a place for contemplation, comfort and leisure; for learning and socialisation of the young; a place for security and sleep; for eating and personal hygiene; a place for nurturing the family - the fundamental building block of society.

4.5.6 CONTRIBUTING CONDITIONS: CROWDING AND PRIVACY

Psychological investigation of the nature and effects of crowding have given rise to various definitions and descriptions. For example, Stokhols views crowding as a subjective experience involving specifically the need for more space, while Rapoport defines crowding as perceived density which is appraised as unfavourable (Viljoen et al,. 1987). However, one characteristic which most definitions of crowding have in common, is that they incorporate some aspect of the experience of stress, which may be the very reason for existing differences (since stress is a broad and rather vague concept). For instance, although high density configurations are regarded as a prerequisite for crowding, they do not necessarily lead to the negative experience of crowding. Crowded situations are more likely to be aversively experienced when (Viljoen et al., 1987):

- the physical boundaries are not clearly perceived, thereby producing ambiguity or uncertainty
- spaces are designed and intended for multipurpose use
- the achievement of personal goals or tasks is physically constrained
- the socio-physical environment is experienced as having a high change potential.

Crowded situations can bring about alterations in social behaviour, for example, increased aggression, withdrawal, reduced helping behaviour and can influence task performance and mood (Viljoen et al., 1987). Crowded conditions ensure that diseases such as tuberculosis, influenza and meningitis are easily transmitted from person to another (their spread often being helped by low resistance among the inhabitants due to malnutrition) and according to the WHO more space is better for health (WHO, 1987). Ideally, enough space must be available so that people are not crowded together, especially when sleeping. For example, children should not be required to share the same bed or sleeping mat (WHO, 1987).

The need for privacy is a basic one, which remains dormant until the individual becomes aware that his/her privacy is being invaded or that too much privacy is making him/her feel isolated. Privacy appears to be necessary for the optimum development of a person's identity, with grave consequences when the control over its expression is thwarted (Viljoen et al., 1986) - a situation that often occurs in poor communities. The desire for privacy when defecating has been found to be important, especially among women (Hardoy et al., 1990). A study in Nepal found that is common for women to eat little or nothing at night to avoid the necessity of going to the toilet.

4.5.7 SUMMARY for INDICATOR: FAMILY HEALTH AND HYGIENE BEHAVIOUR

CONDITIONS	CONTRIBUTING FACTORS
HYGIENE BEHAVIOUR	• there are separate places available for bathing and washing household utensils, with adequate drainage • inhabitants wash hands before and after eating or cooking • inhabitants bath regularly and use soap when bathing • inhabitants use clean water for cooking and bathing • inhabitants wash hands after using the latrine • clothes worn by inhabitants are clean • inhabitants brush teeth after meals • inhabitants do not urinate or defecate on the ground around the house or in water • inhabitants do not spit on the ground • the floor is swept regularly
FAMILY SAFETY	• fire hazards are not present in the house or surrounds • poisonous and hazardous substance are stored out of reach of children • sharp objects are not left where children can reach them • stoves or fires are situated away from wood or curtains that can catch a light • stoves are out of reach of babies and toddlers • vehicles do not drive fast in front of the home • there is a light outside the house • storm drains and sewers are covered • broken windows are not present • steep slopes are protected by a fence or barrier • broken bottles or pieces of glass are not lying around
FOOD SAFETY AND SECURITY	• enough food is available for a balanced diet • insecticides are not used close to food products • food is stored in containers with lids that close properly • animals are slaughtered hygienically to prevent disease
LEVEL OF HEALTH EDUCATION	• inhabitants are aware of HIV/AIDS and how it is transferred • inhabitants have knowledge about tuberculosis and its spread • inhabitants understand that vectors of disease can lead to illness • inhabitants know stagnant water is not to be used for drinking • inhabitants know to boil water if unsure about quality • inhabitants know that they have to bath regularly • inhabitants know about immunisation • inhabitants know where they can be immunised

MENTAL HEALTH	• inhabitants display violent, angry or shouting behaviour without reasonable cause • inhabitants harm other people physically • inhabitants are too quiet or do not want to talk to anybody (anti-social) • inhabitants are able to wash, dress and work • inhabitants are very sad and cry without reason • inhabitants threaten to kill themselves • inhabitants threaten to kill others • inhabitants have lost their memories • inhabitants do abuse alcohol or use drugs • inhabitants do have difficulty in learning and concentrating
CROWDING & PRIVACY	• inhabitants live in over-crowded conditions • there is adequate space for inhabitants not to have to share mats or beds (excluding married couples) • privacy can be obtained when needed • there are adequate eating utensils so that inhabitants do not have to share • provision is made to defecate in private • provision is made for space to wash/bath in

4.6 COMMUNITY FACILITIES

The fundamentals of a healthful residential environment should consist of a neighbourhood setting for dwellings which conforms with sound town, country and regional planning practice as well as appropriate community facilities, such as sport fields, green open space, nursery schools and churches. According to Hammond and Gear (1986) the following are important facilities for communities:

- protection facilities of police and fire services;
- industrial, commercial, cultural, social, religious, educational, recreational and health and welfare facilities connected to the residential structures by a network of roads and public transportation and a system of footpaths;
- freedom from hazards to health, welfare and public morals.

Often the emphasis falls on items affecting physical health (e.g. water, sanitation, ventilation) at the expense of the items affecting social and psychological health (e.g. privacy, sufficient space), which can be regarded as expendable "luxuries". The reason for this can be any of the following speculations (Hammond and Gear, 1986):

- effects on physical health are more immediately seen (e.g. outbreaks of typhoid are more obvious than widespread depression or pent-up frustration
- epidemics threaten the health of other, better-fed, better-housed, better-educated and better-paid people
- major improvements can be made for whole communities within an existing slum (e.g. by supplying clean water but leaving the other conditions unchanged

However, poor people should also have the opportunity to enhance their quality of life through enjoying the availability of community facilities even though it is difficult to measure the benefits. According to Dennis Moss (1994) people's quality of life and their ability to improve their position over time is dependent upon the provision of public facilities and spaces, which in turn, reduces the pressure on individual dwelling units. Furthermore, research has found that people existing in holistically conceived developments in terms of transportation, education, health care, shopping and recreation live better and more economical lives, which again affects their ability to pay their accommodation (Dennis Moss, 1994).

Supportive infrastructure, namely community facilities and public institutions are of particular importance in situations of poverty, in taking pressure off individual dwellings and to satisfy the full range of people's needs. In accordance with the ecosystemic perspective the community environment can be seen either as potentially enabling and enriching or as restricting opportunities and reducing satisfaction.

4.6.1 CONTRIBUTING CONDITIONS: HEALTH FACILITIES

In 1977 the World Health Assembly decided that the main social target of government and the WHO should be the attainment by all people of the world by the year 2 000 of a level of health that will permit them to lead a socially and economically productive life, popularly known as "Health for All by the year 2 000. The Alma-Ata, USSR International Conference on Primary Health Care (PHC) in 1978 stated that Primary Health Care is the key to attaining this target. In 1979 the Health Assembly launched the Global Strategy for Health for All (WHO, 1981).

The main thrusts of the strategy are the development of the health system infrastructure, starting with PHC for the delivery of countrywide programmes that reach the whole population. these programmes included measures for health promotion, disease prevention, diagnosis, therapy and rehabilitation. The Strategy involves specifying measures to be taken by individuals and families in their homes, communities, by the health service at the primary and supporting levels, and by other sectors. Crucial to the Strategy is making sure of social control of the health infrastructure and technology through a high degree of community involvement (WHO, 1981). The number of PHC facilities required is dependent on population density and population distribution in a given area. According the ANC (1994) the following are basic requirements for health care:

- accident, emergency and rescue services
- appropriate health technology
- appropriate care for the elderly
- control of communicable diseases
- environmental health
- health promotion
- laboratory services
- maternal and child health care
- mental health
- non-communicable diseases
- nutrition
- occupational health
- oral health
- palliative care (relief of chronic pain and care of people with terminal illness
- rehabilitation
- research

Staff/population ratios for PHC services should be based on the following norms (MOHSS, 1995):

STAFF CATEGORY	HEALTH WORKER PER POPULATION
Medical practitioner	1/60 000
Dental practitioner	1/60 000
Health inspector	1/60 000
Environmental health assistant	1/20 000
Dental therapist	1/20 000
Oral hygienist	1/60 000
Rehabilitation therapist	1/60 00
Rehabilitation assistant	1/10 000
PHC facilitator	1/60 000
Professional nurse (community services)	1/20 00
Professional nurse (mental health	1/20 000
Professional nurse (ophthalmic)	1/30 000
Staff nurse (community services)	1/20 00
Pharmacist	1/60 000
Pharmacist's assistant	1/20 000

Minimum hospital bed requirement for providing district hospital services should be based on the following norms:

Acute care beds	2.5 beds per 1 0000 population
Chronic care beds	0.5 beds per 1 000 population

In poor communities it is important to have easy and reliable access to PHC facilities (small clinics, large clinics, health centres or hospitals) and that the facilities are adequate to cope with the population structure and density.

4.6.2 CONTRIBUTING CONDITIONS: EDUCATIONAL FACILITIES

The school as a setting has three major constituents: the physical milieu, the human component and the educational programme. It must be remembered that the effectiveness of the physical aspects of the learning environment cannot be evaluated in isolation from the other elements as the effects of the physical milieu depends largely on the suitability of that milieu for the particular programme employed (Viljoen et al., 1987).

The spatial requirement standards for primary schools are 1/700 units and for high schools, 1/1 000 units (Dennis Moss, 1994). Guideline from the Department of Education (1995) for pupil/teacher ratios are the following: for primary schools, 1 teacher per 35 pupils, and for high school 1 teacher per 40 pupils.

Education is one of the most important factors determining employment and thus potential income, therefore in poor communities it is important that educational facilities are located along easy and reliable access roads or within walking distance. There is a close association between poverty and a lack of education and the lack of education of the head of the household is closely correlated with poverty in households(Draft White paper for Social Welfare, 1995).

The lack of education, employment opportunities and access to services has deprived many people their dignity and the ability to look after themselves, therefore poor families and children should be given priority regarding the transfer of information and skills, concerning formal education as well as life skills training.

4.6.3 CONTRIBUTING CONDITIONS: SHOPPING VENUES

To fulfil basic needs such as food and clothing, and for socialisation formal or informal shopping venues are needed where people can buy or exchanged goods and services. Related to environmental health, shopping venues for food and food products have to be hygienically operated. Health inspectors normally inspect business premises and are responsible for the management of environmental and public health activities in their municipal areas.

Health inspectors investigate whether health standards are adhered to by people operating the following shops and services (Pers.Comm., Nolte, 30/11/95): butcheries and abattoirs; sale of pre-packed meat and fish; transportation of meat; supply of milk; restaurants, tea-rooms and eating-rooms; bakeries; hawkers; fish-friers and fish-mongers; second-hand goods; mattress-makers, upholsterers, pillow- and cushion manufacturers; factories; ice-cream and similar commodities; mineral water and ice factories; barbers and hairdressers; laundries and washing facilities; hotels, boarding houses and lodging houses; camping grounds and caravan parks; swimming-baths; and sale of food through the medium of a machine.

In poor communities shopping venues should be in walking distance or reachable with reliable public transport and health requirements should be adhered to at all times.

4.6.4 CONTRIBUTING CONDITIONS: RECREATIONAL FACILITIES

Access to leisure or recreational facilities is an important dimension of city life and can contribute to both urban stability and quality of life (Viljoen et al., 1987). This is particularly true for poor communities who depend on the public sector to provide facilities. There is no doubt that the demand for outdoor recreation is rapidly increasing and authorities throughout the world face the difficult task of accommodating increasing numbers of people in natural areas while preserving the quality of those areas.

Ideally recreational facilities should cater for the needs of all age groups and cycles of human development: infants, children, adolescents, adults and the ageing. Play is the work of children and useful for young children who lack adult facilities for verbal expression (Wachtel, 1990). Children learn the moral values of their culture principally by identifying or modelling themselves after their own parents (Papalia and Olds, 1978) therefore venues when children can interact leisurely with parents are important. Adolescents are interested in analysing the life experiences that they have shaped so far and learn through social interaction with others. Therefore places for socialisation with peers in a recreational fashion, such as parks and sport facilities, are important for development. Generally most old people want to participate actively in life to be as self-sufficient as their health and circumstances permit and to maintain satisfying relationships with others (Papalia and Olds, 1978). Although they usually do not participate in sport themselves, they enjoy watching others and it is important that they are able to visit recreational sites.

Spatial requirement standards for sport facilities are 0.5ha/1 000 people (Dennis Moss, 1994).

Recreation activities also appear to gratify needs such as the development, maintenance or protection of self-image; the development of social identities or affiliation with others; the winning of esteem or the enhancement of status; the development of skills or the achievement of goals; the exercise of power; the satisfaction of curiosity or the urge to explore; the attainment of self-fulfilment; and the mastering of other problems or needs (Viljoen et al., 1987).

4.6.5 CONTRIBUTING CONDITIONS: GREEN OPEN SPACE

Nature appears to be associated with tranquillity and interaction with the natural environment can have positive psychological effects. According to Viljoen et al., (1987) recreation or activities in parks and similar green open areas serves as a means for coping with stress encountered in urban areas and thus provide a temporary means of escape. Even gardening in itself can have important psychological benefits as illustrated in the following example. The new York City Housing Authority sponsored recreational

gardening opportunities to tenants of run-down areas in new York and it was found that gardening activities increased social cohesion in the community by providing meeting places and opportunities for people to work together for a common goal. The residents also developed a sense of accomplishment and increased self-esteem. Furthermore, the incidence of vandalism was reduced (Viljoen et al., 1987).

Gardening allows one a sense of mastery over the environment sand a feeling of control. Community gardening may further satisfy the need to escape into nature fro those without the means to do so. However, one does not have to garden to enjoy green open space, as studies found that just enjoying the aesthetic quality of the area are highly valued by inhabitants (Viljoen et al., 1987). Grass for children to play on is also important in community settings. *The spatial requirements standard for open spaces are 4ha/1 000 people (Dennis Moss, 1994).*

4.6.6 CONTRIBUTING CONDITIONS: CULTURAL FACILITIES

Culture can be defined as the dynamic totality of distinctive spiritual, material, intellectual and emotional features which characterise a society or social group. It includes the value system, traditions, heritage and beliefs developed over time and subject to change (Draft White Paper on Arts, Culture and Heritage, 1996).

To demonstrate the importance of cultural activities the following was stated in the draft White Paper on Arts, Culture and Heritage (1996, p. 10) that "access to, participation in and enjoyment of the arts, cultural expression, and the preservation of one's heritage are basic human rights; they are not luxuries, nor are they privileges".

Especially when dealing with poor communities, it is important to remember that humans are holistic beings. They not only need to improved material conditions in order to have a better quality of life. People have psychological, spiritual and intellectual expression, all of which require nurturing and development for them to realise their full potential, and act as responsible and creative citizens (Draft White Paper on Arts, Culture and Heritage, 1996). Therefore facilities for the expression of art, music, theatre or other artforms are crucial elements in communities to enable people to develop, grow and enjoy an acceptable quality of life.

Furthermore, generally most Bill of Rights states that everyone has the right to freedom of conscience, religion, thought, belief and opinion. Therefore provision must be made in communities for places of worship and burial for all represented religious denominations.

The spatial requirements standards for cemeteries are 1ha/1 000 people, and
The spatial requirements standard for churches (places of worship) 1 church/300 units (Dennis Moss, 1994).

4.6.7 CONTRIBUTING CONDITIONS: COMMUNICATION AND INFORMATION

Regarding environmental health, lines of communication are important, for example, to report blocked drains, damage to infrastructure, floods, or landslides. People also need to be able to telephone emergency services, hospitals and police as well as friends and colleagues. Thus available and reliable telephones are important.

Information is a prerequisite for raising educational standards, participation in decision-making, developing the economy and quality of life (Department of Arts, Culture, Science and Technology, 1996). In general people gather information through books (libraries and schools), radio, television, newspapers and magazines, films, personal discussion and experience. Therefore, at a minimum poor communities should have access to radios and telephones.

4.6.8 SUMMARY for INDICATOR: COMMUNITY FACILITIES

CONTRIBUTING FACTOR	CONDITIONS
HEATH FACILITIES	• emergency and rescue services are available and reliable • enough medical personnel is available to treat the sick • day clinics are within walking distance • hospitals are easily accessible by public transport • hospitals are equipped with appropriate machines/ equipment • sufficient hospital beds are available • hospitals are equipped with sufficient medication for the sick • appropriate health care is available for the elderly • appropriate health care is available for maternal and child health care
EDUCATIONAL FACILITIES	• transport is available to schools or schools are within walking distance • sufficient teachers per class are available • sufficient books are available at school • the school has a playground • toilet facilities at school is well-kept • clean water is available at the school
SHOPPING VENUES	• adequate formal trading venues are available • venues to buy food are within walking distance • flies are not present at shopping venues/markets • good quality food products are available • food vendors and businesses are inspected for hygiene • animals are not allowed in space where food is sold
RECREATIONAL FACILITIES	• sports facilities are available in the neighbourhood • playing space for children is available within viewing distance from home • parks and recreational areas where games can be played are available within walking distance

GREEN OPEN SPACE	• provision is made for green open space to be enjoyed by community members • provision is made for individual or community gardening • grass for children to play on is available close to home
CULTURAL FACILITIES	• community centres are within walking distance • facilities are available for practice and performance of music • facilities are available for display and production of art work • facilities are available for the production and viewing of theatre • places of worship are available for members of all religious denominations • adequate burial facilities are available for all religious denominations
COMMUNICATION & INFORMATION	• people have access to radios • people have access to telephones • people have access to books, magazines and newspapers

4.7 QUALITY OF LIFE

The concept of quality of life is complex, since it is a property of an individual's life, coloured by perceptions and evaluations which are subjective and relative, varying according to personal characteristics. Quality of life (QOL) is conceptualised as more than just fulfilling basic survival needs such as shelter, adequate personal space, food and water. The QOL people lead is about opportunities to achieve more and about the "little bit" that makes life worth living to them and to others (Wiesner, 1992).

It is important to consider QOL when providing housing for people who, because of a lack of resources, are unable to provide it for themselves and are thereby deprived of freedom of choice (Hardoy et al., 1990). Few governments in the developing world have the power, resources, and trained staff to provide their rapidly growing populations with the land, services, and facilities needed for an adequate human life: clean water, sanitation, schools, transport, health care, and educational and cultural. The result is mushrooming illegal settlements with primitive facilities, increased overcrowding, and rampant disease linked to an unhealthy environment - an undesirable quality of life.

There is however, a further dimension related to environmental health and housing that is frequently ignored, related to quality of life. This pertains to consideration of the home as a positive contribution to, and reinforcement of, human health and well-being - conditions that can contribute to a satisfactory quality of life. To illustrate this point, Novick states

the following: "A home is essential as a place for contemplation, comfort and leisure; for learning and socialisation of the young; a place for security and sleep; for eating and personal hygiene; a place for nurturing the family - a fundamental building block of society" (Novick, p. xvii in Hardoy et al., 1990). Nevertheless, the importance of housing is sometimes questioned, when taking into account that there is no human function which requires the house for its performance.

4.7.1 CONTRIBUTING CONDITIONS: RESIDENTIAL SATISFACTION

Housing, and more particularly residential satisfaction, is a significant determinant of quality of life (Viljoen et al., 1987). Regarding housing, definitions of adequate or inadequate house design are often a source of confusion. What is adequate for one family may be inadequate in the eyes of the city architect or town planner (Hardoy et al., 1990).

A house becomes a home when it is an environment to which a person feels some attachment. One's home is more than just a physical shelter from the elements - it serves as a symbol of the owner's identity, status and identity within a particular community, and even of the owner's aspirations in life. The concept of home therefore implies a sense of possessed territory providing fundamental security within the societal framework, familiarity, belonging and control (Viljoen et al., 1987). Furthermore, the home serves as a locus in space - the place to which one always returns. The home environment usually reflects the occupant's self-identity and is seen as an extension of the self. In this way the home becomes a symbol of the self. The home is also a social and cultural unit where standards of behaviour, values and ethics are learned.

Home is therefore both an environmental and psychological concept: it provides a physical shelter, but also meets our needs for self-expression, privacy, territoriality and self-identity.

Regarding residential satisfaction, both the perception and evaluation of the dwelling itself, and the perception and evaluation of public facilities are important. The type of dwelling itself, impacts on the life of household members and residential satisfaction in a number of ways (Dennis Moss, 1994): It affects physical health, for example, protection from environmental hazards; it affects psychological health for example, overcrowding, lack of privacy etc.; and it affects economic life, for example, the degree of drain on the household's financial resources. It also affects to what extent the unit can be used for income generating activities (multipurpose homes).

Migrant labourers are mostly housed in hostels (built by the state and controlled by administration boards) or in compounds which are owned and regulated by employers or large numbers of contract workers such as the mines. According to Hammond and Gear (1986) it is difficult to distinguish between the social and psychological effects of hostel life. Socially, hostel dwellers are isolated from their families and from adults of the opposite sex. They have no privacy and few recreational pastimes except drinking alcohol.

Psychologically, they experience simultaneous isolation (from family) and intrusion (by room-mates). They work in boring, repetitive jobs and often feel depressed and alienated. Physically there are the risks of infectious disease, outbreaks of violence, alcohol abuse and occupational disease.

Regarding squatter camps, health hazards in general include poor water and sanitation, exposure to the elements, harassment, violence and crowding. However, socially squatter camps are probably preferable to hostels as a families lives together (Hammond and Gear, 1986).

People's residential satisfaction also depends upon the provision of public facilities and spaces, (which reduce the pressure on individual dwelling units). People existing in holistically conceived developments in terms of transportation, education, health care, shopping and recreation, live better and more economical lives (which affects their ability to pay their accommodation (Dennis Moss, 1994).

4.7.2 CONTRIBUTING CONDITIONS: EASE OF ACCESS

It is important to improve ease of access of low income residents to employment opportunities, commercial and service facilities and amenities (Dennis Moss Report, 1994). Subsidised housing is often unaffordable or inappropriate to the needs of a large proportion of the community, and maximum use of existing bulk infrastructure should be made by locating public housing projects within existing urban areas. Furthermore, the need to provide new (or extend existing) bulk infrastructure could be reduced by ensuring that public housing is delivered at high density (Dennis Moss Report, 1994). Poorly located housing have led to the creation of inconvenient environments imposing costs on communities in gaining access to social services, as well as employment and commercial opportunities, reducing their quality of life.

4.7.3 CONTRIBUTING CONDITIONS: SECURITY OF TENURE

Security of tenure does not necessarily imply home-ownership, however it does include the concept of renting without the insecurity of being evicted (Dennis Moss, 1994). Security of tenure has a profound effect on satisfaction and psychological health (Hardoy et al., 1990) and in poor communities, fear of eviction is a constant worry for most tenants, temporary boarders in cheap rooms or *de facto* owners in illegal settlements.

4.7.4 CONTRIBUTING CONDITIONS: APPROPRIATENESS OF DELIVERY SYSTEM

Even in poor communities, residential choice, which is a function not only of available resources, but also of attitudes, has a complex relationship with residential satisfaction. Residential satisfaction is influenced by both objective and perceived attributes of the environment, as well as the personal characteristics of the perceiver and the standards of

comparison applied (Viljoen et al., 1987). These standards are based on both personal aspirations and past experience.

Although it remains impossible to provide for the total variation in the requirements and priorities of families (as needs are constantly changing), a wide range of delivery options should be made available for a better fit between needs and priorities: what people can afford to pay; and obtainable housing stock (Dennis Moss, 1994). If residential choice is ignored, that is, the person's expectations are not satisfied by the environment, the resulting dissatisfaction may lead to frustration, alienation and social and political discontent. On the other hand, if there are opportunities to express choice, the resultant satisfaction can influence people's overall perception of life in general (Viljoen et al., 1987). In poor communities the following options of delivery can be considered (Dennis Moss, 1994):

- Conventional housing. This option covers formal, completed houses provided with a high level of infrastructure, services and facilities.
- Starter housing. Either the amount of space and/or the level of finishes of the unit is reduced, taking the form of either a shell with no internal walls or a smaller core unit with internal walls. It is intended that a unit can be upgraded over time.
- Site and services. This option refers to a serviced site on which informal shelter may be built. It is also considered as a starter option that can be upgraded over time.
- Rental. This option can refer to any of the above forms of housing delivery.
- Co-operative ownership. An emerging option that includes co-operative ownership.

4.7.5 CONTRIBUTING CONDITIONS: OCCUPATIONAL ACTIVITIES/ MULTIPURPOSE HOMES

Formal or informal businesses in or very close to the home can contribute to the spread of disease (see Chapter 4.5), noise, pollution (see Chapter 2) and stress if health and safety standards are not adhered to. Noise becomes stressful when it is too loud and causes "energy overload", or the experience of stress may come about because the noise creates continual interruptions which hinder task performance, or it could be that the person feels unable to regulate the noise level and experience stress because of a feeling of helplessness (Viljoen et al., 1987). Noise can also have negative effects on concentration, learning ability and sleep patterns. The recommended upper noise limit for spaces used for dining, social conversation, and sedentary recreational activities is 60 dB.

Other environmental health hazards that can result from multipurpose homes include fumes (spray-paints or chemicals), dust, litter, crowding, and lack of privacy. However, on the positive side, multipurpose homes can contribute to income for households to improve opportunities and quality of life.

4.7.6 SUMMARY for INDICATOR: QUALITY OF LIFE

CONTRIBUTING FACTOR	CONDITIONS
RESIDENTIAL SATISFACTION	• people are satisfied with their house or dwelling • people are satisfied with available infrastructure • people are satisfied with available public facilities (community open space, recreational facilities, schools, health centres etc.) • people are satisfied with available religious facilities • people experience safety and security in their neighbourhood • people are satisfied with the aesthetics in their neighbourhood • space is provided for people to relax in
EASE OF ACCESS	• there is easy access to places of employment • there is easy access to commercial and service facilities
SECURITY OF TENURE	• people do not have fears of being evicted
APPROPRIATENESS OF DELIVERY SYSTEM	• people have different options regarding their housing delivery system
OCCUPATIONAL ACTIVITIES/MULTIPURPOSE HOMES	• people are not working with spray-paints in areas next to home • people are not working with noisy machinery close to home • people are not creating unnecessary dust close to home • people are not creating toxic fumes close to home • spaza shops are not interfering with home life • shebeens are not interfering with home life • dirt and litter is not created because of business ventures within the home • health inspections are carried out at business premises • noise level is 60 dB or below during daytime • there is no unnecessary obstacles to entrepreneurial opportunities in the informal sector • occupational health and safety standards are adhered to

4.8 CONCLUSION

This six part survey (socio-economic setting, house design, infrastructure services, family health and hygiene behaviour, community facilities and quality of life) had as its aim to contribute to identifying health hazards in the micro- and mesosystems, taking into account people, the environment, as well as the interaction between people and the environment, in accordance with the ecosystemic perspective. Topics often neglected when investigating environmental health in poor communities, such as family health and hygiene behaviour and quality of life were included in this survey.

PLATE 2: Aerial photo of Kuisebmond

CHAPTER 5
ENVIRONMENTAL HEALTH IN KUISEBMOND

5.1. METHODOLOGY

This chapter is step three - the completion of the "Environmental Health Survey for Poor Communities" (EHSPC) - in the overall methodology followed in this dissertation. To place this chapter in perspective, the UEP for Walvis Bay was step one, and the development of the Environmental Health Survey for Poor Communities (EHSPC) was step two. Step four is the integration of the information collected in steps one (Chapter 3) and this chapter (Chapter 5) to culminate in an Environmental Health Profile for Kuisebmond.

Before the EHSPC was completed for Kuisebmond, background information on Kuisebmond was discussed under the following headings: introduction; housing; refuse removal; sanitation; maintenance work and water consumption.

The aim of this chapter is to collect relevant information related to the micro- and mesosystems in Kuisebmond. The microsystem is conceptualised as an individual household, including both the physical environment and health and hygiene behaviour of individuals, and the mesosystem is conceptualised as the neighbourhood, comprising of the interaction of more than one microsystem.

5.2 BACKGROUND TO KUISEBMOND

(Unless otherwise stated, the information in this section is attributable to the Annual Report of the Town Engineer (19194/95) of the Walvis Bay Municipality)).

5.2.1 INTRODUCTION

Namibia achieved Independence on March 21, 1990, however, Walvis Bay remained under South African rule until 1 March 1994. Kuisebmond is located in the Greater Walvis Bay. The size of Kuisebmond nearly doubled within the last three years, placing added pressure on infrastructure services, such as refuse removal, water supply, waste disposal and electricity supply.

Kuisebmond Municipality **amalgamated** with the Walvis Bay Municipality (WBM) in 1994 and refuse removal, as well as water supply and sanitation services are administered by the Town Engineer's Department of the WBM. The WBM is also responsible for the provision of electricity in the Walvis Bay district.

South African rule in Walvis Bay resulted in settlement patterns typical **of Apartheid cities.** Traditionally Kuisebmond (See Zone 10 on Map 1) was primarily a black township, while Narraville (See Zone 19 on Map 1) was mainly a coloured township. People residing in Kuisebmond are mainly employed in the fishing or multiplier industries.

The major **problems** identified in Kuisebmond were the following:

- Need for low income residential development in Kuisebmond. The waiting list for housing in Kuisebmond is about 2 000 units.
- Unemployment (magnified by increasing migration).
- High incidence of TB and AIDS, (magnified by increasing migration).
- Informal densification (squatting)
- Lack of an adequate trading environment for informal traders
- Inadequate car parking and taxi rank facilities

Most of these problems contribute to environmental health hazards, typically experienced in poor communities, such as crowded living conditions, unhygienic trading environments, and inadequate water supply, sanitation and waste removal and disposal services.

5.2.2 DEMOGRAPHIC DATA FOR KUISEBMOND

In 1990 the populations distribution for the Greater Walvis Bay according to population group was the following: Black - 15 750 (53% of total); White - 7 500 (25% of total); Coloured 6 700 (22% of total). The percentage growth per year (in %) for population groups, estimated from 1990 statistics were the following: Black: 15,1%; White: -1%; Coloured: 4,4 %, with a total growth of 7.3% (Dennis Moss, 1994).

The population distribution according to the main population concentrations in 1993 was the following:

	Population	Area	Density
Historic white areas	7 500	400 ha	18p/ha
Narraville	7 500	105 ha	70p/ha
Kuisebmond	23 000	110 ha	210p/ha

Most people in Kuisebmond belong to the black population group, where the population density is unacceptable high, resulting in social problems such as crowding, lack of privacy, poor nutrition, unemployment and increased crime.

5.2.3 HOUSING IN KUISEBMOND

Housing in Kuisebmond consists of houses and flats, a hostel, single quarters, serviced sites and informal settlements (mostly in the back-yards of serviced dwellings). There is no transitional area from conventional houses to informal dwellings, as a separate squatter-camp does not exist. The density in Kuisebmond (Zone 10) is between 20 and 30 units/hectare. The low standard is 7,5 people per unit or 150 to 225 people/hectare. The

high standards is 12 people per unit or 240 to 360 people/hectare (Walvis Bay Densification Policy, 1995).

Servicing of 368 erven started during 1994 as part of the development of 500 erven in Kuisebmond during 1994/95. Development included flattening of dunes, construction of roads and the part installation of the water distribution network and sewage reticulation. These erven should be fully serviced by 1996 (WBM, 1995/96). Furthermore, the Walvis Bay Industrial and Urban Development Project (WBIUP) supports the provision of 3000 serviced plots for low income beneficiaries at Kuisebmond (EEU, 1996).

The backlog of 2000 house on the waiting list is thus being addressed, however, migration to Kuisebmond is ever-increasing. According to UCT (1996) if squatting is to be controlled and overcrowding alleviated, between 500 and 800 erven need to be developed in Walvis Bay per annum for the next five years.

5.2.4 KUISEBMOND REFUSE REMOVAL

The refuse removal and street cleansing of Kuisebmond was transferred to the Department of the Town Engineer, Cleansing Services Branch during January 1994. Before being incorporated into the Department of the Town Engineer, refuse removal in Kuisebmond was done by means of two tractor drawn Tippak trailers. The labour force was 2 drivers and 8 labourers. Removals in the residential area and the hostel/single quarters were done twice per week, while a 5-ton flat-bed truck, in addition to the tractors, was used to clean the hostel/single quarters twice per week. At times this was still not sufficient and at least once per month a front-end loader and tipper truck had to be leased from the Works Branch to assist with refuse removals. These tractors were in a bad state of repair and regular break-downs occurred. Some damage was also caused to both tractors during the May 1994 violence at the hostel, which further hampered removals. Interestingly, garbage and waste generated in and around the hostel decreased during October 1994, after entrance control was introduced. However, the amount of refuse now generated at the single quarters increased.

At that stage Kuisebmond was sub-divided into 8 areas and a labourer assigned to each area to clean the streets ands parks within his area. A further 12 labourers were responsible for cleaning and gathering of refuse inside and immediately outside the hostel and single quarters. Residents of Kuisebmond made use of the system of communal refuse points which were spaced anything from a few erven apart to streets apart. These point were not protected against any form of scavenging, and many residents did not put their litter in big plastic bags. In the prevailing wind conditions endless problems were being experienced and street cleaners could not cope with the situation. To add to the existing problems, Kuisebmond expanded at such a rate that the labourers could not keep up with the workload. Other methods of refuse removal had to be considered.

The idea thus arose to **privatise** the refuse removal system. Kuisebmond was divided into zones, each zone consisting of approximately 100 residential units. Contractors from

within Kuisebmond were appointed by Council to clean their respective areas. These contractors had to reside within their specific zone and had to be jobless at the time of their appointment. Large 3-ton "Scowback" containers were provided by Council and placed at strategic points within the zone of each contractor. The idea behind the principle of appointing private contractors from the community was the following:

- the community becomes responsible for their own waste, thereby reducing the number of scattered communal points;
- the contractors are paid to remove the refuse, thus the more refuse they remove, the more they get paid and in theory, the cleaner the town becomes;
- because each contractor is responsible for only 100 houses in his zone, he can start educating the immediate community regarding basic cleanliness as well as general health conditions;
- each contractor appoints his own work force from within his zone to assist him, thereby contributing towards job creation.

Due to problems experienced with the supply of the "Scowback" containers, the privatised system was first introduced during May 1995 using big plastic bags for refuse removal. Contractors were paid N$ 1,00 per bag collected. The "Scowback" system was however implemented at the end of August 1995. During the first two months it was operational, a total of 580 m^3 (14 496 bags) of refuse were collected by these contractors.

5.2.5 SANITATION IN KUISEBMOND

Prior to amalgamation, Kuisebmond Municipality had laid their own reticulation system (without tendering) and construction started departmentally. Initially many problems were experienced and the dewatering pump broke down twice. Because of the high water table, only two pipes could be laid at a time. Problems with inadequate supervision was also experienced. By April 1995 it was clear that the performance of this temporary team was unsatisfactory and it was eventually decided to get tenders for the remaining part of the work.

5.2.6 MAINTENANCE WORK IN KUISEBMOND

The Maintenance section of WBM did maintenance work on 998 Council houses in Kuisebmond during 1994/95. Most of these houses were sold during the year and maintenance by the Maintenance section stopped once the particular agreements were signed. Most of the maintenance work done was routine work, such as replacing hinges, screws, doors water taps, geysers, repairing water leaks, replacing toilet bowls etc. Breaking of windows was perceived as a major problem and a total of 280 windows of various sizes were replaced on Council buildings within Kuisebmond.

Bigger work in Kuisebmond included continues repairs at public toilets to the large amount of N$ 21 805 (this included N$11 027 as provision for burglar proofing and steel gates to four toilet blocks), the building of 18 electrical kiosks inside the hostel, the

erection of 149 poles for the hanging of washing, installation of 34 new doors, the erection of a total length of 620 m new boundary walls, as well as the repair or rebuilding of 661 m of boundary walls.

5.2.7 WATER CONSUMPTION IN KUISEBMOND

The water consumption of Kuisebmond increased steadily through the years, with the growth rate increasing rapidly since the abolishment of access control at the Swakopmund bridge in 1993. This is clearly reflected in the population of Kuisebmond which still amounted to 23 000 people in 1991, but was estimated at 30 000 in 1994. With such an increase in population, water consumption must increase and the effect of increasing tariffs to curtail the growth in demand is barely visible.

The consumption in 1994 stood at 0,991 million m^3, triple the 1985 consumption of 0,329 million m^3, and a growth of 300% in 9 years, i.e. 13% per annum average. The growth rate for the first six months of 1995 was 7,0% over the same period for the previous year and it can be expected to further increase when the fishing quotas increase, as people flock to Walvis Bay in search of work. The establishment of the EPZ and the (real and anticipated) job creation associated with that should contribute to a relatively high growth rate for still some time to come. Kuisebmond's contribution to the overall water consumption of Walvis Bay grew from 10,2% in 1985 to 21,2% in 1995 and is likely to increase still further.

5.2.8 COMMUNITY FACILITIES IN KUISEBMOND

The following table supplies information regarding community facilities in Kuisebmond. As can be seen from the table more sport facilities, cemeteries, churches as well as more open spaces are needed. Data about other religious meeting places is not available.

STANDARD	NEED	CURRENT	FUTURE
Sport facilities - 0.5ha/1 000	21 ha	11 ha	10 ha
Cemeteries - 1ha/1 000	30 ha (the planning norm for cemeteries is high and the land to be provided could therefore be less)	uncertain (data only supplied for Walvis Bay)	uncertain (data only supplied for Walvis Bay)
Churches - 1/300 unit	18	uncertain (lack data)	uncertain (lack data)
Open space - 4ha/1 000 people	about 120 ha	uncertain (lack data)	uncertain (lack data)

Source: Dennis Moss (1994)

5.3 ENVIRONMENTAL HEALTH SURVEY FOR POOR COMMUNITIES

COUNTRY: **NAMIBIA**
NAME OF STUDY AREA: **KUISEBMOND (zone 10, map 2)**
STREET ADDRESS: **General data on Kuisebmond**
NAME OF ASSESSOR: **MARETHA SHROYER**
COMPANY: **ENGEO, UCT**
DATE: **JUNE 1996**
TEL/FAX: **021 233-335**

To complete this survey please:

write the relevant data in the space provided e.g. numbers, statistics, or %
circle 1 for Yes
circle 2 for No or
mark a ? for uncertain
comment on the data where possible

BACKGROUND STATISTICS FOR KUISEBMOND

POPULATION PROFILE	*UNIT*	*COMMENTS*
• total population		**30 000 in Kuisebmond, between 45 000 and 55 000 in Walvis Bay.**
• annual population growth in (% per year)	**(8-10%)**	**Population was 23 000 in 1991, and estimated at 30 000 in 1994. (High growth scenario for Walvis bay is 3-4% in Dennis Moss, 1994).**
• population density (no. per ha)	**210p/ha**	**Compared to 18p/ha in trade. white areas; and 70p/ha in Narraville, in 1991.**
• population distribution (according to age and sex)	**high % age 15 to 44**	**males (in 1991) 17 460 age 15-44 females (1991) 10 478 age 15-44 (for entire Erongo region)**
• population below the poverty line	**?**	**60% in Namibia below subsistence level N$570/month (uncertain in Kuisebm.)**

EMPLOYMENT CONDITIONS	*UNIT*	*COMMENTS*
• employment by manufacturing industry (in %) • employment by major economic sector (in %): food industry; textiles and clothing; wood and wood products; paper and paper products; chemical/coal - petro/plastic; non-metallic mineral products; basic metal industry; fabrication of machinery/equip; retail & trade; recreational and cultural services; personal and household services. employment by informal sector, for example, cottage industries, households with workshops, unregistered small factories (in %) unemployment figures (in %) • adult literacy rate (in %) • Are Health and Safety regulations in place in the work-place? • Are Health and Safety regulations enforced in the work-place? • Are labour unions in place? • Does the Labour Act adequately protect workers?	? ?	**Various surveys are currently still being undertaken. Specific data for Kuisebmond is not available, therefore statistics from Walvis Bay are included. However, most people in Kuisebmond work in fishing or multiplier industries.** **Employment in Walvis Bay (1991):** **OCCUPATION GROUP %** **Professional/Technical 17** **Administrative/Management 17** **Clerical 8** **Services 15** **Sales 3** **Transport and Communication 7** **Production 8** **Fisheries 8** **Non-economic Activity 17** **TOTAL 100** **Furthermore, 90 people are employed by the Salt and Chemical Company (salt mining) and 20 people are employed by Damara Granite. People are also employed for quano and mineral sand mining in Walvis Bay environs. NAMPORT employs 400 people.** **Unemployment in Namibia is estimated at 40% to 50%. Estimated at 10% in WB Occupation Health and Safety inspectors rarely visit Walvis Bay (only 3 inspectors for entire Namibia). No regulations in place in fishing industry, however, Maritime Institute can make a contribution. Hygiene for businesses is inspected by health inspectors from WBM.** **Yes, NAFAU represents 5000 to 6000 members in Walvis Bay. According to NAFAU the following problems need to be addresses: unemployment, lack of sufficient housing for employees, limitations in the Labour Act of 1992, and unfair dismissal. No. Limitations in Labour Act 6 of 1992, regarding employees in fishing industry.**

HOUSING CONDITIONS	*UNIT*	*COMMENTS*
ownership of occupied dwelling unit (in %): • - owner-occupied • - rented • - other	?	**Data is not available, however, there is a waiting list of a 2 000 backlog on housing in Kuisebmond.** **Developed erven (houses and flats) in Kuisebmond: - 1660 units** **Walvis Bay Proper: - 2171 units** **Meersig: - 96 units** **Narraville: - 920 units** **Langstrand: - 22 units** **TOTAL: 4919**
type of dwelling: house apartment hostel single quarters shack	?	**More data needed for figures.**
facilities in dwelling: • kitchen • lighting • water supply inside • fixed bath or shower • any type of sanitation system	?	**Depends on type of dwelling: conventional, shell, sites and services, single quarters, hostel or back-yard shack. Conventional house have all services supplied.**
size of dwelling unit: • average number of occupants per room (in no) • floor area per person (in m^2)	? ?	**Varies according to type of dwelling.**
marginal dwelling units: • total number of marginal dwelling units • population living in marginal dwelling units • annual number of new marginal dwelling units • number of collective living quarters		**More data is needed, however, most informal settlements are attached to private erven (back-yard shacks), and rent money is charged.**

HEALTH PROFILE	*UNIT*	*COMMENTS*
• life expectancy at birth (in years)	?	
• infant mortality rate,	?	
• child mortality rate,	?	
• productive days lost due to illness	?	
• productive years lost due to early death	?	
• mortality rates as a result of major groups of diseases: diarrhoeal gastrointestinal, infectious and parasitic respiratory genito-urinary gynaecological, obstetric perinatal sexually-transmitted cancer cardio-vascular cerebro-vascular, trauma malnutrition skin diseases.	?	**However, diagnosis for population over and under 5 is available from HIS (see Table 9 p. 41).** **Statistics for population over 5 is as follows for Jan - DEC 1995:** **RANK DISEASE NO OF NEW PATIENTS** **1 Skin disease 3776** **2 Musculo-skeletal/Neuro 3367** **3 Acute upper respiratory 2734** **4 Ear, nose, throat, mouth 2539** **5 Other respiratory 2457**
• incidence of tuberculosis		**1989 - 148 cases; 190 - 240 cases; 1991 - 213 cases; 1992 - 327 cases; 1993 - 369 cases; 1994 - 400 cases; 1995 - 420 cases.** **It is important to remember that TB is very contagious and can be treated effectively. TB notification data in WB is 50% higher than national average (see p. 18 sec. 3.2.2.5)**
• incidence of HIV/AIDS		**From Jan to Aug. 1995 98 patients were treated at WB North hospital. Lack data for clinics and WB South hospital.**

INDICATORS TO BE CONSIDERED IN HOUSE DESIGN

LAYOUT	*YES /NO*	*COMMENTS*
• a sufficient number of rooms, usable floor area and volume of enclosed space is available to satisfy human requirements consistent with the prevailing cultural and social norms;	1 2	**Answers vary according to housing options and level of crowding. Yes for conventional housing with a high level of infrastructure with an average of 4 rooms occupied by a single family unit. Varies for housing where only an outer shell and services are provided as different options can be followed. More data is required from field studies for conditions in the hostel, single quarters and shacks.**
• at least a minimum degree of desired privacy is possible between individuals in the household; (in context of prevailing cultural norms)	1 2	**Privacy is a subjective experience depending on customs and social norms. Lack data.**
• at least a minimum degree of privacy is possible for the household from disturbance by external factors (in context of prevailing cultural norms);	1 2	**Uncertain. Lack data.**
• there is a suitable separation of sleeping quarters for inhabitants (except husband and wife) not to have to share sleeping mats;	1 2	**Depends on crowding and type of dwelling. Lack data.**
• a potable and palatable water supply in quantities large enough to provide for sanitation, comfort and cleanliness is readily available;	1 2	**Yes for serviced dwellings**
• a safe and sanitary means for the disposal of sewage, garbage and other wastes is available in close proximity;	1 2	**Yes for serviced dwellings that are not over-crowded.**
• sufficient facilities for washing of clothes and utensils are available	1 2	**Lack data.**
• sufficient facilities for bathing are readily available;	1 2	**Lack data.**
• appropriate facilities for cooking, dining, and the storage of food, household goods and personal belongings are available;	1 2	**Lack data.**
• sufficient natural and artificial illumination is available in the dwelling	1 2	**Lack data.**

SITE OF DWELLING	*YES /NO*	*COMMENTS*
• the house is at least 100 meters away from a place where waste is dumped	1 2	**Lack data.**
• the walls are not damp	1 2	**Lack data.**
• no standing water or puddles are present	1 2	**Lack data.**
• domestic animals are kept in a separate area	1 2	**Varies from household to household**
• provision is made for drainage of water/storm water	1 2	**Depends on type of dwelling**
• the house is suitable to local climate	1 2	**Varies with type of dwelling. However sand from dunes can be a problem regarding maintenance.**
• noise levels are acceptable during day and night-time	1 2	**Lack data.**
VENTILATION	*YES /NO*	*COMMENTS*
• windows and/or doors are positioned to permit cross-current (adequate ventilation)	1 2	**Yes in conventional housing**
• internal air free of toxic or noxious agents (stale smoke does not "hang" in the air in the dwelling)	1 2	**Yes in conventional housing**
BUILDING MATERIALS	*YES /NO*	*COMMENTS*
• building materials that do not burn easily are used for the structure of the dwelling	1 2	**Yes in conventional housing**
• there is a gutter for rainwater to drain from the roof	1 2	**Yes in conventional housing**
• the dwelling has a floor (not bare earth)	1 2	**Yes in conventional housing**
• the walls have a smooth, hard surface	1 2	**Yes in conventional housing**
• windows and doors openings are adequately screened	1 2	**Lack data**
• good quality roofing and walls are in place to eliminate vector entry	1 2	**Lack data**

INDICATORS TO BE CONSIDERED REGARDING INFRASTRUCTURE

MUNICIPAL SERVICES PROVIDED	*YES /NO*	*COMMENTS*
• water supply	1 2	**Yes in conventional housing.**
• sewerage	1 2	**Yes in conventional housing.**
• drainage	1 2	**Yes in conventional housing.**
• solid waste collection	1 2	**Yes in conventional housing.**
• street cleaning	1 2	**Yes.**
• street lighting	1 2	**Yes, illumination towers.**
• electricity	1 2	**Yes in conventional housing**
• gas	1 2	**Available from shops.**
• telephone	1 2	**Telephone service is available if inhabitants are willing to pay**
• parks and recreation	1 2	**Dunes are easy to reach for a nature experience. Regarding sport facilities the standard is 0,5ha/1000 people. 11 ha is available and 21 ha is needed.**
• education	1 2	**Schools are available but more are needed: Currently there are 2 primary schools, need 8 more (Standard is 1/700 unit) and 2 high schools, need 5. (Standard is 1/1000 unit)**
• health care	1 2	**Specific data for Kuisebmond is not available.**
• other	1 2	**More cemeteries and churches (places of worship) are needed.**
WATER SUPPLY	*YES /NO*	*COMMENTS*
• a minimum of 50 litres of water is available daily, per person	1 2	**Yes, for services plots, houses, and flats. Uncertain for single quarters and hostel (lack data).**
• water supply is reliable and continues	1 2	**Yes.**
• water is supplied by local authorities	1 2	**Yes.**
• no taps or pipes are leaking	1 2	**Lack data.**
• clean containers are available for storing of water	1 2	**Uncertain.**
• water pipes are not visible above ground	1 2	**Lack data.**

SANITATION	*YES /NO*	*COMMENTS*
• a well-kept latrine is available in or close to the house	1 2	**Latrines are available in conventional housing, single-quarters and hostel. Hygiene level has not been researched.**
• sanitation facilities take cognisance of the geology of the area	1 2	**Lack data.**
• blocked sewers or overflowing septic tanks are not present	1 2	**Lack data.**
• raw sewage is not discharged into rivers or sea	1 2	**Effluent water is used to water road verges, the golf-course etc.**
WASTE REMOVAL AND DISPOSAL	*YES /NO*	*COMMENTS*
• solid waste is removed on a regular basis	1 2	**Yes.**
• waste products and litter are not observed in the environs of the dwelling	1 2	**Varies, however was observed at single-quarters, hostel and proposed market site.**
• waste is not perceived as a fire hazard	1 2	**Lack data.**
• a separate container to store waste in is available in the home	1 2	**Varies.**
• a dust-bin with a lid is available outside	1 2	**Varies.**
• waste is not disposed of within 100 metres of the house	1 2	**Varies**
ENERGY SUPPLY	*YES /NO*	*COMMENTS*
source of energy:		
• electricity	1 2	**Electricity is available for serviced sites, housing, the hostel and single quarters. Other sources of energy have not been investigated.**
• fuel oil	1 2	
• gasoline	1 2	
• diesel	1 2	
• kerosene	1 2	
• natural gas	1 2	
• coal gas	1 2	
• coal	1 2	
• soft coke	1 2	
• charcoal	1 2	
• firewood	1 2	
• other	1 2	
• reliable energy supply is available for heating or cooling	1 2	

TRANSPORT	*YES /NO*	*COMMENTS*
• reliable transport is available to hospitals, clinics, schools and employment opportunities	1 2	**No public transport is available. Taxi service and private vehicles are used.**
• roads are well-maintained (for safety)	1 2	**Mostly, however, sand deposits on roads are a problem.**
• roads are tarred/paved (an inhospitable environment for helminth eggs)	1 2	**Tarred or gravel**
• transport services are affordable for poor people	1 2	**No local public transport available.**
• sufficient parking facilities are available	1 2	**Not in central informal trading area.**

INDICATORS TO BE CONSIDERED REGARDING FAMILY HEALTH AND HYGIENE BEHAVIOUR

HYGIENE BEHAVIOUR	*YES /NO*	*COMMENTS*
• there are separate places available for bathing and washing household utensils, with adequate drainage	1 2	**In services areas.**
• inhabitants wash hands before and after eating or cooking	1 2	**Lack data.**
• inhabitants bath regularly and use soap when bathing	1 2	**Lack data.**
• inhabitants use clean water for cooking and bathing	1 2	**Lack data, however, is available.**
• inhabitants wash hands after using the latrine	1 2	**Lack data.**
• clothes worn by inhabitants are clean	1 2	**Lack data.**
• inhabitants brush teeth after meals	1 2	**Lack data.**
• inhabitants do not urinate or defecate on the ground around the house or in water	1 2	**Lack data.**
• inhabitants do not spit on the ground	1 2	**Lack data.**
• the floor is swept regularly	1 2	**Lack data.**

FAMILY SAFETY	*YES /NO*	*COMMENTS*
• fire hazards are not present in the house or surrounds	1 2	**Lack data.**
• poisonous and hazardous substance are stored out of reach of children	1 2	**Lack data.**
• sharp objects are not left where children can reach them	1 2	**Lack data.**
• stoves or fires are situated away from wood or curtains that can catch a light	1 2	**Lack data.**
• stoves are out of reach of babies and toddlers	1 2	**Lack data.**
• vehicles do not drive fast in front of the home	1 2	**Lack data.**
• there is a light outside the house	1 2	**Illumination towermasts are in place.**
• storm drains and sewers are covered	1 2	**Lack data.**
• broken windows are not present	1 2	**Lack data.**
• steep slopes are protected by a fence or barrier	1 2	**Lack data.**
• broken bottles or sharp objects are not lying around	1 2	**Lack data.**
FOOD SAFETY AND SECURITY	*YES /NO*	*COMMENTS*
• enough food is available for a balanced diet	1 2	**Lack data.**
• insecticides are not used close to food products	1 2	**Lack data.**
• food is stored in containers with lids that close properly	1 2	**Lack data.**
• animals are slaughtered hygienically to prevent disease	1 2	**Lack data.**
LEVEL OF HEALTH EDUCATION	*YES /NO*	*COMMENTS*
• inhabitants are aware of HIV/AIDS and how it is transferred	1 2	**Lack data.**
• inhabitants have knowledge about tuberculosis and its spread	1 2	**Lack data.**
• inhabitants understand that vectors of disease can lead to illness	1 2	**Lack data.**
• inhabitants know stagnant water is not to be used for drinking	1 2	**Lack data.**
• inhabitants know to boil water if unsure about quality	1 2	**Lack data.**
• inhabitants know that they have to bath regularly	1 2	**Lack data.**
• inhabitants know about immunisation	1 2	**Lack data.**
• inhabitants know where they can be immunised	1 2	**Lack data.**

MENTAL HEALTH	*YES /NO*	*COMMENTS*
• inhabitants display violent, angry or shouting behaviour without reasonable cause	1 2	**Lack data, however, alcoholism, wife battering, child neglect, drug abuse and crime are prevalent in Walvis Bay.**
• inhabitants harm other people physically	1 2	**Lack data.**
• inhabitants are too quiet or do not want to talk to anybody (anti-social)	1 2	**Lack data.**
• inhabitants are able to wash, dress and work	1 2	**Lack data.**
• inhabitants are very sad and cry without reason	1 2	**Lack data.**
• inhabitants threaten to kill themselves	1 2	**Lack data.**
• inhabitants threaten to kill others	1 2	**Lack data.**
• inhabitants have not lost their memories	1 2	**Lack data.**
• inhabitants abuse alcohol or use drugs	1 2	**Lack data.**
• inhabitants have difficulty in leaning and concentrating	1 2	**Lack data.**
CROWDING & PRIVACY	*YES /NO*	*COMMENTS*
• inhabitants live in over-crowded conditions	1 2	**Crowding is a social problem in Kuisebmond.**
• there is adequate space for inhabitants not to have to share mats or beds (excluding married couples)	1 2	**Depends on type of dwelling, cultural norms and social values.**
• privacy can be obtained when needed	1 2	**Depends on type of dwelling**
• there are adequate eating utensils so that inhabitants do not have to share	1 2	**Lack data.**
• provision is made to defecate in private	1 2	**Depends on dwelling**
• provision is made for space to wash/bath in	1 2	**In conventional dwellings, uncertain about single quarters, hostel and shacks.**

INDICATORS TO BE CONSIDERED REGARDING COMMUNITY FACILITIES

HEATH FACILITIES	*YES /NO*	*COMMENTS*
• emergency and rescue services are available and reliable	1 2	**Yes, for Walvis bay, lack data for Kuisebmond.**
• enough medical personnel is available to treat the sick	1 2	**Yes, in hospitals, lack data for the clinic in Kuisebmond.**
• day clinics are within walking distance	1 2	**Lack data.**
• hospitals are easily accessible by public transport	1 2	**No public transport available.**
• hospitals are equipped with appropriate machines/ equipment	1 2	**Yes for Walvis Bay hospitals.**
• sufficient hospital beds are available	1 2	**Yes.**
• hospitals are equipped with sufficient medication for the sick	1 2	**Lack data.**
• appropriate health care is available for the elderly	1 2	**Lack data.**
• appropriate health care is available for maternal and child health care	1 2	**Lack data.**
EDUCATIONAL FACILITIES	*YES /NO*	*COMMENTS*
• transport is available to schools or schools are within walking distance	1 2	**Lack data.**
• sufficient teachers per class are available	1 2	**Lack data.**
• sufficient books are available at school	1 2	**Lack data.**
• the school has a playground	1 2	**Lack data.**
• toilet facilities at the school is well-kept	1 2	**Lack data.**
• clean water is available at the school	1 2	**Lack data.**
SHOPPING VENUES	*YES /NO*	*COMMENTS*
• adequate formal trading venues are available.	1 2	**No. Only an informal trading area for approximately 150 stands are available next to the hostel.**
• venues to buy food are within walking distance	1 2	**Lack data.**
• flies are not present at shopping venues/markets	1 2	**Lack data.**
• good quality food products are available	1 2	**Lack data.**
• food vendors are inspected for hygiene	1 2	**Lack data.**
• animals are not allowed in space where food is sold	1 2	**Lack data.**

RECREATIONAL FACILITIES	*YES /NO*	*COMMENTS*
• sports facilities are available in the neighbourhood	1 2	**More recreational and sport facilities are needed (10 ha more)**
• playing space for children is available within viewing distance from home	1 2	**Lack data**
• parks and recreational areas where games can be played are available within walking distance	1 2	**Yes, however, more is needed**
GREEN OPEN SPACE	*YES /NO*	*COMMENTS*
• provision is made for green open space to be enjoyed by community members	1 2	**Yes, however there is a lack of specific data for Kuisebmond**
• provision is made for individual or community gardening	1 2	**Lack data.**
• grass for children to play on is available close to home	1 2	**Lack data.**
CULTURAL FACILITIES	*YES /NO*	*COMMENTS*
• community centres are within walking distance	1 2	**Lack data.**
• facilities are available for practice and performance of music	1 2	**Lack data.**
• facilities are available for display and production of art work	1 2	**Lack data.**
• facilities are available for the production and viewing of theatre	1 2	**Lack data.**
• places of worship are available for members of all religious denominations	1 2	**Yes, however, more churches are needed. Lack data regarding other places of worship.**
• adequate burial facilities are available for all religious denominations	1 2	**Need more cemeteries.**
COMMUNICATION & INFORMATION	*YES /NO*	*COMMENTS*
• people have access to radios	1 2	**Radios are available and can be purchased or friends can listen together.**
• people have access to telephones	1 2	**Telephones can be installed for a fee.**
• people have access to books, magazines and newspapers	1 2	**Yes, from shops and libraries.**

INDICATORS TO BE CONSIDERED REGARDING QUALITY OF LIFE

RESIDENTIAL SATISFACTION	*YES /NO*	*COMMENTS*
• people are satisfied with their house or dwelling	1 2	**Lack data.**
• people are satisfied with available infrastructure	1 2	**Lack data.**
• people are satisfied with available public facilities (community open space, recreational facilities, schools, health centres etc.)	1 2	**Lack data.**
• people are satisfied with available religious facilities	1 2	**Lack data.**
• people experience safety and security in their neighbourhood	1 2	**Lack data, however, there is a high crime rate.**
• people are satisfied with the aesthetics in their neighbourhood	1 2	**Lack data.**
EASE OF ACCESS	*YES /NO*	*COMMENTS*
• there is easy access to places of employment	1 2	**Lack data.**
• there is easy access to commercial and service facilities	1 2	**No public transport, only taxi's and private vehicles.**
SECURITY OF TENURE	*YES /NO*	*COMMENTS*
• people do not have fears of being evicted	1 2	**Lack data.**
APPROPRIATENESS OF DELIVERY SYSTEM	*YES /NO*	*COMMENTS*
• people have different options regarding their housing delivery system	1 2	**Yes, however there is a lack of data regarding how they feel about the different options.**
OCCUPATIONAL ACTIVITIES/ MULTIPURPOSE HOMES	*YES /NO*	*COMMENTS*
• people are not working with spray-paints in areas next to home	1 2	**Lack data.**
• people are not working with noisy machinery close to home	1 2	**Lack data.**
• people are not creating unnecessary dust close to home	1 2	**Lack data.**
• people are not creating toxic fumes close to home	1 2	**Lack data.**
• spaza shops are not interfering with home life	1 2	**Lack data.**
• shebeens are not interfering with home life	1 2	**Lack data.**
• dirt and litter is not created because of business ventures within the home	1 2	**Lack data.**

• health inspections are carried out at business premises	1 2	**Lack data.**
• noise level is 60 dB or below during daytime	1 2	**Lack data.**
• there are no unnecessary obstacles to entrepreneurial opportunities in the informal sector	1 2	**Lack data.**
• occupational health and safety standards are adhered to	1 2	**Lack data.**

5.4 SUMMARY OF RESULTS

5.4.1 INDICATOR: SOCIO-ECONOMIC SETTING

(Due to the historical resource material, past tendencies and composition drawn from such data is included in the population statistics)

5.4.1.1 CONTRIBUTING CONDITION: POPULATION PROFILE

An estimated 30 000 people live in Kuisebmond, with an annual population growth of 8% to 10%. The population density is 210 people per hectare, which is much higher than in the surrounding areas of Walvis Bay proper and Narraville. The majority of the people are in the 15 to 44 age group, the economically active age, indicating an influx of people seeking employment opportunities in the greater Walvis Bay. The number of people living below the poverty line of N$ 570 per month is uncertain as data is not available for Kuisebmond or Walvis Bay.

5.4.1.2 CONTRIBUTING CONDITION: EMPLOYMENT

The economic base for Walvis Bay is the fishing industry and most people in Kuisebmond work in the fishing or multiplier industries. Employment figures by major economic sector is only available for 1991, prior to Walvis Bay being incorporated into Namibia and therefore not an accurate reflection of what the situation currently is. More data is needed.

Unemployment is a serious social problem for residents of Kuisebmond. Unfortunately reliable statistics are not available, however unemployment is estimated at 10% for Walvis Bay.

Health and safety issues of the workforce are not adequately addressed, and is especially problematic in the fishing industry, world-wide regarded as the most dangerous peace-

time occupation (Stuttaford, 1995). NAFAU (The Namibian Food and Allied Union) represents 5 000 to 6000 members in Walvis Bay. According to NAFAU unemployment, lack of sufficient housing for employees, limitations in the Labour Act 6 of 1992 and unfair dismissal are problems that need to be addressed. Although the Labour Act of 1992 addresses basic conditions of employment and termination of service, it does not apply at sea. The Merchant Shipping Act of 1951 applies to fishing vessels, and in terms of this act, a skipper can dismiss any employee at will, leading to as lack of job security. There is a lack of data concerning other unions and legislation pertaining to health and safety of workers in other industries.

5.4.1.3 CONTRIBUTING CONDITION: HOUSING

Housing in Kuisebmond consists of houses, flats, single quarters, a hostel, sites with services and back-yard shacks. There are currently 1660 developed erven (houses and flats) and one hostel in Kuisebmond. More data is needed on the other type of dwellings.

Housing conditions vary as different housing options are provided for, varying from core structures (outer shell) to four-roomed houses. Conventional houses and flats are supplied with all the infrastructural services (water, sanitation, waste removal and electricity) according to prevailing cultural and social norms, however, crowding can affect the level of health and hygiene available in the different housing options.

The backlog of 2 000 houses in Kuisebmond is currently being addressed, however, migration to Kuisebmond is still increasing. Servicing of 368 erven started during 1994 as part off the development of 500 erven by the Walvis Bay Municipality for Kuisebmond.

5.4.1.4 CONTRIBUTING CONDITION: HEALTH PROFILE

Data is lacking regarding life expectancy, infant mortality, productive days lost due to illness and mortality rates. The major groups of diseases in the population over 5 years of age, treated at the outpatient facilities are ranked in the following order: 1. Skin disease; 2. Musculo-skeletal and neurological diseases; 3. Acute respiratory; 4. Ear, nose, throat and mouth; 5. Other respiratory diseases. Respiratory related diseases appear to be a significant problem. As the air quality in Walvis Bay is not monitored and the effect of odour pollution on health not known, causal relationships cannot be established.

Other disease with important social ramifications are tuberculosis and AIDS. Tuberculosis is a disease of poverty, poor nutrition and over crowded living conditions and the number of new cases of active disease in Walvis Bay is escalating at an alarming rate (specific information for Kuisebmond is not available, however, it is the most over-crowded area in the Greater Walvis Bay). Tuberculosis notification data in Walvis Bay increased by 149% from 1998 to 1993, an actual overall incidence of 600/100 0000 total population, which is 50% higher than the national average (Pers.Comm., Els, 08/02/1996). The cure rate of fully treated tuberculosis cases for 1994 was above 80% while the defaulter rate of all notified tuberculosis cases was 31,2%, which is an unacceptable high percentage.

The incidence of AIDS/HIV appear to be seriously under-reported. From January to August 1995, only 98 patients were treated for HIV/AIDS at the Walvis Bay North hospital. The number of HIV/AIDS patients treated at the Kuisebmond clinic is unknown.

5.4.2 INDICATOR: HOUSE DESIGN

5.4.2.1 CONTRIBUTING CONDITION: LAYOUT

A sufficient number of rooms, usable floor area and volume of enclosed space is available to satisfy human requirements consistent with prevailing cultural and social norms in conventional housing for individual families. However, the population density in Kuisebmond is very high and crowding takes place. More data is needed to investigate the extent of the problem.

The usable floor area and volume of enclosed space in the hostel and single quarters appear to be inadequate, however, more data is needed. Data relating to privacy in dwellings and between dwellings are lacking. Privacy is a subjective experience and field studies are needed before conclusions can be made. The separation of sleeping quarters have also not been investigated and is assumed to vary greatly depending on the type of dwelling.

An acceptable level of infrastructural services are supplied to most dwellings, however information on sufficient facilities for washing of clothes and utensils and bathing is lacking. Lighting is available for serviced dwellings, while data on facilities for cooking, storage of food and personal belongings are lacking.

5.4.2.2 CONTRIBUTING CONDITION: SITE OF DWELLING

As dwellings are constructed on a variety of different sites, specific answers regarding distance from a place where waste is dumped, dampness of walls, the provision for drainage, and the presence of standing water or puddles are not available. The location of retaining walls, to protect dwellings from sand, as well as data on noise levels are also lacking.

5.4.2.3 CONTRIBUTING CONDITION: VENTILATION

Ventilation in dwellings vary with the type of dwelling and type of energy used for cooking and warmth. As electricity is supplied to most of the dwellings, ventilation is assumed to be adequate in conventional housing and flats, while the window and door positioning in the hostel and single quarters have not been investigated. The number of people making wood fires for cooking and warmth have not been investigated, however, indoor wood fires can cause significant indoor air quality problems.

5.4.2.4 CONTRIBUTING CONDITION: BUILDING MATERIALS

The building materials used in conventional housing, the hostel and single quarters appear to be adequate, however the presence of gutters, the quality of floor, walls and windows have not been investigated. Building materials used in back-yard shacks vary greatly and sufficient data is not available to determine the adequacy of these building materials which include wood, plastic, corrugated iron and building rubble.

5.4.3 INDICATOR: INFRASTRUCTURE

5.4.3.1 CONTRIBUTING CONDITION: MUNICIPAL SERVICES

The infrastructure services in Kuisebmond is supplied by the Walvis Bay Municipality and is of a high level. Services include the supply of water of an acceptable quality, waste removal, sanitation services and a reliable electricity supply.

The size of Kuisebmond nearly doubled within the last three years, with the implication that added pressure is palace on existing infrastructure services. More schools, health care facilities, churches, cemeteries as well as recreational and sport facilities are needed, as the demand is currently higher than the supply.

5.4.3.2 CONTRIBUTING CONDITION: WATER SUPPLY

Conventional housing, the hostel, single quarters as well as sites with services (a cheaper housing option) are all supplied with a reliable and adequate quality of water in sufficient qualities for drinking, cooking, bathing and other uses. Maintenance of the water supply system is also provided for by the Municipality, and leaking pipes or dripping taps that are reported are fixed timeously.

5.4.3.3 CONTRIBUTING CONDITION: SANITATION

Kuisebmond is served by a biofiltration sewage treatment facility and connected to the Walvis Bay sewerage system. This service is adequate, however the condition of latrines in dwellings varies greatly and not enough data is available to come to any meaningful conclusions. Problems such as blocked sewers or overflowing septic tanks are fixed by the Municipality if reported. Approximately 60% of the treated effluent in the Walvis Bay Municipal district is reticulated in a separate pipeline for watering road verges and open space, and raw sewage is not discharged into rivers or the sea.

5.4.3.4 CONTRIBUTING CONDITION: WASTE REMOVAL

The refuse removal of Kuisebmond is supplied by private contractors, appointed by the Municipality. Contractors from within Kuisebmond were appointed to clean their

respective areas or zones, consisting of approximately 100 residential units. Large "Scowback" containers were provided by the Municipality and placed at strategic points within the zone of each contractor. There is a lack of data regarding the effectiveness of this system, however, it supplies jobs and contributes to health education in the community. During a visit to Kuisebmond litter was observed in the area next to the single quarters and hostel, however, the general cleanliness of the different zones was not investigated.

5.4.3.5 CONTRIBUTING CONDITION: ENERGY SUPPLY

The Walvis Bay Municipality is responsible for the distribution and provision of electricity to Kuisebmond. The supply is reliable and continuous to all serviced erven. The source of energy used by inhabitants of back-yard shacks has not been investigated. Data is also lacking regarding other sources of energy used in Kuisebmond.

5.4.3.6 CONTRIBUTING CONDITION: TRANSPORTATION

The road infrastructure in Kuisebmond consists of tarred or gravel roads. Private vehicles or taxis are used as a means of transport, as public transport is not available from Kuisebmond to the CBD. Data is lacking regarding daily means of transport to places of employment. Blowing sand and sand deposits are safety hazards on roads in the area.

5.4.4 INDICATOR: FAMILY HEALTH AND HYGIENE

5.4.4.1 CONTRIBUTING CONDITION: HYGIENE BEHAVIOUR

Family health and hygiene is of major importance in any investigation concerned with environmental health, as the highest quality of services provided can be contaminated through unhygienic behaviour. The quality of infrastructure provided in Kuisebmond is of adequate quality, however data is lacking on family health and hygiene behaviour. Future investigations relating to health and hygiene behaviour are therefore recommended.

5.4.4.2 CONTRIBUTING CONDITION: FAMILY SAFETY

Illumination towermasts are in place to illuminate the streets and surrounding areas in Kuisebmond and electricity is available to most dwellings. However, there is a lack of data about dangerous factors such as: broken bottles and sharp objects on the ground; fire hazards such as litter and reckless driving in neighbourhoods. The level of safety measures taken by individual households, such as storing poisonous and hazardous substances out of the reach of children was not investigated.

5.4.4.3 CONTRIBUTING CONDITION: FOOD SAFETY AND SECURITY

Household food security depends primarily on the ability of the household to secure enough food to ensure an adequate dietary intake for all of its members at all times for a healthy and active life. The extent to which a household has achieved food security can be measured by the nutritional status of its members, particular children under five, whose nutritional status changes most rapidly in response to inadequate food intake. A study by MOHSS in 1992 showed that 28% of children in Namibia under age five suffered from chronic undernutrition (NDP1, 1995). However, data regarding food security is lacking for Kuisebmond. Data regarding the storage of food, the use of insecticides and methods of slaughtering animals is also lacking.

5.4.4.4 CONTRIBUTING CONDITION: LEVEL OF HEALTH EDUCATION

There is a general lack of data regarding the level of health education in Kuisebmond, which includes issues such as the spread of AIDS and tuberculosis, immunisation, cleanliness and hygiene, and the relationship between illness and vectors of disease.

5.4.4.5 CONTRIBUTING CONDITION: MENTAL HEALTH

There is a lack of data regarding mental health in Kuisebmond, however, alcoholism, drug abuse, wife battering and child neglect are prevalent in the Greater Walvis Bay. The crime rate is also high, and perceived as a social problem.

5.4.4.6 CONTRIBUTING CONDITION: CROWDING AND PRIVACY

Privacy is a subjective experience and has to be studied in the context of prevailing social and cultural norms. Data relating to privacy is lacking, however crowding is a significant social problem in Kuisebmond.

5.4.5 INDICATOR: COMMUNITY FACILITIES

5.4.5.1 CONTRIBUTING CONDITION: HEALTH FACILITIES

The available health care facilities and health care services provided in Walvis Bay are of a good standard, however more hospitals and clinics are needed to supply the demands of Greater Walvis Bay. Specific data relating to accessibility, staffing and services provided at the clinic in Kuisebmond is lacking.

5.4.5.2 CONTRIBUTING CONDITION: EDUCATIONAL FACILITIES

More primary and secondary schools are needed in Kuisebmond, however data relating to the availability of teachers, books and infrastructure at schools is lacking.

5.4.5.3 CONTRIBUTING CONDITION: SHOPPING VENUES

Inadequate formal trading venues are available in Kuisebmond. The Municipality of Walvis Bay wishes to establish a trading market to replace the existing informal market situated adjacent the hostel in the centre of the suburb. In order to provide a temporary site until such time as the new market is established, an area to the south-east of the hostel was levelled and provided with a gravel surface large enough to accommodate approximately 150 stands. Data regarding the hygiene of the informal trading market is lacking.

5.4.5.4 CONTRIBUTING CONDITION: RECREATIONAL FACILITIES

More recreational and sport facilities are needed in Kuisebmond. According to Dennis Moss (1994) an additional 10ha is needed for sport facilities.

5.4.5.5 CONTRIBUTING CONDITION: GREEN OPEN SPACE

Data regarding green open space is lacking for Kuisebmond.

5.4.5.6 CONTRIBUTING CONDITION: CULTURAL FACILITIES

There is a lack of data regarding community centres and facilities for the practice, performance and enjoyment of arts and music. More cemeteries and churches are needed, and there is a lack of data regarding other places of worship.

5.4.5.7 CONTRIBUTING CONDITION: COMMUNICATION AND INFORMATION

People have personal access to radios and telephones if they can afford it or have friends or neighbours on whom they can rely. Books and magazines are available from libraries and shops, however information regarding the level of literacy in Kuisebmond is not available.

5.4.6 INDICATOR: QUALITY OF LIFE

The concept of quality of life is conceptualised as more than just fulfilling basic survival needs such as shelter, adequate personal space, food and water. It concerns values, which make life worth living and enhance one's life experiences.

5.4.6.1 CONTRIBUTING CONDITION: RESIDENTIAL SATISFACTION

Residential satisfaction is a subjective experience and information regarding how people feel about their dwellings, available infrastructure, public facilities and their neighbourhood is not available. Residential satisfaction also has to be interpreted in the context of prevailing cultural and social norms. Crime has been reported to be a problem, however, a survey to investigate how people feel about the crime rate and their own safety has not been undertaken.

5.4.6.2 CONTRIBUTING CONDITION: EASE OF ACCESS

No public transport is available and residents have to rely on private vehicles and taxis. However, the question of whether residents perceive ease of access to be adequate have not been investigated. Data is also lacking regarding transport to places of employment.

5.4.6.3 CONTRIBUTING CONDITION: SECURITY OF TENURE

There is a lack of data regarding security of tenure in Kuisebmond. People may feel comfortable, stable and secure or afraid of being evicted, (which can decrease their quality of life).

5.4.6.4 CONTRIBUTING CONDITION: APPROPRIATENESS OF DELIVERY SYSTEM

Although people have different options regarding their housing delivery system, information concerning how they feel about the various options is not available. A positive point is that a choice is provided, however other circumstances such as family size, employment situation, available funds, health and fitness and support systems have to be taken into consideration.

5.4.6.5 CONTRIBUTING CONDITION: OCCUPATIONAL ACTIVITIES/MULTIPURPOSE HOMES

There is a lack of data regarding multipurpose homes. That people are working with spray-paints, noisy machinery, or toxic substances in residential areas in Kuisebmond is

likely, however, assumptions cannot be made as data is lacking. Information regarding shebeens, spaza shops and occupation health and safety measures, such as the wearing of personal protective equipment (PPE) is also lacking. Furthermore, data regarding the frequency of health inspections was not available.

5.5 SUMMARY

From the EHSPC survey it is clear that environmental health data related to the human component of the microsystem (the individual household) was seriously lacking, especially regarding the following: hygiene behaviour; family safety; food safety and security; level of health education; mental health; crowding and privacy; and residential satisfaction. These factors are used to investigate the indicators family health and hygiene as well as quality of life, areas often neglected in environmental health studies.

Unlike townships in many other developing countries the infrastructure in Kuisebmond is relatively well-developed with the Walvis Bay Municipality playing a key role in providing these services. An acceptable quality and quantity of water is available, a privatised waste removal system is in place, (making use of local residents to collect waste and educate community members regarding basic cleanliness and general health conditions), an adequate sanitation system exists and electricity is supplied.

PLATE 3: Informal housing in Kuisebmond

CHAPTER 6
6.1 SUMMARY: ENVIRONMENTAL HEALTH PROFILE of KUISEBMOND, WALVIS BAY, NAMIBIA (JUNE 1996)

Introduction

South African rule in Walvis Bay resulted in settlement patterns typical of Apartheid societies. Traditionally Kuisebmond (See Zone 10, Map 2) was primarily a black township, with its own municipality. However, in 1994 Kuisebmond Municipality amalgamated with the Walvis Bay Municipality (WBM), and currently refuse removal, water supply and sanitation, as well as electricity are administrated by the WBM.

Kuisebmond is a poor community in an arid desert environment, where it is hard to grow food for subsistence living. South-westerly and north-easterly winds blow frequently and transport and deposit desert sand against buildings and roads. It is therefore difficult to keep dwellings clean from dust, sand, and windblown litter. Wastes and dirt, if not controlled can result in favourable breeding conditions for vectors of disease. Social problems in Kuisebmond comprise unemployment (magnified by increasing migration), a high incidence of Tuberculosis and AIDS, (magnified by increasing migration), a high crime rate as well as alcoholism, drug abuse, wife battering and child neglect.

Indicator: Socio-Economic setting

The 1995 **population** of Kuisebmond was estimated at 30 000, with a population density of 210 people per hectare, which is much higher than in the surrounding areas of Walvis Bay Proper (18p/ha) and Narraville (70p/ha). The majority of the people are males in the 15 to 44 age group, the economically active age, indicating an influx of people seeking employment opportunities in the Greater Walvis Bay. The Greater Walvis Bay has an estimated 1995 population of 55 000.

The Greater Walvis Bay has an estimated annual **population growth rate** of 8-10%. The highest growth rate is in Kuisebmond, resulting in very high accommodation density in the single quarters and hostel traditionally reserved for workers, as well as increased informal densification.

The number of people living below the **poverty line** of N$ 570 per month is uncertain as data is not available for Kuisebmond or Walvis Bay. The **economic base** for Walvis Bay is the fishing industry and most people residing in Kuisebmond are employed in the fishing or multiplier industries. Besides the fishing industry, NAMPORT employs 400 people, the Salt and Chemical Company (salt mining) employs 90 people and Damara Granite employs 20 people. Employment opportunities are also provided by guano and mineral sand mining. **Employment figures** by major economic sector are only available for 1991, prior

to Walvis Bay being incorporated into Namibia, and therefore, do not accurately reflect the current situation. **Unemployment figures** in Kuisebmond are uncertain, however, are estimated at 10% for Walvis Bay.

Occupational health and safety inspectors rarely visit Walvis Bay and health and safety issues regarding the workforce are currently not adequately addressed. This is especially problematic in the fishing industry, regarded world-wide as the most dangerous peace-time occupation. NAFAU (The Namibian Food and Allied Union) represents 5 000 to 6000 members in Walvis Bay. According to NAFAU unemployment, lack of sufficient housing for employees, limitations in the Labour Act 6 of 1992 and unfair dismissal are problems that need to be addressed. Although the Labour Act of 1992 addresses basic conditions of employment and termination of service, it does not apply at sea. The Merchant Shipping Act of 1951 applies to fishing vessels, and in terms of this act, a skipper can dismiss any employee at will, leading to a lack of job security. There is a lack of data concerning other unions and legislation pertaining to health and safety of workers in other industries.

Housing in Kuisebmond consists of houses and flats, a hostel, single quarters, serviced sites and informal settlements, which are mostly in the back-yards of serviced dwellings. There is no transitional area from conventional houses to informal dwellings, and a separate squatter-camp does not exist. The density in Kuisebmond (Zone 10, Map 2) is between 20 and 30 units/hectare, with the low standard estimated to be 7,5 people per unit or 150 to 225 people/hectare, while the high standard is estimated to be 12 people per unit or 240 to 360 people/hectare. There are currently 1 660 **developed erven** (houses and flats) in Kuisebmond. Servicing of 368 erven started during 1994 as part off the development of 500 erven by the Walvis Bay Municipality for Kuisebmond. This development included flattening of dunes, construction of roads and the part installation of the water distribution network and sewage reticulation. These erven should be fully serviced by 1996. The housing conditions and standards vary as different housing options are provided for, from core structures (outer shell) to four-roomed houses. Conventional houses and flats are supplied with all the infrastructural services (water, sanitation, waste removal and electricity).

There is currently a **backlog** of 2000 houses on the waiting list in Kuisebmond, and if squatting is to be controlled and overcrowding alleviated, between 500 and 800 erven need to be developed in Walvis Bay per annum for the next five years. To contribute to the provision of housing, the Walvis Bay Industrial and Urban Development Project (WBIUP) supports the provision of 3000 serviced plots for low income beneficiaries at Kuisebmond, and an environmental impact study is scheduled to start in July 1996.

Concerning the **health profile**, data is lacking regarding life expectancy, infant mortality, productive days lost due to illness and mortality rates. The major groups of **diseases** in the population over 5 years of age, treated at outpatient facilities (for Walvis Bay District)are ranked in the following order: 1. Skin disease; 2. Musculo-skeletal and neurological

diseases; 3. Acute respiratory; 4. Ear, nose, throat and mouth; 5. Other respiratory diseases.

Respiratory related diseases appear to be a significant problem. As the air quality in Walvis Bay is not monitored and the effect of odour pollution on health not known, causal relationships cannot be established. Other diseases with important social ramifications are tuberculosis and AIDS. **Tuberculosis** is a disease of poverty, poor nutrition and over crowded living conditions and the number of new cases of active disease in Walvis Bay is escalating at an alarming rate (specific information for Kuisebmond is not available, however, it is the most over-crowded area in the Greater Walvis Bay). The incidence of **AIDS/HIV** appears to be significantly under-reported.

Indicator: The natural environment

The **climate** of Walvis Bay is characterised by mild temperatures and a low, highly variable rainfall. Fog is the dominant form of precipitation. Due to the climatic conditions, soil development is limited and plants are highly adapted to harsh conditions. The Benguela current running along the coast generates an upwelling of cold water to the coastal zone from greater depth in the Atlantic Ocean. This water is extremely rich regarding nutrient content, and the basis for the production of plankton in the coastal zone, which in turn creates the basis for the wealthy coastal fishing waters.

The **rainfall** in Walvis Bay is low, seasonal and highly variable. Rain originates from thunderstorms or showers of high intensity and short duration. In general, there are less than 30 rain days per annum, 90% of which occur during the summer months.

The dominant **winds** are south-westerly and north-easterly winds. The south-westerly wind is predominant, causing movement of desert sand in a northerly to easterly direction. Furthermore, land-to-sea breezes are significant because they blow polluted air offshore during the day, however, at night sea-to-land breezes result in pollutants being blown back to land. The climatic conditions thus exacerbate pollution and must be considered when planning and siting new developments.

The main **natural risks** are sand dune movement, sulphur eruptions and red tide. Sulphur eruptions and red tides occur mainly in summer between January and March when the sea is particularly calm. Even though these events are seldom toxic to humans, marine fauna are killed as a result of oxygen starvation.

Indicator: Infrastructure

Since Kuisebmond Municipality **amalgamated** with the Walvis Bay Municipality (WBM) during January 1994, refuse removal, as well as water supply and sanitation services are administered by the Town Engineer's Department of the WBM. The WBM is also responsible for the provision of electricity in the Walvis Bay Municipal area.

The existing infrastructure in Walvis Bay is of a high standard, however, what was previously considered adequate, must be upgraded to cater for the expected population growth and as well as for current demand. It has been forecasted that Walvis Bay will no longer be able to supply **water** on a sustainable basis from 1998, and the construction of a desalination plant has been recommended. The existing **sewage** treatment infrastructure is currently operating beyond its present design capacity. The current **waste** management plan does not deal effectively with hazardous or toxic wastes, and a new landfill site to accept domestic refuse as well as hazardous and toxic wastes has been earmarked by the Municipality of Walvis Bay. Current demand for **electricity** in the district is exceeding earlier projections and supply is likely to be a constraint without system upgrading and expansion within the next two years.

The **transport** infrastructure is well-developed with tarred as well as gravel roads. Nampost and Telkom are responsible for the provision of **postal** and **telecommunication** services. Inhabitants of Kuisebmond have access to radios, telephones and television if they can afford it personally or have friends or neighbours on which they can rely. Books and magazines are available from libraries and shops, however information regarding the level of literacy is not available.

Indicator: Community facilities

As a result of the rapid population growth the demand for **community facilities** in Kuisebmond is increasing. Additional schools, health care facilities, churches (there is a lack of data regarding other places of worship), cemeteries as well as recreational and sport facilities are needed, while there is a lack of data regarding the amount of green open space provide for the inhabitants of Kuisebmond. Data is also lacking regarding community centres and the availability of facilities for the practice, performance and enjoyment of arts and music. The current demand for community services is much higher than the number and volume of existing facilities provided.

Inadequate formal **trading venues** are available in Kuisebmond and the Municipality of Walvis Bay wishes to establish a trading market to replace the existing informal market situated adjacent the hostel in the centre of the suburb. In order to provide a temporary site until such time as the new market is established, an area to the south-east of the hostel was levelled and provided with a gravel surface large enough to accommodate approximately 150 stands. Data regarding the hygiene of the informal trading market is lacking.

Environmental health hazards in Kuisebmond

Important environmental health hazards with the potential of impacting negatively on the health of residents of Kuisebmond (as well as in Walvis Bay) are water pollution, air pollution and hazardous wastes. **Water pollution** includes possible leaching to ground water resources from the solid waste dump site in Walvis Bay and maritime pollution. Sources of **maritime pollution** include oil spills, commercial activities, waste and sewage

from ships, anti-fouling paints from the dry docks and the high organic pollutants in effluent water from the fish processing factories.

Air pollution in Walvis Bay is mainly created by the fish factories, in the form of **odour pollution.** The Municipality of Walvis Bay and other key affected parties maintain that odour pollution in Walvis Bay due to the fish factories is damaging the town's prospects of development as a tourist attraction. There have also been many letters of complaints by inhabitants of Walvis Bay to newspapers and the Municipality as a result of offensive smells. Currently the air quality in Walvis Bay is not monitored and emission control standards are not in place. Odour pollution is a nuisance and irritant to residents, however, a causal relationship between odour pollution an diseases cannot be assumed. As **electricity** is supplied to most of the dwellings, ventilation is assumed to be adequate in conventional housing and flats, while the window and door positioning in the hostel and single quarters have not been investigated. The number of people making wood fires for cooking and warmth have not been investigated, however, indoor wood fires can cause significant indoor air quality problems.

The current **waste disposal** site impacts negatively on the health of residents of Kuisebmond as scavengers recover articles from the dump, sometimes including wet waste, to re-use or re-sell in Kuisebmond. There are also no facilities available for the dumping of hazardous and toxic waste, waste is not sorted or covered properly, uncontrolled fires often burn for days and no proper fence exist around the terrain. The **refuse removal** in Kuisebmond is supplied by private contractors, appointed by the Municipality, however there is a lack of data regarding the effectiveness of this system.. During a visit to Kuisebmond litter was observed in the area next to the single quarters and hostel. Litter is a health hazard as it creates breeding sites for vectors of disease.

Private vehicles or taxis are used as a means of transport as **public transport** is not available from Kuisebmond to the CBD. Data is lacking regarding daily means of transport to places of employment. Concerning **road safety**, blowing sand and sand deposits are safety hazards on roads and there are inadequate car parking and taxi rank facilities in the area. Regarding **shopping venues**, only an informal market is available in Kuisebmond and a trading market, adhering to health and safety standards is needed.

There is a 2 000 **housing** backlog in Kuisebmond, which is contributing to crowding and possibly promoting anti-social behaviour and the spread of disease. The environment in and around human dwellings offers an important habitat for a wide range of arthropods and other **vectors of disease**. Unfortunately, data relating to specific vectors of disease is lacking for Kuisebmond.

Regarding **house design**, dwellings are constructed on a variety of different sites, and specific data regarding distance from a place where waste is dumped, dampness of walls, the provision for drainage, and the presence of standing water or puddles are not available. The location of retaining walls, to protect dwellings from sand, as well as data on noise levels are also lacking. The **building materials** used in conventional housing, the hostel

and single quarters appear to be adequate, however the presence of gutters, the quality of floor, walls and windows have not been investigated. Building materials used in back-yard shacks vary greatly and sufficient data is not available to determine the adequacy of these building materials which include wood, plastic, corrugated iron and building rubble.

Although an high level of infrastructural services are supplied to most dwellings in Kuisebmond, information relating to environmental health, such as the availability of sufficient facilities for washing and bathing is lacking. Lighting is available for serviced dwellings, while data on the adequacy of cooking facilities and the storage of food are lacking. **Health and hygiene behaviour** of individual households and communities can either eliminate or contribute to health hazards. Litter and dirt provides breeding places for vectors of disease, unscreened windows and door can allow entry to vectors of disease, and lack of health education can result in diarrhoea, typoid or other water-borne diseases, or contamination by tuberculosis germs. Unfortunately, data is lacking regarding family health and hygiene behaviour.

Regarding **family safety**, illumination towermasts are in place to illuminate the streets and surrounding areas in Kuisebmond. However, there is a lack of data regarding the lying around of broken bottles, sharp objects, fire hazards such as litter and reckless driving in neighbourhoods. The level of safety measures taken by individuals households, such as storing poisonous and hazardous substance out of the reach of children was also not investigated. Regarding **health**, data is lacking regarding life expectancy, infant mortality, productive days lost due to illness and mortality rates, however respiratory problems, tuberculosis and AIDS were found to be significant problems.

Household **food security** depends primarily on the ability of the household to secure enough food to ensure an adequate dietary intake for all of its members at all times for a healthy and active life. The extent to which a household has achieved food security can be measured by the nutritional status of its members, particular children under five, whose nutritional status changes most rapidly in response to inadequate food intake. However, data regarding food security, dietary intake, the storage of food, the use of insecticides and methods of slaughtering animals are lacking for Kuisebmond.

The is a general lack of data regarding the level of **health education** in Kuisebmond, which includes issues such as the spread of AIDS and tuberculosis, immunisation, cleanliness and hygiene, and the relationship between illness and vectors of disease. Privacy is a subjective experience and has to be studied in the context of prevailing social and cultural norms. Data relating to privacy is lacking, however **crowding** is a significant social problem in Kuisebmond. Regarding **mental health** and the welfare profile in Kuisebmond, alcoholism, drug abuse, wife battering and child neglect are prevalent. Crime has been reported to be a problem, however, a survey to investigate how people feel about the crime rate and their own safety has not been undertaken.

The concept of **quality of life** is conceptualised as more than just fulfilling basic survival needs such as shelter, adequate personal space, food and water. It is more about values

which make life worth living. **Residential satisfaction** is a subjective experience and information regarding how people feel about their dwellings, available infrastructure, public facilities and their neighbourhood is not available. Residential satisfaction also has to be interpreted in the context of prevailing cultural and social norms. Whether residents perceive **ease of access** to be adequate have not been investigated. There is also a lack of data regarding security of tenure in Kuisebmond. People may feel comfortable, stable and secure regarding their dwellings and neighbourhood, or afraid of being evicted (which leads to a decreased quality of life). Although people have different options regarding their housing delivery system, information concerning how they feel about the various options is not available. A positive point is that a choice is provided, however other circumstances such as family size, employment situation, available funds, health and fitness and support systems have to be taken into consideration.

There is a lack of data regarding **multipurpose homes**. That people are working with spray-paints, noisy machinery, or toxic substances in residential areas in Kuisebmond is likely, however assumptions cannot be made as data is lacking. Concerning **occupational health and safety** multipurpose homes, informal trading areas as well as shebeens can affect the level of waste, noise and pollution created. Information regarding noise levels, shebeens, spaza shops and occupation health and safety measures, such as the wearing of personal protective equipment (PPE) and health inspections by health inspectors is also lacking. As most resident of Kuisebmond work in the fishing or multiplier industries, the lack of health and safety measures in the fishing industry can result in accidents, injuries, loss of employment or loss of life.

6.2 CONCLUSION AND RECOMMENDATIONS

This dissertation has established an approach to evaluate poor communities using a four step research structure to culminate in an environmental health profile of a poor community, Kuisebmond.

Step 1 investigated the exosystem and constituted an Urban Environmental Profile for Walvis Bay. Step 2 was the development of an environmental health survey for poor communities, while step 3 was the completion of this survey for Kuisebmond. Step 2 and 3 addressed the micro- and mesosystems. Step 4, the integration of data from Steps 1 and 3 - the environmental health profile of Kuisebmond - aimed to contribute to the Health for All Strategy by the Year 2 000 by focusing attention on areas often neglected regarding environmental health in poor communities.

In accordance with the WHO definition of health (not simply the absence of disease, but a state of complete physical, mental and social well-being), this dissertation approached environmental health from a broad holistic perspective. Indicators that were included comprised of socio-economic setting, natural environment, infrastructure, community

facilities, house design, family health and hygiene behaviour, quality of life, environmental hazards and future developments.

In applying this methodology, it was found that data was lacking, especially regarding family health and hygiene behaviour, health education, house design and quality of life. Other environmental health problems that were not adequately addressed related to odour pollution and air quality, waste management and occupational health and safety, in the fishing industry (where many inhabitants are employed) and in multipurpose homes.

Environmental health problems cannot be seen in isolation, as health, the environment and development are inter-linked and the following actions are recommended:

Recommendations for Kuisebmond and Walvis Bay

- Undertake a census of the Greater Walvis Bay to improve the availability, reliability and validity of existing data.

- Undertake field studies to fill the gaps in the existing data base, especially regarding family health and hygiene behaviour, level of health education, housing, quality of life and multi-purpose homes. Family health and hygiene is of major importance in any investigation concerned with environmental health, as the highest quality of services provided can be contaminated through unhygienic behaviour. Although the quality of infrastructure provided in Kuisebmond is adequate, data is lacking regarding the behaviour of inhabitants.

- Undertake Environmental Impact Assessments (EIAs) for all proposed developments and include environmental health as an important component. Currently impact assessments are not done for all projects and developments are taking place without considering environmental, social and health implications. Walvis Bay Municipality (WBM) appears to be committed to improving the conditions which lead to an inadequate level of environmental health. Six projects have been proposed by WBM: Expansion of Walvis Bay's Export Processing Zone (EPZ); upgrading and expansion of the sewage treatment plant; a new refuse disposal site that can deal effectively with hazardous and toxic wastes; upgrading of the bulk electricity supply; servicing of 3000 plots for of low income groups in Kuisebmond, and 200 plots for middle income groups at Lot 79; and the establishment of a formal trading market in Kuisebmond. The Environmental Evaluation Unit (EEU) is scheduled to commence with EIAs for these projects in July 1996.

- Investigate the health impacts of odour pollution. People living in the Walvis Bay area appear to be prone to respiratory diseases, and the effect of odour pollution and air quality must investigated to determine if a relationship between certain diseases and odour pollution exist.

- Implement systems to monitor air and water quality on a regular basis. There are currently no emission standards or monitoring systems in place regarding air quality, and the effluent from industry and the possible leaching of waste from the dump site to ground water resources are not monitored.

- Investigate the hygiene level at all trading venues and in multi-purpose homes. Hygiene must be addressed in all places where food products are handled, including informal venues. Trading venues can contribute to air and soil pollution as well as create waste (solid, liquid, and hazardous) or litter, ideal breeding conditions for vectors of disease.

Recommended future Research

The methodology used in this dissertation evaluates environmental health in poor communities from a holistic perspective, however, this study evolved over a three month period and there is scope for improvement regarding structure and accidental omission. Reliability and validity were not addressed and two future research proposals are made:

- Develop a reliable and valid research tool to assess environmental health in poor communities by improving the methodology used in this study.

- Apply the methodology used in this study in other poor communities in the Southern African context to identify environmental health hazards.

- Undertake a field study to establish a complete environmental health profile of Kuisebmond, and Walvis Bay to identify environmental health hazards that can be eliminated or mitigated.

A final conclusion regarding environmental health in Kuisebmond cannot be made as important data is lacking, especially regarding the human component in the human-environment interaction.

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APPENDIX A

PERSONAL COMMUNICATIONS

INTERVIEWER: MARETHA SHROYER

FIRST FIELD TRIP

PERSON INTERVIEWED	POSITION	ORGANISATION/ MINISTRY	TEL/FAX	DATE
Gunter Strubrenrauch.	Principle Partner	Strubenrauch Planning Consultants, Windhoek	061-251189 Fax: 252157	27/11/95
Dr. Goraseb	Deputy Director, Primary Health Care	MOHSS, Windhoek	061-2032218	27/11/95
Dr. Foster	Deputy Director, Planning & Human Resource Development	MOHSS, Windhoek	061-2032811	28/11/95
Ms.Coetzee	Information Officer	UN Information Centre, Windhoek	061-233035 Fax: 233036	29/11/95
Mr Nolte	Senior Health Inspector	Swakopmund Municipality	064-402444 Fax: 402249	30/11/95
Ms Erb	Owner/Manager	Camel Farm, Swakopmund		30/11/95
AIDS Awareness Ceremony	World AIDS Day Public Meeting	MOHSS, Swakopmund		30/11/95
Dr. Saidi	District Surgeon	MOHSS, Swakopmund	064-404770 Fax: 404770	4/12/95
Group Visit		Rossing Uranium		5/12/95
Mr Els	Chief health Inspector	Walvis Bay Municipality	064-205981	6/12/95
Mr Kahele	AIDS Counsellor	Walvis Bay Hospital		6/12/95
Ms Litula	Deputy Director	Ministry of Labour, Windhoek	061-212956	7/12/95

SECOND FIELD TRIP

PERSON INTERVIEWED	POSITION	ORGANISATION/ MINISTRY	TEL/FAX	DATE
Mr. Amweelo	Chief OHS Inspector	MLHRD, Windhoek	061-212956 x 2084	5/2/96
Dr. Burkhardt		MOHSS: Occupational Health		6/2/96
Captain Johnsen	MD JEJ Consultants International, Norway	DOT, Maritime Directorate, Windhoek	061-2082058 Fax: 240024	6/2/96
Mr Els	Chief health Inspector	Walvis Bay Municipality	064-205981	8/2/96
Cap. Van Der Meer	Port Captain	NAMPORT	064-208217	8/2/96
Mr. Boyer and Ms Currie	Researchers	MFMR, Swakopmund	064-405744	8/12/96
Mr Els	Chief health Inspector	Walvis Bay Municipality	064-205981	8/2/96
Mr Mubusisi	Port Health Officer	Walvis Bay Hospital		9/12/96
Mr Theo-Bin Keib	trade union Representative	NAFAU, Kuisebmond	064-205307	10/2/96
Dr. Saidi	District surgeon	MOHSS, Swakopmund	064-404770 Fax: 404770	12/2/96
Mr. Nolte	health inspector	Swakopmund Municipality	064-402444 Fax: 402249	12/2/96
Mr. Nubrough	Director	Maritime Training Institute, Walvis Bay	064-203112 Fax: 203112	12/2/96
Mr Shivute	Fisheries Inspector	MFMR, Walvis Bay		12/2/96
Bill Wilson	Surveyor	Namibian Maritime Services	064-205192	12/2/96
Dr Gert Cloete	Factory Manager	Cadilu Fisheries	064-203567	13/2/96
Carl Cuscke	Factory Manager	Etosha Fisheries	064-202331	13/2/96
Mr Tomani	Customs Officer	Customs, Walvis Bay		13/2/96
Inspector du Preez	Police Inspector	Swakopmund Police Station	064-402594	14/2/96
Fanie Kruger	Chief Traffic Officer	Swakopmund Traffic Department	064-461223	14/2/96
Johan Heindrick	SABS Manager	SABS Office, Walvis Bay	064-202430	14/2/96
Dr Burkhardt	Unit Head, PHC	MOHSS, Windhoek	061-2032306	15/2/96
Mr Demon	Inspector, Environmental Health, PHC	MOHSS, Windhoek	061-2032319	15/2/96
	Secretary, Permanent Secretary	Ministry of Home Affairs	061-2829111	15/2/96
Mr Victor		Social security Commissioner	061-211763	15/2/96
Peter Tarr	Permanent Secretary	MET, Windhoek	061-249015 Fax: 240339	16/2/96

C. BREEDING PERI-DOMESTICALLY and/or IN CONTAINERS AND SEWERAGE:

Jiggers[1]:	
Tunga penetrans	jiggers
Midges:	
Culicoides furens	*Mansonella ozzardi, M. perstans*
C. phlebotomus etc.	
C. austeni	*M. perstans, M. streptocerca*
C. grahami	
Mosquitoes[1]:	
Aedes aegypti	dengue, chikungunya
Ae. albopictus	
Ae. aegypti	yellow fever
Haemagogus equinus	
Ae. scutellaris group	subperiodic Bancroftian filariasis
Culex pipiens group	urban periodic Bancroftian filariasis
Cx. tritaeniorhynchus	arboviruses, e.g. CHIK, JE,WN
Cx. gelidus etc.	
Anopheles stephensi	malaria: *Plasmodium* spp.
Armigeres subalbatus	bites only: not a vector of human disease
Sandflies[1]:	
Lutzomyia spp.	sandfly fever
Phlebotomus spp.	visceral leishmaniasis: *Leishmania donovani* complex
	cutaneous/mucocutaneous leishmaniasis: *L. braziliensis, L. tropica*
Mothflies[3]:	
Psychoda spp.	allergy to moth
Telmatoscopus spp. etc.	flies
Blowflies[3]:	
Calliphora	intestinal myiasis, dysentery:
Lucilia	*Clostridium, Salmonella, Shigella* etc.
Chrysomya	
Houseflies[3]:	
Musca domestica	dysentery: *Clostridium, Entamoeba, Salmonella* etc.
	viruses: hepatitis A, poliomyelitis etc
Latrine flies[3]:	
Fannia spp.	dysentery?
Face flies[3]:	
Musca sorbens	yaws: *Treponema pertenue*
	trachoma: *Chlamydia trachomitis*
	septicemia: *Clostridium, Staphylococcus, Streptococcus* etc.
	infective dermatitis: *Candida, Staphylococcus* etc.
Stable flies[1]:	
Stomoxys spp.	bites only: not a vector of human disease
Poisonous spiders[3]:	
Atrax, Latrodectus, Loxosceles, Lycosa etc.	spider bites

D. ADVENTITIOUS – ENTERING THE HOUSE TO FEED

Mosquitoes[1]:	
Aedes spp.	arbovirus, e.g. CE, JE, RVF, VEE
	subperiodic Bancroftian filariasis
Anopheles spp.	arboviruses, e.g. JE, ONN,
	malaria: *Plasmodium* spp.
	periodic Brugian filariasis
	rural periodic Bancroftian filariasis
Coquillettidia spp.	arboviruses, e.g. BSQ, COT, CVO, MAY, MUR, TEN, WN
Culex spp.	arboviruses, e.g. CHIK, CE, EEE, GMA, JE, RVF, SIN, WN
Mansonia spp.	arboviruses, e.g. ILE, RVF, VEE
	sub periodic Brugian filariasis
Sandflies[1]:	
Phlebotomus spp.	cutaneous leishmaniasis: *L. aethiopica, L. major, L. tropica*
	visceral leishmaniasis (kala azar): *L. donovani, L. infantum*
	sandfly fever
Scorpions[3]:	
Androctonus, Buthus, Centruroides etc.	scorpion stings

[1]blood sucking [2]dermatophagous (eating skin) [3]scavenging

Source: Adapted from C.J. Schofield and G.B. White, "House design and domestic vectors of disease", Transcript of the Royal Society for Tropical Medicine and Hygiene Vol. 78, 285, 1984.

APPENDIX B

LIST OF ARTHROPODS OF MEDICAL IMPORTANCE IN THE DOMESTIC AND PERIDOMESTIC ENVIRONMENT

[Source: Hardoy, E.J.; Cairncross, S and Satterthwaite, D. (1990).]

A. BREEDING ON THE BODY:	CAUSE OR CARRIER OF:
Head lice[1]	
Pediculus capitis	head louse infestation
Body lice[1]:	
Pediculus humanus	typhus: *Rickettsia prowazeki* trench fever: *Rickettsia quintana* relapsing fever: *Borrelia recurrentis*
Pubic lice[1]:	
Phthirus pubis	phthiriasis
Scabies mites[2]:	
Sarcoptes scabiei	scabies
Follicle mites[2]:	
Demodex folliculorum	*Corynebacterium acnes?*
B. BREEDING IN THE HOUSE	
Fleas[1]:	
Pulex irritans	bites only: not vectors
Ctenocephalides spp.	plague: *Yersinia pestis* typhus: *Rickettsia mooseri*
Xenopsylla spp.	
Cockroaches[3]:	
Blatta orientalis	shigellosis: *Shigella dysenteriae* salmonellosis: *Salmonella* spp. and other enteric infections; viruses: hepatitis A, poliomyelitis, etc. Legionnaire's disease: *Legionella* etc.
Blattella germanica	
Leucophaea maderae	
Periplaneta spp.	
Supella spp. etc.	
Bedbugs[1]:	
Cimex hemipterus	viral hepatitis B?
C. lectularis	
Triatomine bugs[1]:	
Panstrongylus megistus	Chagas Disease, *Trypanosoma cruzi*
Rhodnius prolixus	
Triatoma infestans	
Soft ticks[1]:	
Ornithodoros spp.	relapsing fever, *Borrelia duttoni*
Argas spp.	bites only: not a vector of human disease
Dust mites[2]:	
Dermatophagoides spp.	house dust allergy