

**ENVIRONMENTAL QUALITY: AN ANALYSIS OF  
THE IMPACT OF HIGHRISE RESIDENTIAL  
DEVELOPMENTS .**

(A case study of Kileleshwa Estate; Nairobi, Kenya)

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Research project submitted in partial fulfillment of the award of  
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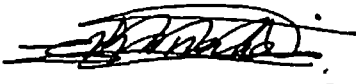


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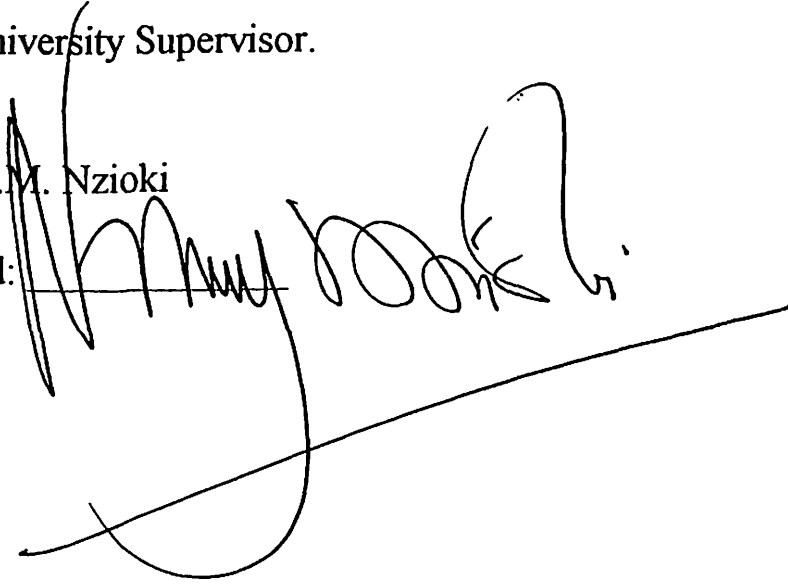
I, JUSTUS MUNENE MUNYI, do hereby declare that this research project is my original work and has not been submitted for a degree in any other University.

Signed: 

DECLARATION BY SUPERVISION

This Research project has been submitted for examination with my approval as the University Supervisor.

1. Mr. N.M. Nzioki

Signed: 

## **ACKNOWLEDGEMENT**

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Your contribution made successful completion of this study possible.

## DEDICATION

This work is dedicated first to my Creator, Protector and Redeemer -----  
“Dear God, you are the source of my energy, you are the source of energy in the sun, in the atom, in all flesh, in the bloodstream and in the mind. Throughout my life, I have drawn energy from you as from an illimitable source. Thank you”.

Secondly to my Mum and Dad, ---- you said to me ----- “Nothing splendid has ever been achieved except by those who dared believe that something inside them was superior to circumstances”.

## **ABSTRACT**

Increasing the densities of existing residential areas is often seen as a convenient option to address the problem of housing shortage in many urban centres. This is mainly due to the fact that existing neighbourhoods are fully serviced and the basic infrastructure is in place, hence eliminating the cost of providing the same.

However, the densification process, and especially in previously high income estates, such as Kileleshwa have had adverse environmental impacts which the planners never envisaged or ignored altogether, as they tried to take advantage of existing infrastructure and services.

An ideal residential estate must meet multiple goals, which include healthy living i.e. devoid of pollution, for its habitants, well planned as to afford constant water supply, efficient sewer and garbage disposal systems, well paved/tarmac roads, free from traffic congestion and availability of social centers/open spaces.

The objectives of this study is to establish the various key environmental impacts linked directly to construction of multi-storey buildings; to identify

the factors aggravating environmental degradation in Kileleshwa Estate and to establish whether re-planning Kileleshwa estate is a misdirected strategy likely to result to irreversible negative environmental impacts, and to recommend the best way forward. Environmental issues in Kileleshwa estate, as a result of highrise residential developments basically revolve around development – environment nexus – whereby the need to provide shelter must be seen within the context of Environmental conservation. The study hypothesizes that development of multi-storey residential dwellings has contributed to significant decline in infrastructure in Kileleshwa estate.

The collection and analysis of primary and secondary data was basically aimed at meeting the objectives of the study. The concept of sustainable development is described in the study to enable formulation of practical recommendations and suggest further areas of study.

The data collected was analyzed by use of various statistical techniques and presented in form of a pie chart, graphs and tables.

The study sample was obtained randomly from the target population.

However respondents were divided into two groups i.e. those occupying newly developed highrise apartments and the occupants of single storey

residences. This was important for the purposes of obtaining views and responses from varied perspectives.

The main environmental degradation indicators identified in the study area include; tattered road sections, traffic congestion, wanton destruction of natural vegetation to pave way for development, infringement of fragile lands i.e. the riparian section – mainly as a result of lack of adherence to planning rules and regulations.

Based on the understanding that options for confronting urban environmental degradation must correspond with their basic causes, the study recommends that there is need to increase awareness among the public in order to improve their participation and support on environmental agenda. It is also noted that there is need to upgrade the management and delivery of key urban services for example collection and disposal of solid wastes and maintenance of basic infrastructure.

Recommendations have also been made on areas of further study especially to establish cost and benefits of development projects in residential areas in respect of environmental concerns. Also, it is recommended that studies be carried out to identify trends in the city's demographic changes with the aim

of advising on residential development requirements so that environmental quality is not compromised through haphazard planning and development. Finally, it is deemed necessary to model ideal environment – development relationship/nexus with the main objective being to advise on acceptable population thresholds which allow for sustainable environmental quality assurance.



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## ACRONYMS

C.B.D	Central Business District
D.E.C	District Environmental Committee
E.I.A.	Environmental Impact Assessment
E.M.C.A.	Environmental Management and Coordination Act
E.M.S	Environmental Management Strategy
E.P.M	Environmental Planning and Management
G.D.P	Gross Domestic Product
K.A.R.A	Kenya Alliance of Resident Associations
K.R.A	Kenya Revenue Authority
N.C.C	Nairobi City Council
N.E.M.A	National Environmental Management Authority
N.E.A.P.C	National Environment Action Plan Committee
N.E.T	National Environmental Tribunal
N.G.O	Non Governmental Organization
P.C.C	Public Complaints Committee
P.E.C	Provincial Environment Committee
S.E.R.C.	Standardization Enforcement Review Committee
T.A.C	Technical Advisory Committee
U.N.E.P	United Nations Environmental Programme
U.N.D.P	United Nations Development Programme
U.N.C.E.D	United Nations Conference on the Environment and Development
W.C.E.D	World Commission on Environment and Development

W.H.O      World Health Organization

W.T.P.      Willingness to pay



## CHAPTER 1

### 1.0 INTRODUCTION AND PROBLEM STATEMENT

#### 1.1 INTRODUCTION

In 1974, the Onyx Group on Environment in the USA noted that the word environment when used by the general public connoted vague awareness of pollution of air, water and land as reaching objectionable levels. This is no doubt a true statement which indicates that environmental degradation is only eye catching when its negative effects to daily lives of people concerned is clearly visible. However in Kenya today, we are witnessing an evolution of campaigns for environmental improvement and conservation, which are proactive and not necessarily reactive to the issues at hand. For instance a National Environmental Management Authority (NEMA) was established under the environment management and co-ordination Act (EMCA) of 1999. Mainly to exercise general supervision and co-ordination over all matters relating to environment, and to be the principal instrument of the government in implementation of all environmental policies. It came into operation on 1<sup>st</sup> July 2002.

There has been a call internationally for nations to embrace “sustainable development”. For instance in January 1971 the business week magazine observed that nations must not pursue development programmes without assessing future environmental impacts on natural resources. However, although many conferences and meetings have been held to drum up support for sustainable development agenda, many countries have continuously found it challenging to adopt the principles of sustainable development. The main factor contributing to this difficulty has been observed to be the continued, unrestricted increase of human population in urban areas and cities, which has continued to exert pressure on the existing stock of housing. Although population increase had its fair contribution to environmental degradation in urban areas, it is the author’s view that, the principle barriers to sustainable development – which ensures sustained environmental quality, are as clearly captured in Agenda 21, of the Rio Conference (1992) which are: - Lack of interest by stakeholders and low level of concern among Citizens in matters of sustainable development and environment.

Lack of interest by stakeholders, to embrace environmental sustainability issues in urban development has been demonstrated in Kenya, giving consent to development of multi-dwelling buildings in residential estates

previously designated for private residences. It is saddening to note that these approvals were not accompanied by any environmental impact reports (especially those approved prior to establishment of NEMA), to illuminate on the possible negative or positive consequences. Secondly these approvals were not accompanied by improvement in infrastructural services to cater for the projected increases in population. As noted by the Nairobi City Council meeting (planning committee) held on 12<sup>th</sup> April 1996, these approvals culminated into “extensive physical dereliction and environmental degradation”. A proper Environmental Impact Assessment (E.I.A) would have enabled the Council to make adjustments to proposed development plans, with a view to making them environmental friendly.

Probably, the reason as to why effects on environmental quality by development projects is ignored is due to lack of data on the extent of degradation in the estates. The issue of approving multi-dwelling units on Nairobi residential zones 3, 4 and 5 (see the map overleaf) arising from a meeting of works and town planning committee held on 13<sup>th</sup> May 1987 comes to focus because there was over emphasis on the need to fix an inherent problem without considering issues of sustainability and impact on environment.

The committee completely ignored infrastructural concerns such as improving and widening the road network, water supply and solid waste management. Although the committee noted the need to improve the existing road network in the area to reduce traffic congestion, no attempt was made to address this situation was undertaken.

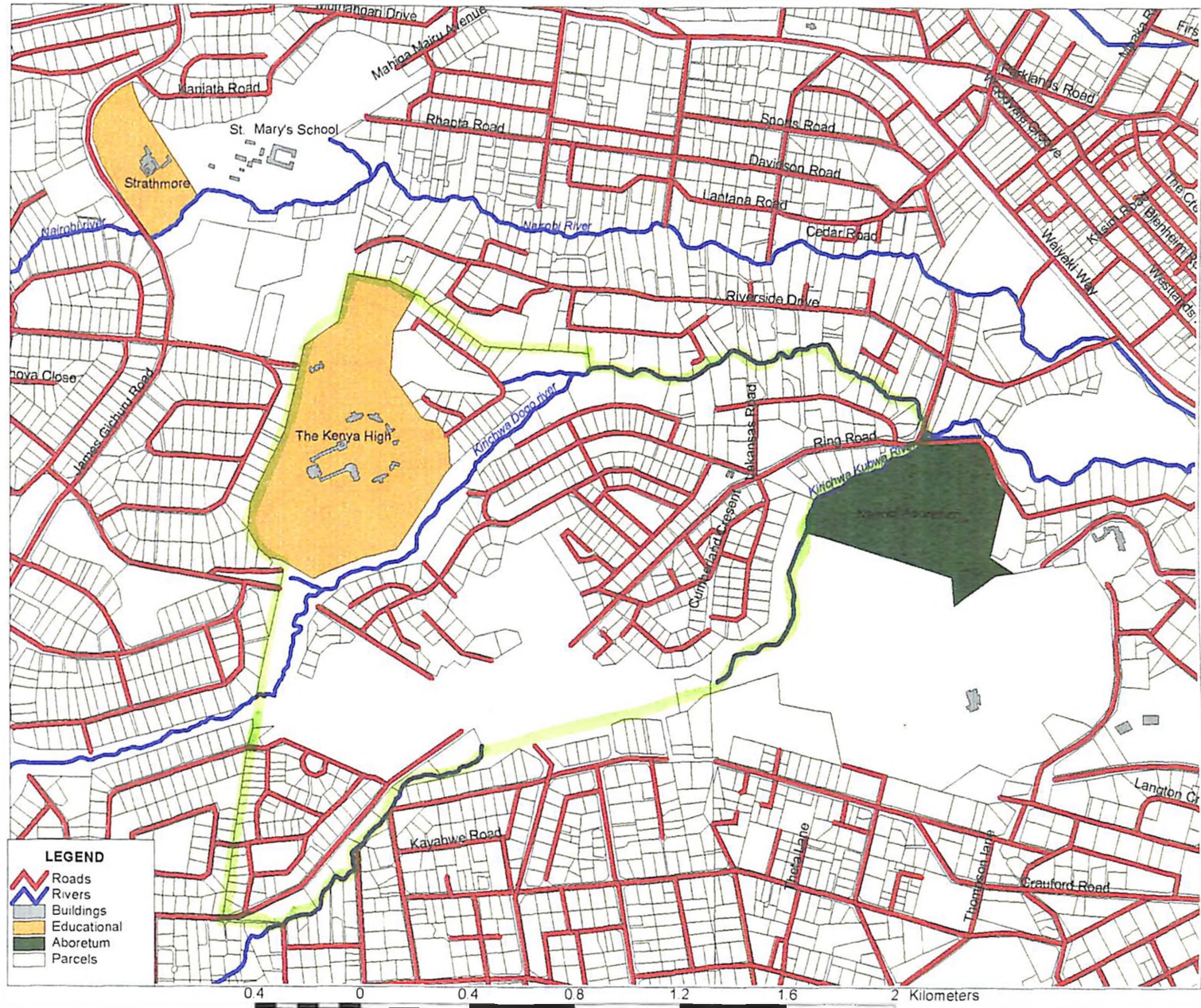
Failure to take into account infrastructural concerns has led to tremendous environmental quality degradation. The multi-dwelling units have led to a sharp population increase in the Estate and as a result pressure on existing services and public facilities has been building up over time. Kileleshwa Estate falls under Westlands Division with population projections as follows:-

**Table 1: Population Projections for Westlands Division.**

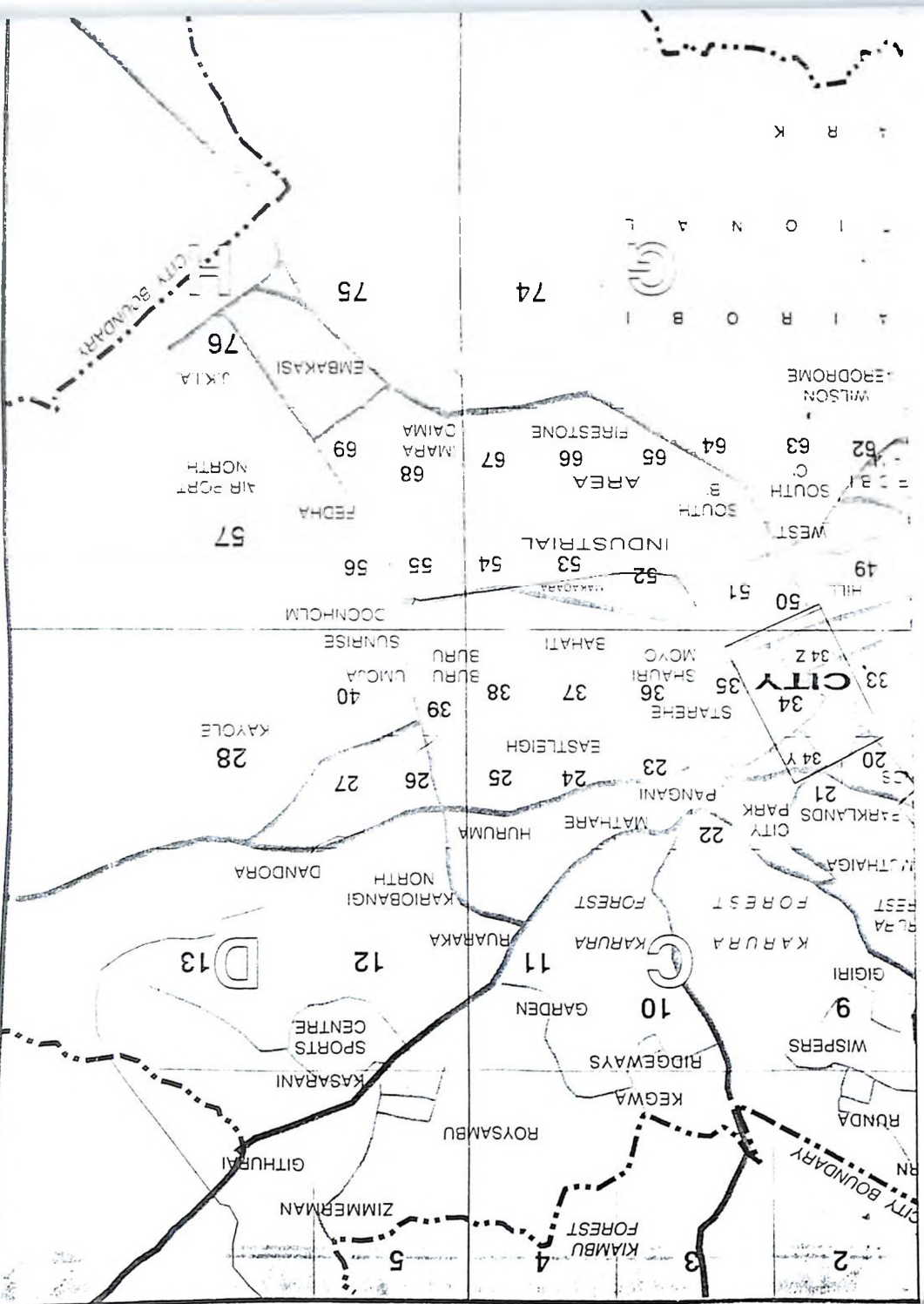
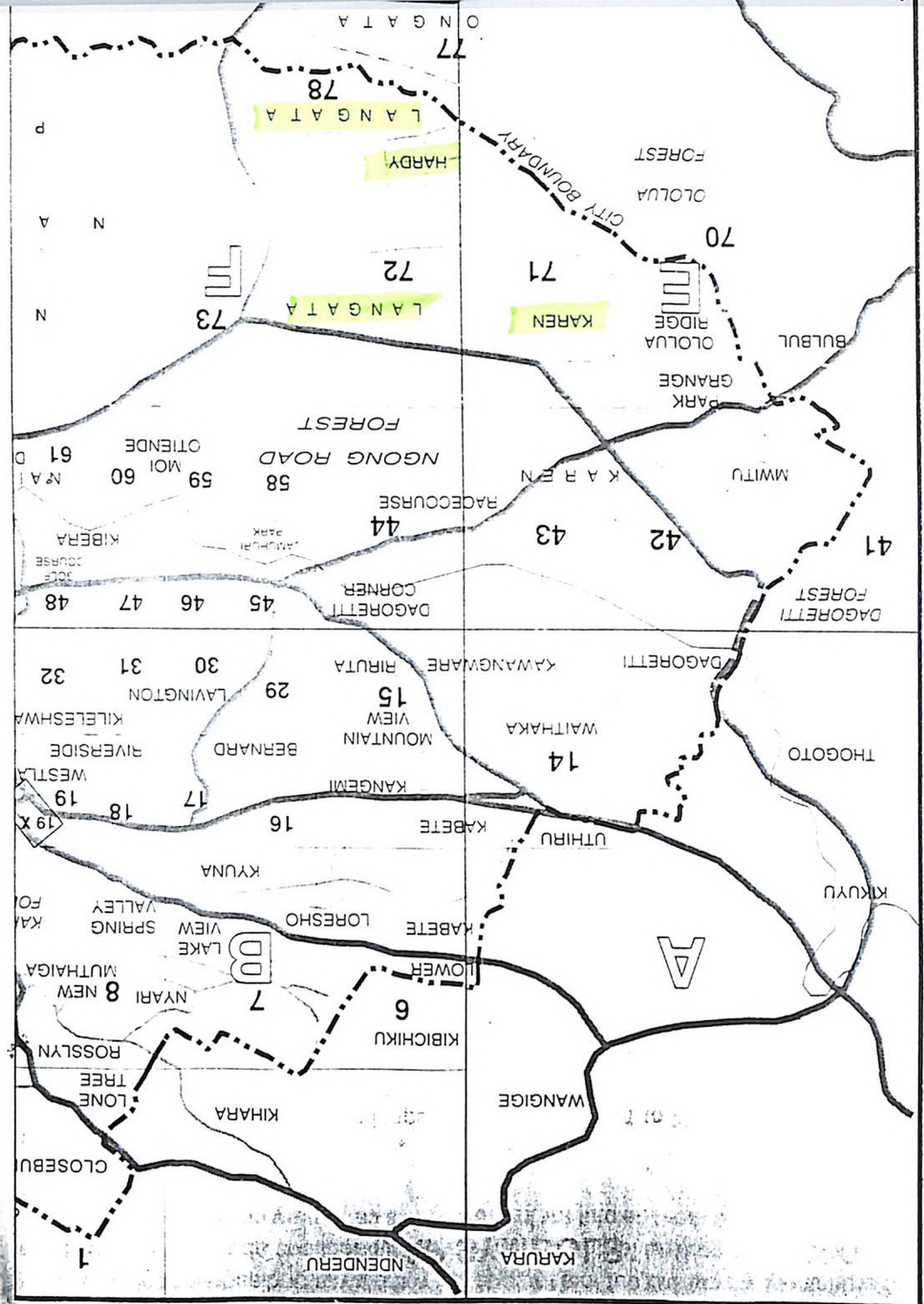
1999	2000	2001	2002	2003	2004	2005
207,610	217, 575	228, 019	238, 964	250, 434	262, 455	275, 053

**Source: Nairobi city Council (2000).**

# THE STUDY AREA : KILELESHA AND ITS ENVIRONS

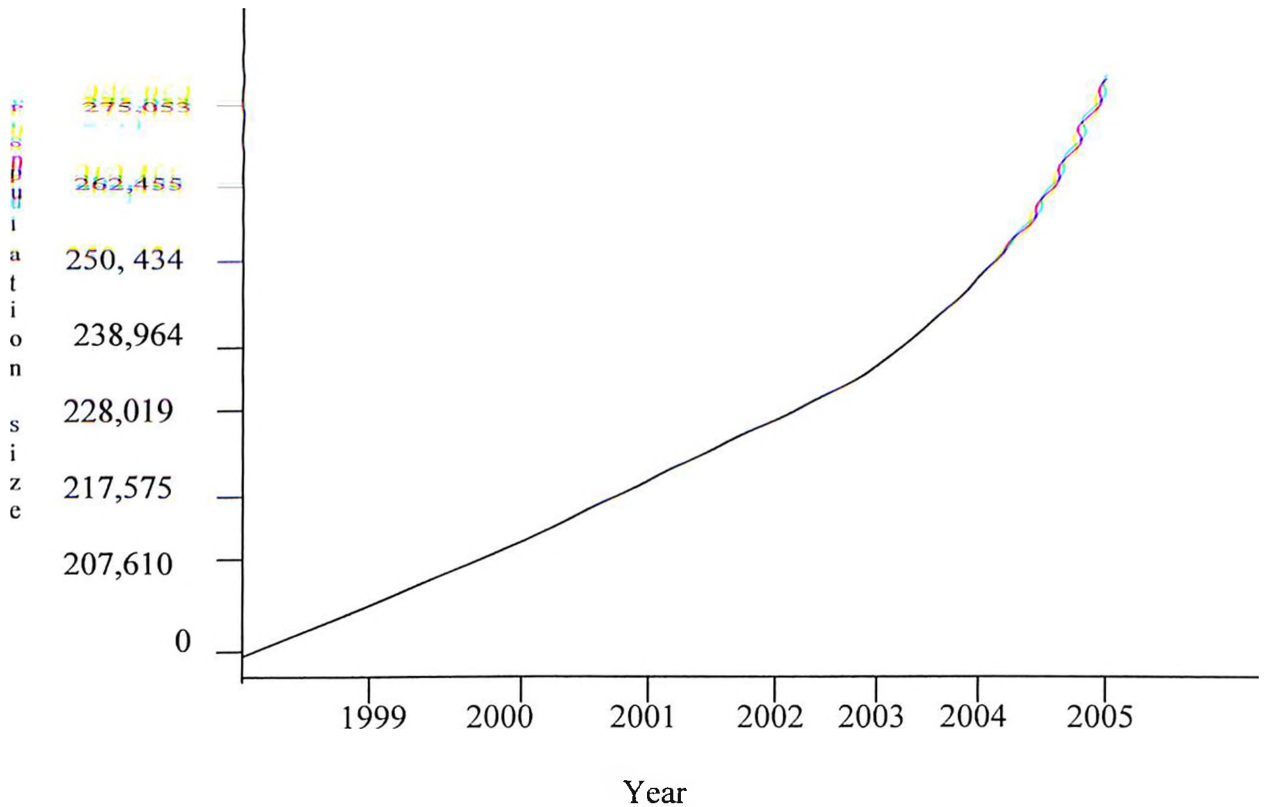


INDEX TO ADJOINING MAPS



The line graph below shows the population trend within this division

**Fig 1: Projected population growth trends in Westlands Division.**



Source: Author (June 2005).

It is worth noting that the infrastructure services for zones 3, 4 and 5 were designed to cater for a maximum population of 243,000 persons. However, currently these zones are estimated to accommodate over 900,000 persons (Nairobi City Council records).

Environmental quality in the estate has been on decline. The first areas to reach objectionable levels of pollution are those along the sewer lines where highrise developments are concentrated. Environmental impacts observed by

the Author include destruction of scenic views and natural flora as development spill over to riparian reserves, water pollution due to destabilization of drainage systems, poor solid waste disposal due to increased population and tattered road network due to resultant traffic congestion.

The nature of “environmental degradation” in light of residential developments varies from country to country. The World Bank (1984) classifies countries on the basis of their choice of development plans reflecting the intent to focus on contemporary environmental problems. Developed economies such as United States, Canada, United Kingdom and all other member states of the European community have made environmental components central in their decision-making. At the global scale there is an ongoing debate over which are the most urgent problems, which are the most important and what factors influence observed patterns and changes in environmental quality. The debate has zeroed in to four key priority areas according to the World Bank report (2002).

These are; sustainable conservation of resources, Preservation of nature, prevention of pollution and control of population growth.

Evidently most developing countries cannot claim to have addressed any of the above themes sufficiently. However, this is no accident, Chapman 1969 :



32 noted that “----- as a society reaches some threshold of economic development with its attendant scientific and technological capabilities, it can afford to concern itself less with materials and quantity and concentrate more with the quality of life -----“. However, this is no justification for poor planning and lack of enforcement of existing building codes and regulations. In Kenya the Physical Planning Act of 1996 (Cap 286) requires all alterations to existing buildings be subject to approval. This is seldom the case especially in Kileleshwa Estate, where there are numerous old type bungalows, being demolished to pave way for multi storey highrise constructions. Further this Act requires ----- on part IV of 36 “----- any development activity likely to have any injurious impact on the environment ----- be required to submit ---- environmental impact assessment report”. However, these legislative requirements continue to pursue policies of short term benefits at the expense of long term environmental stability and sustainability, most of our residential estates seem to be experiencing the predictions made by the Global 2000 report to the President of United State that “----- the World in 2010 will be more crowded, more polluted, less stable ecologically and more vulnerable to disruptions than the World we live in now.

Serious stresses involving population, resources and environment are clearly visible ahead -----”.

Appreciating the importance of environmental quality is difficult to some stakeholders given that our economic system is founded on the notion of free enterprise in the private market place where environmental goods and services are seen as public assets to be used with a market price and therefore treated as free resources. However as Matthews and Perkowski (1975 P. 214) notes “---- *society cannot simply decide and get what kind of environment it wants; it must also decide what it is willing to give up, or to do in addition, so that it can affect the change in the status quo which will generally be required to produce a change in the environment.*”

If the above counsel is to be heeded, then a variety of immediate steps need to be undertaken to address environmental impacts of buildings and construction industry in general and more so in residential areas where we live and our children grow. The researcher will attempt to show that there is need to take cognizance of long-term approaches to balance the competing needs of sustaining environmental quality and providing housing to continuously increasing urban population. To achieve this, it is important to re-think the policies touching on construction industry, with a view to

strengthening and upgrading environmental requirements to be fulfilled by developers. On the same breath there is need to promote corporate environmental and social responsibility as well as building both public and enterprise awareness through continuous knowledge sharing.

## **1.2 BACKGROUND TO THE PROBLEM AND PROBLEM STATEMENT**

### **1.2.1 BACKGROUND TO THE PROBLEM**

In addressing issues of rapid urbanization and the need to provide shelter for all, the government has encouraged – through legal and policy guidelines, the construction of highrise buildings infact the effect of Sectional Property Act No. 21 of 1987 is to promote legal ownership of parts of multi-dwelling premises. Due to lack of proper Town planning control mechanisms, construction of highrise buildings has not only been allowed in vacant peri-urban plots, but also within the existing middle and upper - middle residential estates. Some of the most affected areas in Nairobi include: -

#### ***Karen and Langata areas***

This constitutes areas to the south west part of Nairobi and covering an area of approximately 5,922 hectares (Nairobi City Council records, 2005), the original minimum plot size of 1 hectare (2.447 Acres) has currently been reduced to 0.2 hectares (0.5 Acres) with a projected population of 126, 000,

assuming occupancy rate of six (6) persons per plot. It is to be noted that there is no sewer in most parts of Karen- Langata and most residents rely on borehole water for domestic consumption.

***Area between Museum hill road and Westlands Shopping Centre:-***

This is bound by Ojijo road, Museum hill road, Chiromo road, Cross way and Waiyaki way. It measures approximately 60 ha. Although it is supposed to be a residential area with a plot ratio of 0.75 and ground coverage of 35%, the area has been approved for commercial use without any improvement of infrastructural services. In actual fact, this area has no definite pattern of development distribution; it has mixed residential and commercial users, both featuring prominently along the main artery roads. 'Kiosks' – which are supposed to be illegal, are dominant with some lanes completely blocked. As at the time of this study, Nairobi City Council had moved in to demolish illegal structures in these areas.

***Areas marked as zone 3, 4 and 5: -***

These zones comprise of Lavington, Bernard Estate, Thomson Estate, Kilimani, Kileleshwa, Westlands and Parklands.

They occupy an estimated area of 4,000 hectares with an estimated population of 243, 000 (1997 projections).

The area enjoys a wide range of public utilities and facilities including; Forty Five (45 No.) Primary Schools, Thirteen (13 No.) Secondary schools, about seven (7 No.) Hospitals and shopping Centres such as Yaya Centre and Kasuku Centre. (Nairobi City Council records, 1997).

### ***Background of development policies***

The premise of the Research problem is built around multi storey residential developments in Kileleshwa. It is therefore important to highlight the development policy trends in this area, with a view to tracing the genesis of the current development trends as well as environmental problems.

The first development policy was formulated in 1968 and approved on 9<sup>th</sup> August of the same year. Under this policy, the minimum plot size to be permitted for comprehensive development was 1.0 ha (2.5 acres).

The second development control policy was approved on 16<sup>th</sup> January 1979.

This policy was aimed at rationalizing the minimum plot sizes and the ground coverage and plot ratios in the whole city. For these zones, the

ground coverage for plots on sewer was raised from 33.5 % to 35% and plot ratio remained at 0.75. Those plots without sewer, the ground coverage was to be 25% on septic tanks,

In 1986, however the issue of minimum plot size and ratios was put to focus as the council geared towards approving highrise developments.

Development proposals were in the mean time being pegged on ground coverage and plot ratios for approvals.

From 1987 to date, the minimum plot size on sewer has been reduced from 0.1 ha to 0.05 ha for one dwelling house. Unsewered plots remain at 0.2 ha minimum for a single dwelling unit. Noteworthy, highrise developments have been allowed although limited to sewerred areas. These developments are at 10% ground coverage and plot ratio of 0.25 ha and must not exceed four floors. (Nairobi City Council Records, 1997).

The tragedy in the above development policy trends is that no action was taken to assess, estimate, or project or attempt to predict environmental implications of such high-density residential developments of upto four (4 No.) floors, without supportive infrastructure.

Inevitably, these areas continue to be subjected to increasing pollution levels derived from inadequate water, poor sanitation and drainage, ineffective solid waste management and air and noise pollutions.

These problems affect the residents and takes a heavy toll on their health and productivity, World Health Organization (2003).

If an environmental cost-benefit analysis was conducted before approval of these development policies, which have reduced this once serene and 'posh' residential suburb into a mess of downgraded estates, then physical dereliction of infrastructure and environmental quality would not have occurred to the levels it is today.

Environmental impact research could have helped policy makers to secure continued support from Landlord/Property owners to resist any developments likely to compromise environmental quality. This support can be in form of support and participation in public meetings organized to address environmental issues, identifying greedy developers who encroach on public land and reporting corrupt government officials. In addition, studies would help policy makers to choose policy instruments that would

relieve conflicts among competing needs of housing and Environmental conservation requirements.

A consultative meeting on sustainable growth and development in Dar-es salaam – (1992) called for recognition and acceptance that deteriorating urban environmental quality due to poor planning is a major obstacle to achieving sustained and equitable social economic growth and development. The meeting felt that efficient and effective environmental management in urban residences need to revolve around the principles that; environmental hazards threaten development achievement and that environment is critical in managing development. Furthermore, environmental issues cut across development sectors, geographic spaces and time hence environmental management must evolve incrementally over time. Active support must therefore be ensured by creating continuous public awareness campaigns.

### **1.2.2 STATEMENT OF THE PROBLEM**

In view of the above, this research effort will therefore seek to investigate and find out the effect of multi-storey buildings (Highrise apartment blocks) on environmental quality in high-income residential estates previously zoned for single – dwelling residences. Environment degradation will be viewed in terms of degenerating infrastructure and services; degradation of



environmentally fragile lands like riparian reserves; air pollution particularly due to traffic congestion and construction activities; water pollution as a result of poor sanitation, drainage and poor solid waste management. This will serve to illustrate on the need to take into account at the earliest possible stage all environmental implications likely to culminate from residential development policies. The measure of environmental implications of any kind is necessary because as Lord Kelvin (1907 – 1924) once remarked, “when you express and measure what you are speaking about, ---- you know something about it. But when you cannot ----- then your knowledge is meager and of unsatisfactory kind.

It is the researchers view that environmental quality is difficult to maintain and easy to compromise because housing is seen as a basic human right and it is a sector where various excuses and arguments have been advanced with a view to compromise environmental quality. Such arguments may state; where do I take my family.....? Securing livelihoods is better than safeguarding the environment. ....

At the moment, there is tremendous evidence of environmental degradation in Kileleshwa estate. Records at various government agencies indicate that there has been numerous complaints regarding these multi-storey

developments in the study area; numerous complaints are recorded with the City Council, National Environmental Management Authority, as well as the Provincial Administration.

#### A VIEW OF UPCOMING DEVELOPMENTS ON A RIPARIAN SECTION

PLATE NO. 1.0



Note the wall being constructed in the middle of the river

Source: Field Survey (June 2005)

What is missing to complete the whole spectrum is a clear link between the observable environmental degradation in the study area and construction of highrise buildings within the estate. This link once established will serve as a foundation for making informed choices now and in future.

#### 1.2.2.1 RESEARCH OBJECTIVES

The main objectives of this study will be to: -

- (1) Identify factors aggravating environmental degradation in Kileleshwa estate.

- (2) Establish key environmental impacts being experienced in Kileleshwa
- (3) Establish whether re-planning Kileleshwa estate to accommodate highrise developments is a strategy likely to lead to adverse environmental impacts.
- (4) Make suggestions and recommendations to address and arrest the rapid deterioration of Environmental quality in the study area.

#### **1.2.2.2 RESEARCH HYPOTHESIS**

Development of multi-storey residential dwellings has significantly contributed to the strain on infrastructure in Kileleshwa Estate.

#### **1.2.2.3 SCOPE OF THE STUDY**

Policies put in place to address urbanization trends will be examined and an understanding of the “green”, the “brown” and “social” issues of urban environment sought. The study will focus on development – environment nexus, with important underlying issues such as inappropriate land uses, illegal developments, traffic congestion, inadequate water supply, poor drainage and solid waste management being addressed exhaustively. The study will conclude by addressing approaches for confronting urban environmental issues geared towards formulating an urban environmental

management strategy and action plan, for similar zones and Nairobi in general.

#### **1.2.2.4 ASSUMPTIONS**

The study assumes that approval of the highrise developments in Kileleshwa is in accordance with the existing rules and regulations, and that only stipulated densities/plot ratios will be complied with and adopted in respect of all development sites in the area.

#### **1.2.2.5 RESEARCH METHODOLOGY**

This study encompasses both Theoretical and practical aspects in environmental quality management, paying special attention to provision of infrastructural services.

Data collection for the purpose of this study has been carried out from primary and secondary sources. Primary data is sourced by administering questionnaires, carrying out inspections and discussions as well as organizing interviews. Secondary data will be gathered on areas relevant to the study.

The population of the study comprises of tenants, owners of apartments and owners of single storey residences. A sample of 30 apartment owners/tenants and 15 single storey residences was selected by simple random sampling.

#### **1.2.2.6 SIGNIFICANCE OF THE STUDY:**

Sustainable environmental strategies require participation of diverse spectrum of actors. This is because the environment in its pure form is an extremely broad subject, which requires institutional, political, informational and technical capabilities to address.

An understanding of various factors contributing to environmental degradation is therefore the foundation to formulating economically viable and politically acceptable environmental management policies. It is only by examining the impacts of environmental degradation, that informed choices of integrating environmental considerations into existing policies can be realized, moreover the issue of public participation needs to be recognized and appreciated in a special way because, in most cases environmental quality is compromised not by default or accident but by sheer ignorance of adhering to set rules and regulations. Apart from advocating for strengthened institutions, better facilities and equipment, the study also focuses on

possible incentives both for improved institutional performance and mobilization of resources based on strategic environmental management.

As noted by Dean (1996) “--- protecting and improving the urban environment is fast becoming a necessity rather than a luxury. Rapid urbanization ---- is threatening health, the environment and urban productivity”.

It is in highlighting and estimating some of the environmental quality compromises that have been made so far and outlining their consequences, that the trend of ignoring environmental issues as we pursue our development agenda and especially in residential developments can be reversed.

The study was largely motivated by WCED report of 1987 which put the environmental problem of African Cities very starkly, anticipating that in 15 years (i.e. by 2002), developing countries will have to increase their ability to provide urban infrastructure, services and shelter by 65%. The sheer magnitude of this problem looks insurmountable in the context of lack of awareness and willingness to adopt principles of sustainable development, as noted by the RIO conference of 1992.

## CHAPTER 2

### 2.0 A CONCEPTUAL FRAMEWORK OF URBAN ENVIRONMENT – URBAN DEVELOPMENT NEXUS

#### INTRODUCTION

Although cities are a driving force in national development they are threatened by pollution, congestion and environmental hazards, basically from unprecedented rates of growth. Unlike in developed countries where these problems are more predominant in industrial zones, in developing countries, it is the residential areas, which are largely affected. This can be attributed to over reliance on human labour force in the cities as well as high rates of rural urban migrations. It is the author's view that this is a culmination of imbalanced rural-urban development.

As urban populations grow, so do the environmental problems.

There is therefore a need to develop an understanding among stakeholders on the seriousness and the implications of gradual environmental decay.

In order to establish these implications, this chapter will delve into the issues of urban development versus urban environment. This will be achieved by highlighting various urban environmental problems and more so those associated with urban residential areas. A review of the framework and *structure for dealing with environmental issues in Kenya – as encapsulated*

in the Environmental management and Coordination Act (EMCA) will be done with a view to assessing efficiency in application and implementation.

The Chapter will broaden an understanding of the effects of multi-storey buildings on urban environment by reviewing case studies of some selected cities which experienced almost similar problems in their residential zones.

Sometimes proponents of environmental conservation in urban areas are seen as anti-development. This chapter will therefore endeavour to bring to the fore the “brown”, the “green” and the “social” urban environmental issues with a view to demonstrating the dynamics of urban developments.

This is of paramount importance to the study, given that our research problem revolve around urban environmental issues brought about by the dynamics of urban development such as changes in building policies.

## **2.1 TOWARDS UNDERSTANDING URBAN ENVIRONMENTAL PROBLEMS**

The challenge of environmental planning is to assess the effects of and rank urban environmental problems in terms of health effects, productivity, amenity, ecological values and other key indicators. Environmental Impact assessment can serve as the best basis to categorise impact associated with



urban environmental degradation. It usually concerns itself in the following broad areas.

#### 2.1.1 Health and safety:

To assess the effect on health and safety associated with downgraded environmental quality, the assessment criteria would consider; health care costs, lost working days and mortality rates.

#### 2.1.2 Productivity:-

Environmental Impact Assessment procedures usually focus and make judgments on the extent of losses in urban productivity, which is the result of proposed developments.

#### 2.1.3 Equity

This is a key factor in environmental Impact Assessment because the negative effects of urban environmental degradation affect all urban dwellers including those not residing at the “epicenter of pollution” (i.e.) the effects are non-exclusive for instance, water polluted at Kileleshwa Estate, affects residents downstream.

#### 2.1.4 Ecology:

Ecological effects are usually judged by the availability and costs of fresh water, vulnerability and loss of biological diversity.

#### **A VIEW OF WANTON DESTRUCTION OF NATURAL VEGETATION ALONG GITHUNGURI ROAD (WITHIN THE STUDY AREA) TO PAVE WAY FOR CONSTRUCTION WORKS**

**PLATE NO. 2.0**



Source: Field Survey (June 2005)

#### 2.1.5 Amenity: -

Effects on amenity include air and water quality, noise levels, scenic beauty and the presence of parks and clean, open spaces.

To be able to make reliable assessments on most pressing environmental problems, a matrix linking key policies to problems is useful. This is contrasted to the institutional framework for the EMCA (See Table 2.1 and Diagram 2.1)

**TABLE 2.1 LINKAGE BETWEEN URBAN DEVELOPMENT POLICIES AND ENVIRONMENTAL PROBLEMS.**

Urban Environmental issues (urban environmental problems).	Underlying causes	Relevant policy reforms
(a) Access to basic environmental infrastructure and services: (i) Serviced land and shelter	Poorly functioning urban land and housing markets: Highly regulated prices and vice versa. Lack of affordable housing.	<ul style="list-style-type: none"> <li>- Reform property rights.</li> <li>- Develop mortgage financing.</li> <li>- Introduce affordable standards.</li> <li>- Reduce unnecessary regulations in building sector.</li> </ul>
(ii) Water supply, sanitation, drainage, solid waste collection, transport.	Supply side dominated by Government monopoly.	<ul style="list-style-type: none"> <li>- Introduce policing and demand management.</li> <li>- Move towards decentralization, privatization and participation.</li> </ul>
(b) Pollution from urban wastes and emissions: (i) Water pollution. (ii) Energy use and air pollution. (iii) Solid and hazardous waste management	<ul style="list-style-type: none"> <li>- Uncontrolled discharges</li> <li>- Excessive water use and waste generation.</li> <li>- Failure to link water quality and quantity issues.</li> <li>- Increased motorization and transport congestion.</li> <li>- Lack of disposal facilities</li> <li>- Inadequate regulation and enforcement.</li> </ul>	<ul style="list-style-type: none"> <li>- Strengthen regulations and capacity for monitoring and enforcement.</li> <li>- Introduce emission charges and integrate transport and land use planning.</li> <li>- Promote clean technologies.</li> <li>- Introduce regulations, licensing and charges privatize disposal operations.</li> </ul>
(c) Resource Losses: (i) Ground water depletion. (ii) Land and ecosystem degradation.	<ul style="list-style-type: none"> <li>- Unsuitable extraction linked to unclear property rights and treatment as free resource.</li> <li>- Encroachment of fragile lands by lack of access to affordable serviced land.</li> <li>- Lack of controls over damaging economic activities.</li> </ul>	<ul style="list-style-type: none"> <li>- Clarity of property rights:</li> <li>- Coordinate land development;</li> <li>- Remove artificial shortages of land,</li> <li>- Develop sustainable uses of sensitive areas.</li> <li>- Monitor and enforce land use controls.</li> </ul>
(iii) Loss of cultural and historic property.	- Lack of property rights. Regulation, enforcement,	- Introduce tax incentives for preservations;

	maintenance; failure to reflect social values in land prices.	<ul style="list-style-type: none"> <li>- Use redevelopment planning, zoning and building codes;</li> <li>- Develop property rights.</li> </ul>
(d) Environmental Hazards; (i) Natural hazards (Outbreak of waterborne diseases and airborne diseases.	<ul style="list-style-type: none"> <li>- Poorly functioning land markets;</li> <li>- Ineffective land policies.</li> <li>- Poor construction practices.</li> </ul>	<ul style="list-style-type: none"> <li>- Provide disincentives to occupation of high-risk areas, incentives for using disaster –resistant construction techniques.</li> <li>- Introduce and enforce environmental zoning.</li> </ul>
(e) Man made hazards	<ul style="list-style-type: none"> <li>- Inadequate regulation and enforcement;</li> </ul>	<ul style="list-style-type: none"> <li>- Formulate urban disaster preparedness, plans and strengthen response capacity.</li> </ul>

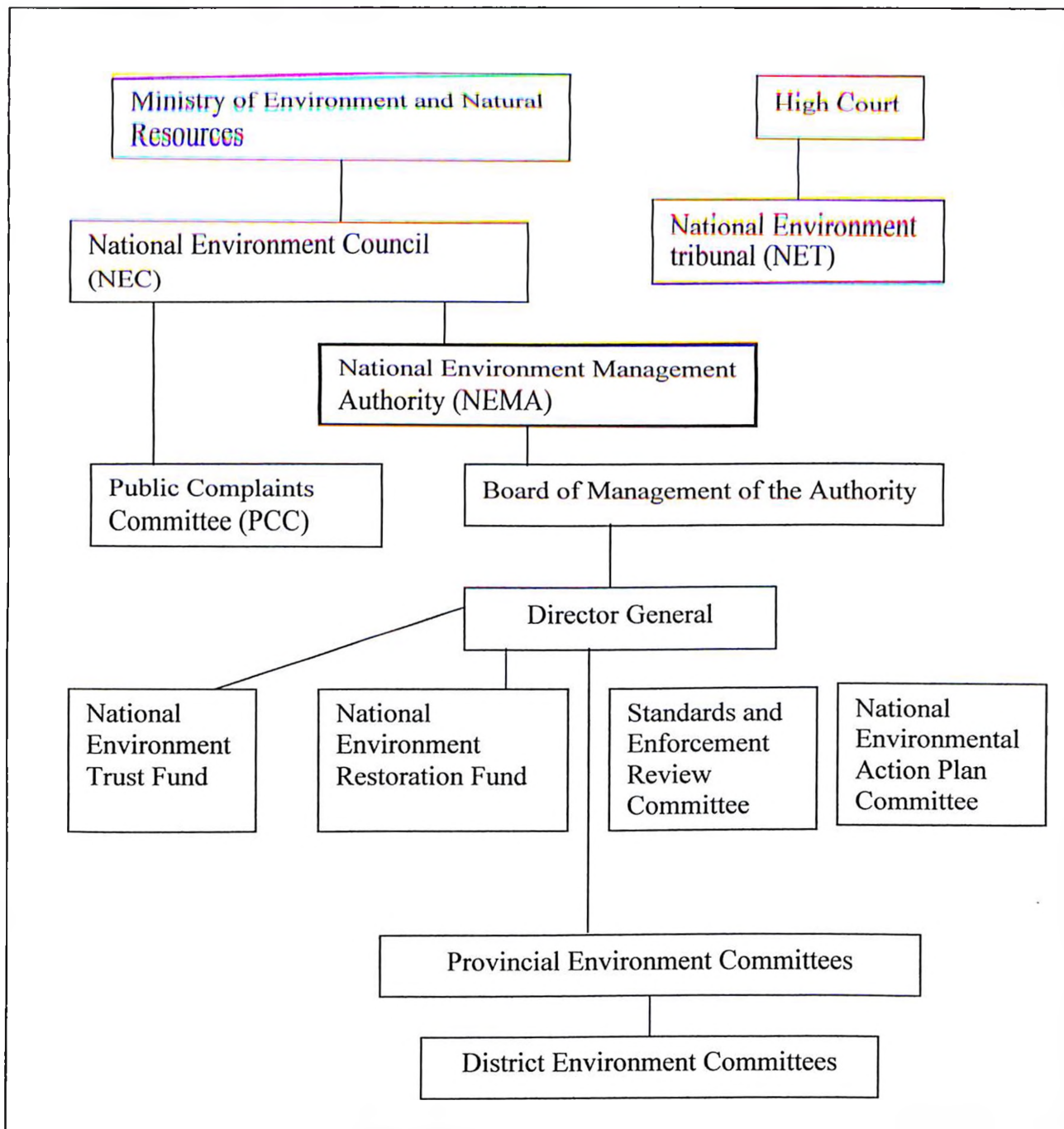
Source: Toward Environmental Strategies for Cities (Carl B. 1995).

From the above matrix, it is very clear that our environmental management strategies are wanting. For instance, there is lack of adequate environmental data and absence of acceptable analytical frameworks for understanding the problems, ranking them and designing locally appropriate environmental protection programmes. Although section 54 of environmental management and coordination Act (EMCA) 1999, provides for protection of environmentally significant areas, the government agencies dealing with environmental protection such as National Environmental Management Authority (NEMA), the Nairobi City Council and Provincial Administration though aware of the magnitude of the ongoing environmental damage and how various waste disposal practices are threatening human health and environmental resources, they don't seem to have adequate logistical

systems to execute their mandates in this respect. Perusal of documents at city hall reveals voluminous information on the locations of environmentally fragile and hazard prone lands yet nothing has been done so far in terms of policy guidelines and enforcement to protect them. This is made worse by the fact that data on capacities of existing utilities and services is dismal. The following diagram shows the institutional framework established by EMCA.

## 2.1 INSTITUTIONAL FRAMEWORK FOR THE EMCA

DIAGRAM 2.0



Source: NEMA RECORDS (June 2005)

The structures encapsulated in EMCA for implementing the provisions of the Act include; The Board of Management for the National Environmental Authority (NEMA), Provincial and Districts Environment Committees (PCE's/DEC's), Standards and Enforcement Review Committee (SERC), National Environment Action Plan Committee (NEAPC), Public complaints Committee (PCC), National Environment Tribunal (NET) and Technical Advisory Committee (TAC).

All these structures have potential to address environmental management programmes, however more resources and enabling from the government, is necessary if results are to be achieved. For instance the researcher observed that provincial environment committees had serious logistical and coordination problems when responding to public complaints and enforcing the Act (i.e., EMCA) – a case in mind is the response to public complaints in respect of encroachment of the riparian reserve along Kirichwa Kubwa and Kirichwa ndogo Rivers.

## **2.2 KEY PRINCIPLES TO IMPROVE URBAN ENVIRONMENTAL QUALITY**

### **2.2.0 INTRODUCTION**

Before embarking on the process of tackling the numerous urban environmental problems, it's important to define priorities and formulate sustainable environmental policies. Usually budgetary constraints are a major concern. It's imperative therefore that cost effective solutions that focus on one or two priority problems are set. The policies should aim at influencing the behaviour of both public and private actors. For example user fees or taxes can be introduced for services that affect waste management, water use, and other household engagements. Proper systems need to be put in place to regulate and enforce rules and regulations relating to urban land markets especially in as far as converting environmentally fragile land to urban use is concerned. The priority concerns as established by NEMA, covers institutional, infrastructural and human resources development, educating and sensitizing communities on environmental issues.

Other areas concern data and information gathering and dissemination, environmental policy developments and sectoral review, guidelines and



development of regulations, mobilization of financial resources and rehabilitation of degraded sites.

National Environment Management Authority (NEMA) also endeavours to enhance sustainable environmental management in order to reduce or stop environment stresses and damages, through effective co-ordination and supervision of stakeholder activities.

### **2.2.1 EXAMINING THE BENEFITS OF “WIN – WIN” PRINCIPLE**

This is concerned with seeking situations where environmental and economic goals are balanced. One way of achieving this is to make them complimentary. For instance in Mexico City there is an environmental action plan for improving air quality. This action plan was necessitated by an estimated economic damage related to health effects of air pollution to at least \$1.5 billion a year (World Bank Reports 1992). By comparing the cost per kilogram of emissions, researchers were able to rank the cost-effectiveness of several alternative measures, by settling for a win-win plan.

A combination of regulations, incentives and fuel taxes were used to reduce transport related emissions. The subject of transport and air quality management should include components, which support comprehensive

policies on air quality research, monitoring and institutional strengthening (Eskeland, 1993).

### 2.2.2 THE PRINCIPLE OF COST EFFECTIVE APPROACH

The benefits of environmental conservation are not immediate, compared to benefits accruing from other investment decision such as putting up residential units. Critical decisions have to be made especially if expenditure is to be incurred to remedy downgraded environment or to carry out reforms. Justifications are usually required for capital investments for environmental improvements such as solid waste management programmes, sanitation and sewerage system upgrading etc. However, although environmental benefits are not easily quantifiable, there is need for broad political and public agreement as the benefits are intergenerational. Issues of cost-effectiveness need to be addressed so that only those solutions which meet environmental goals are adopted.

For instance, in **Jakarta**, where sharp water shortage and environmental degradation was experienced due to “poor City planning and population increase”, more than \$50 million (an amount equivalent to 1% of the City’s GDP) is spent each year by the population to boil water. This is not cost

effective and therefore an investment in water supply can reduce fuel wood consumption, air pollution and water borne diseases. (World Bank, 1992).

**In Metropolitan Manila**, a cost-benefit analysis was carried out prior to implementation of the proposed environmental management strategy project.

The analysis indicated that investment in waste water treatment; sewer upgrading, improvement in transport networks etc would cost \$196 million.

Without the project, the estimated **annual** economic and social costs of continued urban environmental degradation in Manila would be about \$53 million per annum (Ibid).

The above two cases demonstrate that environmental benefits are not immediate but the opportunity cost incurred for not taking remedial measures is enormous.

#### **2.2.2.1 Adopting Cost effective technologies**

Determining and responding to ever increasing demand for urban services should form the basis upon which technologies and environmental management strategies which afford greater economic efficiency and cost recovery are adopted. One of the major obstacles to improved efficiency in urban environmental management is over – reliance to public budgets. This

should be reduced by applying; User charges Property and business taxes as well as Fuel taxes among others.

Its however worth noting that although the above measures have already been implemented in Nairobi, their potential gains are being compromised by lack of efficient collection procedures for example the Nairobi City Council recently offloaded collection of land rates to Kenya Revenue Authority (KRA). Incompetence among the employees is another aspect, which leads to heavy losses especially when coupled with corruption and lack of professional ethics. Facts on the ground indicate that developments have been allowed on riparian reserves and flood like the Phenom valley developments.

The viability of any environmental management strategy relies upon “matching its costs to users’ ability and willingness to pay (WTP). In essence therefore, potential users must be ready to pay for the full costs of improved services.

Case studies indicate that user charge – commonly referred to as “the polluter pays principle” is applied in both developing and developed Countries with varying degrees of success. For instance in some parts of **France**, individual households pay a pollution charge and the local

community is responsible for collecting and treating waste water, solid waste etc (Williams 1992).

In **Kenya**, NEMA has taken the cue and recently ordered an oil company to pay for environmental damages caused by crude oil spillage in the ocean, near the port of Mombasa.

In **Liberia** (in West Africa) payment for use of roads, sanitary services and water is mandatory. This helps to cover operating and maintenance costs.

In **Bihar and Delhi**, India, user fees have allowed Sulabh International (an NGO) to extend the benefits of environmental friendly developments to various urban neighbourhoods. It should however be noted that although user charges and polluter pays principle seem to offer almost immediate solution to various urban environmental problems, government involvement may still be needed, particularly for legal backup in implementing an environmentally sound urban infrastructural services and development and part development plans.

Having highlighted the need for public participation the question arises on how this support can be mobilized. This should be addressed against the background of the necessity and sustainability in participation by diverse

cast of actors. To ensure continued participation, the ideal case is where the cast of stakeholders are involved;

Those whose interests are affected by environmental problems, strategies and plans. For instance in Kileleshwa Estate, those affected by multi-dwelling developments are those who prefer to maintain single dwelling residences/units. Those who control relevant implementation instruments and those who possess relevant information and expertise i.e. both professionals and stakeholders residing in affected neighbourhoods should be at the front line.

Urban environmental improvement should be initiated and sustained on the basis that residents require a better quality of life. As such, therefore, the first group of participants is the most important for accomplishing change. This group can also be instrumental in applying political pressure that may be necessary for environmental action to be taken. To facilitate effective participations, there is need to create public awareness (probably through the media and adverts) on the causes of environmental problems, whereupon issues of planning and implementation of environmental infrastructure and services are articulated.

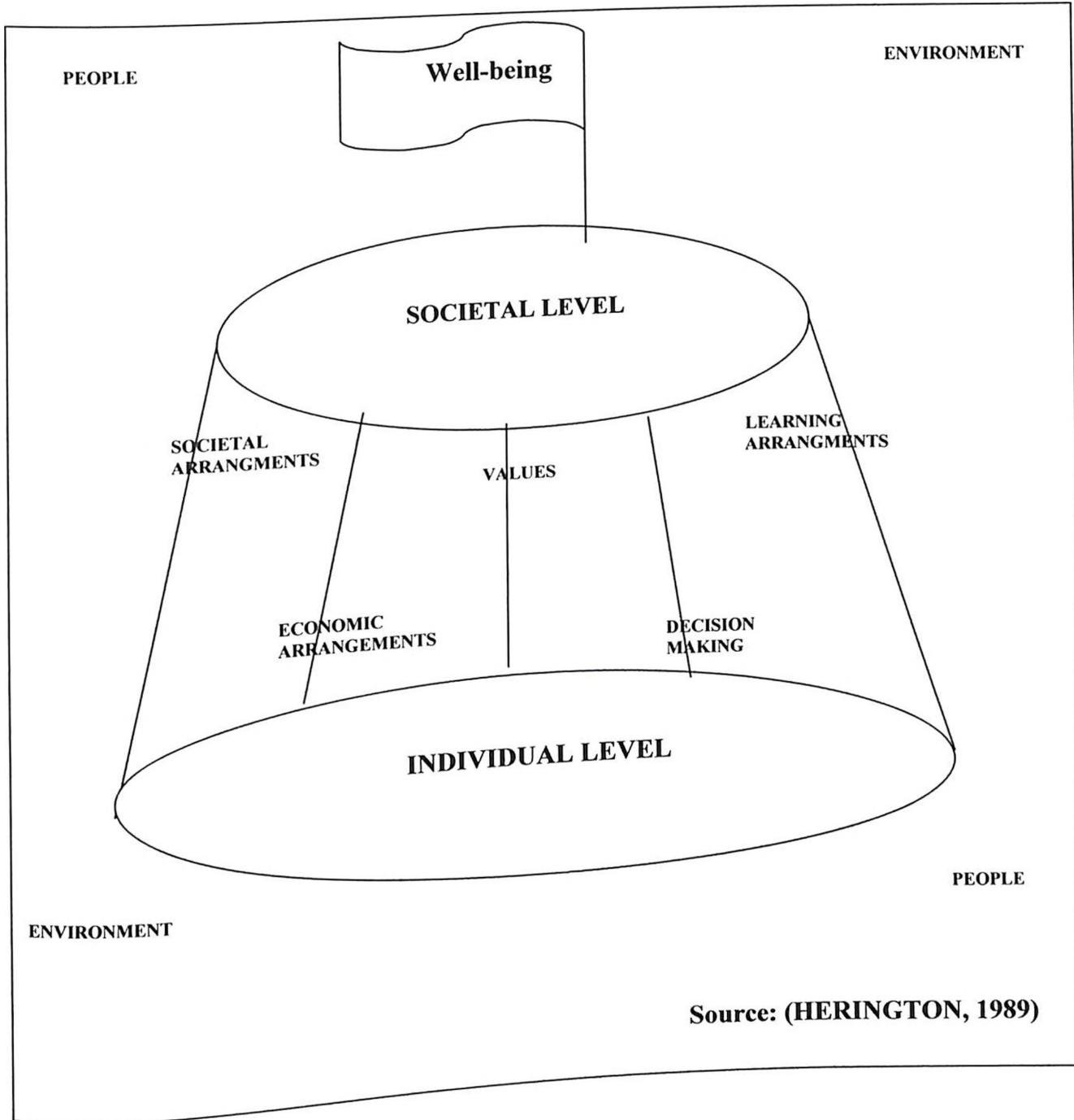
## 2.3 TOWARDS ENSURING SUSTAINED ENVIRONMENTAL QUALITY

Amidst all discussions about what the term sustainable development actually means and what it implies, especially when used in the context of urban development, it's worth recalling two key points; on one hand, the goal of sustainable development is to “.... meet the needs of the present without compromising the ability of the future generations to meet their own need.”

For any development effort to be sustainable, it requires incorporating the principle of integration (UNEP). This essentially means “----- bringing parts into the whole”. The question however is, “what is to be integrated?” This depends on the theme and context. For instance in environment management, there is need to integrate relationships between society and environment. In this case societal needs for development and advancement should not compromise environmental conservation. On the other hand preservation should not be seen as an obstacle towards modernizing the people's way of life.

Integration also calls for multi-sectoral approach to environmental concerns, if at all to achieve minimum levels of sustainability. This interaction is as illustrated below (Herrington, 1989).

**FIGURE 2.0 INTERACTION BETWEEN PEOPLE AND ENVIRONMENT.**



The above interactions can be at different scales like individual, family, community, regional, national and international. In as much as the people perceive the need to contain environmental pollution, the process of taking

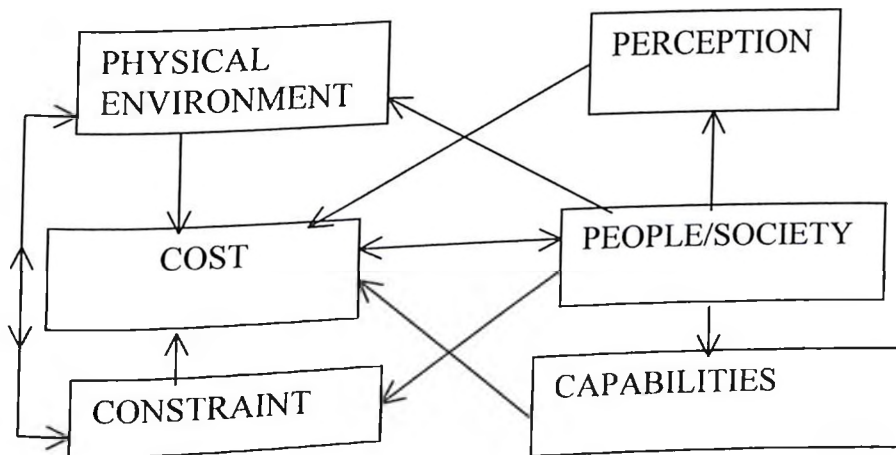


decisive action is usually hindered by various issues such as; Budgetary constraints and the need to increase housing stock.

The society functions at collective levels of consideration such as; Values, decision-making, Economic arrangements, social arrangements, and learning arrangements are recognized.

Interaction of these considerations are illustrated below;

**Diagram 2.1 Combined framework showing people – environment interactions at different scales.**



Source: Author: (June 2005).

From the diagram, it is clear that physical environment is affected by many variables ranging from perceptions to capabilities. Campaigns to address environmental degradation phenomenon must therefore address these issues if they are to be successful.

In conclusion, and as highlighted in the proceeding sections, issues of environmental impact assessment, adoption of cost effective technologies, public participation and understanding the concept of sustainable development play a crucial role in ensuring that urban environmental quality is not compromised. As UNEP's (2003) report on "Global environmental outlook 3" notes the growth of cities and related urban infrastructure will entail the disturbance or outright destruction of urban biodiversity on over 70% of the planets land surface by 2032!

According to Garbutt (1989) the main environmental concerns related to built environment which must therefore be recognized and addressed include; Ecological considerations, in this case biological diversity and aspects of sustainable use of resources to achieve inter and intra generational equity are addressed, as well as elements and principles of ecosystem management. For instance: -

**Social consideration;** Economic impacts of developments are addressed in the light of social cohesion or disruption. Also issues of the effects of developments in human health, immigration and/or emigration are discussed. Aspects of communication like roads opened up, closed or rerouted also form part of social consideration

**Landscape;** Under landscape, matters under consideration basically involve views either opened up or closed, visual impacts, compatibility with surroundings and amenity potential or otherwise or proposed developments.

**Land uses, including;** the effect of proposal on current land uses and land potentials in the project are, and also on the surrounding land uses and land use potentials.

**Water;** The sources in terms of quantity and quality are considered for example rivers, springs, lakes and underground water. Also not left out are the drainage patterns of the subject area.

In summary therefore it is the above concerns and considerations that form the basis of the study.

## **2.4 NEW DAWN OF ENVIRONMENTAL CONCERNS**

After addressing various principles of urban environmental management and the whole concept of sustainable development, probably the next question is; what are the new approaches to address these intricate and ever changing environmental problems?

To address this question, it's important to note that most developing countries, Kenya not being exceptional is experiencing a new dawn in terms

of dealing with environmental issues especially in urban areas. This new way of addressing environmental concerns has been institutionalized in Kenya through enactment of environmental management and co-ordination Act 1999 as well as with the establishment of National Environmental Management Authority (NEMA). This has in a unique way made it easy to address environmental issues in the Country. The fact that over 50% of the World's population is currently estimated to be in urban areas (United Nations Year 2000 Projections) this new scope and scale of dealing with environmental issues comes as no surprise. In Kenya, it is currently estimated that over 35% of the population dwell in urban areas. Nairobi alone accommodates over 3 million persons. These realities have brought about concern by policy makers over the changing role and functions of cities.

Most of environmental problems being experienced in Nairobi City today have been in existence and were noted some decades back. Take for instance the polluted nature of Nairobi River? In fact various surveys conducted by the United Nations, prior to the conference on the *human environment* held in Stockholm, 1972 highlight most of the recommendations reached at in matters of environment and development. Implementation of the "environmental agenda" continued to receive lukewarm attention from

policy makers. This is attested in the report prepared by the world commission on environment and development (W.C. E. D) in 1987 titled *Our common future* and also known as the Brundtland report.

This report went further to popularize concepts of sustainable development and particularly the need to bring about forms of economic growth, which are compatible with a maintained –or-improved environmental quality for present and future generations:

It is generally accepted by scholars and policy makers that the future will be predominantly urban and that the most immediate environmental concerns of most people will be urban ones – (World commission on Environment and Development- 1987: Pg. 255).

## **2.5 CONSEQUENCES OF HAPHAZARD INCREASE OF POPULATION DENSITIES IN RESIDENTIAL ESTATES**

*“Modern man is living with unsettlement”*. Cities differ and change over time so that in our assorted roles as leisure seekers, migrants, consumers, producers etc are always and constantly in the move within and between cities, while cities themselves continually change and develop in both form and function. (Barbara Ward, 1975).

It is from this diversity and dynamism of urban centers that we should seek understanding of its environmental drivers.

Increasing population density in an estate is bound to bring with it many transformations of nature, including pollution, site transformation for example river channel diversion and changes to the functioning of local ecosystems especially due to affected drainage patterns. Issues of crime, transport crisis and accelerated degradation of existing infrastructure also come about (McMichael, 1993).

If “over development” is allowed in a “leafy suburb”, it poses a problem of “eating into” vulnerable but valuable natural habitats as well as intensifying demand on environmental resources such as open spaces for recreation.

However, Banister (1992) offers hope by indicating that cities and in particular residential estates are potentially more environmentally friendly than many would think. To tap this potential, he suggests that residential planning in a city including re-zoning of existing estates must be supported by designs, which are intergrated with nature. However, it is the author’s view that lack of enforcement of planning rules and regulation is the major threat to the environment than lack of integrated approach.

To avoid the consequences of compromised environmental quality in residential estates, principles of sustainable development such as, intergenerational equality, principle of futurity, social justice, polluter pays and transfrontier responsibility must be incorporated in development planning.

### **2.5.1 EFFECTS OF HIGH DENSITY LIVING ON ENVIRONMENTAL QUALITY**

One of the most important environmental dimension of urban growth is that it increases consumption of resources in unprecedented trend leading to collapse of basic infrastructural services for instance water usage per capita tends to increase as more water is used in cleaning common areas, fire fighting and so on. Expanding the density of an estate also increases its dependency on external ecosystems, as is evidenced by increased incidences of air and water pollution not only in the affected areas but also the immediate neighbourhoods, Banister (1992).

The key question probably is, if high-density estates have the potential to be so bad, why do we continue to allow them to expand? The answer is probably because we have never developed tools sufficiently powerful to contain the growth of dynamic urban settlements, and lack of desire to control urban expansion.

A critical perusal of Kenya's urban policies in respect to enhancing environmental protection in respect to urban residential expansion, clearly shows that they are framed in the usual absolutes of physical spread of resident population, instead of in terms of urban environmental impacts. EMCA is the only single Act against many Acts which addresses issues of urban development and environment, part of the reason why its implementation is difficult is because it creates conflicts among ministries charged with the responsibilities of enforcing these 'other' Acts! It would be far much desirable if planning was done in terms of "acceptable", "standard", "average" annual pollution levels above certain set limits. Any development proposals in areas, which have attained these set limits, should not be permitted. This approach is already in operation in the U.S.A., (The World Bank report – 1994 and the UNDP report, 1992).

Moreover high population densities in a single estate are undesirable because they are associated with anti social behaviours such as delinquency and crime. It's important to note that high density in the context of this research efforts, does not necessarily equate to overcrowding. It's vital to take cognizance of the world of difference between high density living in highrise residential blocks, with low numbers of people per room and



overcrowding in low-rise shanty town (slum) development, with high numbers of people per room.

## 2.6 TOWARDS UNDERSTANDING THE “BROWN AND THE “GREEN” AGENDA/ISSUES

According to Carl et al (1995), the “brown agenda” is a concept involving a collective set of problems including pollution, environmental hazards and poverty. The brown agenda, links these problems to development, income growth and concern for green issues including integrational concerns about global warming and natural resource depletion.

The “green” issues typically involve; Inappropriate land uses, precarious housing, deficient public transportation and Road congestion.

The manifestation of the “green” issues or problems is usually depicted in terms of; Overcrowding, Noise pollution, degradation of environmentally fragile lands and occupation of the same.

It's clear therefore that solving “brown” issues requires deep understanding of the “green” issues. In this context, the brown agenda should essentially be seen from the perspective of two extremes. On one end, there is serious deficiency of shelter and serviced, and on the other extreme, are the environmental consequences of development. These issues need to be taken

seriously especially in a developing country like Kenya where challenges of “traditional” pollutants have not been tackled. Let alone the increasing cases of “advanced” pollution from the industries.

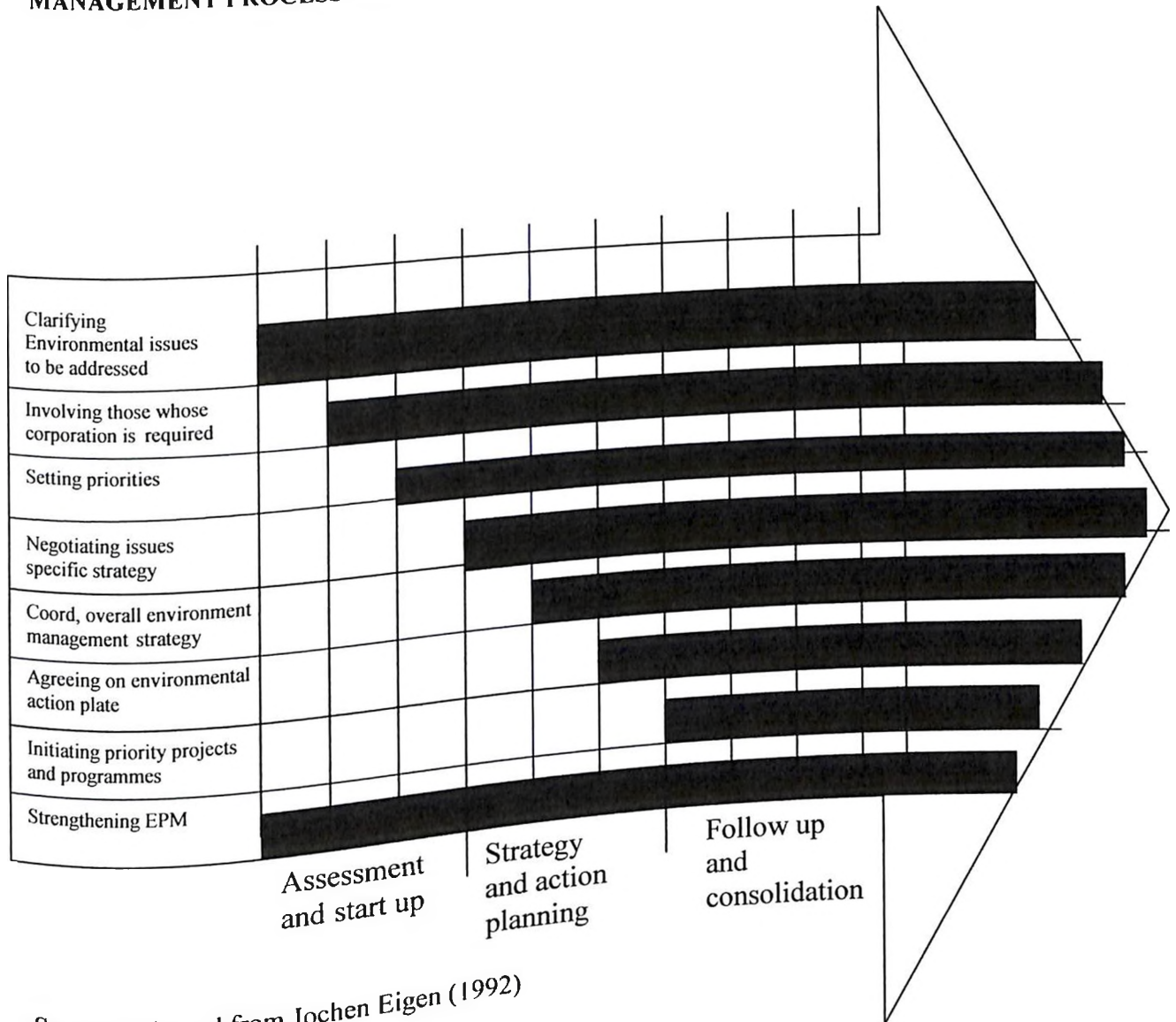
To cope with the “brown” issues, there is need to take into consideration the cities’ strengths and weaknesses in as far as environmental management issues are concerned of priority should be reinforcing the effects of environmental degradation. This should be addressed against the background of pace, scale and intensity of urbanization, the cross-media and spatial complications of environmental degradation. Other issues not to be ignored include; Urban land use and environmental inter-relationships and public and private actors involved in causing as well as solving the environmental problems (see page 35 on the diverse cast of actors).

The following figure indicates elements of environmental management and planning that need to be taken into accounting in an effort to balance the “brown” and the “green” issues.

The essence of urban environmental planning and management is to identify environmental issues before they turn into costly emergencies. Environmental Planning and Management (EPM) therefore requires strategies and actions geared towards enhancing co-operation among the

planners for example the public and the private sector. The eight elements highlighted in figure 2.1 basically address the ideal management process that can be adopted. However, it is the Authors view that initiating collaborative programmes can ensure evolvment and maturity of this EPM process.

**FIGURE 2.1 SUSTAINABLE CITIES PROGRAMME ENVIRONMENTAL PLANNING AND MANAGEMENT PROCESS**



Source: Adopted from Jochen Eigen (1992)

## **2.7 AN ATTEMPT TO JUSTIFY HIGHRISE RESIDENTIAL DEVELOPMENTS**

According to Ministry of Lands and Housing, highrise residential developments are in line with urban consolidation policy, which aims to bring about measures to promote more house building within the existing city estates/areas, to accommodate the rising number of Residents thereon. Highrise developments are seen as a means of making a saving on infrastructural costs, reducing demand on edge-of-city land, reducing travel distances (to CBD) and possibly increasing and promoting use of public transport. This is particularly so if estates, which previously enjoyed low density zoning are re-zoned to accommodate highrise developments.

The opponents of highrise buildings and especially when approved in previously “posh” estates decry the loss of valuable open space, lack of privacy, especially where highrise developments are adjacent to single storey residences, over burdening the existing infrastructure and loss of scenic views.

### **2.7.1 EFFECTS OF HIGHRISE BUILDINGS TO LOCAL HYDROLOGICAL PROCESSES**

Construction of highrise residences is frequently being associated with the replacement of natural or semi-natural soil and vegetation surfaces with

concrete, tarmac, brick etc. Rainwater is usually routed along gutters, drains, and sewers into nearby water courses. The effect of these construction activities is to reduce natural evapotranspiration losses from wet areas. The overall effect is that movement of surface water is accelerated whilst replenishment of ground water is reduced. Over time these processes culminate into observable alteration to river flow downstream – In this case, a classic example is Kirichwa Kubwa, whereby water quality is highly degraded through effluent discharges and enhanced overland flows.

#### DEGRADED WATER QUALITY

##### PLATE NO. 2.1



Source: Field Survey (June 2005)

## 2.8 THE MAIN LINKS BETWEEN HEALTH AND ENVIRONMENT

The most immediate environmental problems in the world are ill health and premature death caused by biological agents in the human environment: In water, food, air and soil.

**TABLE 2.1 A SUMMARY OF SELECTED POLLUTANTS AND THEIR EFFECTS ON HUMAN HEALTH**

Pollutant	Reaction to exposure	Effect
<b>1. Traditional ('reducing') pollutants from coal/heavy oil combustion</b>		
Smoke/Suspended particulates (some contribution from diesel traffic too)	<p>Can penetrate lungs: some retained; possible long-term effects.</p> <p>May also irritate bronchi</p> <p>Readily absorbed on inhalation; irritation of bronchi, with possibility of bronchospasm.</p> <p>Hygroscopic; highly irritant if impacted in upper respiratory tract. Acid absorbed on other fine particles may penetrate further to promote bronchospasm</p>	<p><b>LONDON SMOG COMPLEX</b></p> <p>Short term effects; sudden increases in deaths, in hospital admissions and in illness among bronchitic patients.</p> <p>Temporary reductions in lung function (patients and some others).</p> <p>Long term effects; increased frequency of respiratory infections (children).</p> <p>Increased prevalence of respiratory symptoms (adults and children ) Higher death rates from bronchitis in polluted areas.</p> <p>Possible carcinogenic effects; may take some parting the higher incidence of lung cancer in urban areas</p>
Sulphur dioxide		
Sulphuric acid (Mainly a secondary pollutant formed from sulphur dioxide in air).		
<b>2. Photochemical ('oxidising') pollutants from traffic or other hydrocarbon emissions</b>		
Hydrocarbons (volatile; petrol )	<p>Non toxic at moderate concentrations.</p> <p>Capable of combining with haemoglobin in blood but no apparent effect in humans.</p> <p>Neither gas is very soluble; some irritation of bronchi but can penetrate lungs to cause oedema at high concentrations. Urban concentrations too low for such effects but evidence of reduced resistance to infections in animals. Eye irritation odour</p>	<p><b>LOS ANGELES SMOG COMPLEX</b></p> <p>Short term effects; primarily eye irritation, reduced athletic performance. Possibly small changes in deaths, hospital admissions.</p> <p>Longer term effect; increased onsets on respiratory illness (children) increased asthma attacks (adults). No clear indication of increased bronchitis.</p>
Nitric oxide		
Nitrogen dioxide and ozone (Mainly secondary pollutants formed in photochemical reactions).		
Aldehydes, other partial oxidation products, peroxyacetylnitrate		
<b>3. Others from traffic</b>		
Carbon monoxide (other sources contribute – smoking an important one	<p>Combines with hemoglobin in blood, reducing oxygen carrying capacity.</p>	<p>Possible effects of central nervous system (reversible unless concentrations are very high). Some evidence of effects on perception and performance of fine tasks at moderate concentration.</p>

<p>Lead (some industrial sources contribute to air lead; human intake often dominated by lead in food and drink.</p>	<p>Taken up in blood, distributed to soft tissues and sometimes to bone.</p>	<p>Possible effects on central nervous system (longer time scale than in case of CO and not necessarily reversible). Indications of neuropsychological effects on children within overall, environmental exposure range, but role of traffic lead uncertain.</p>
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Source: Adapted from J. E. Hardoy (1992)

## **SOME URBAN AIR POLLUTANTS AND THEIR EFFECTS ON HEALTH**

### **Factors which influence the public's level of risk from exposure to air pollution**

The extent to which air pollution poses a risk to the general public depends on a number of factors including:

The hazard of the compound released or of derivatives formed by chemical processes occurring within the air (for instance the formation of secondary pollutants such as ozone and acid sulphates) – including the stability and persistence of the agent within the environment and its ability to penetrate indoors:

The amount of pollutant released and the height at which it is released: tall chimney stacks tend to protect local people but disperse the pollutant over a wider area.

The atmospheric conditions leading to dilution and dispersal of the pollutant, including worst – case inversion conditions and geographical considerations: local topographical and climatic conditions can exacerbate the situation as in Mexico City where thermal inversions trap pollutants within the valley in which the City is located.

The person's distance from the source, the composition, activities and location of the general public in relation to the time of release (for example, they might be exercising; children might be present).

Source: Adapted from G. Houghton and C. Hunter (1994)

### **2.8.1 HIGHRISE RESIDENTIAL DEVELOPMENTS AND THEIR EFFECTS ON HEALTH AND SOCIAL WELL BEING OF RESIDENTS**

Neighbourhoods and shelters are made more pleasant, safe and vulnerable to their inhabitants because of other large and complex range of Environmental factors such as sufficient indoor and outdoor space, access to desired services and facilities, safe play for children, minimum noise and recreation facilities. However, it's difficult to be precise on what is needed because the interaction between environmental factors and human well-being is poorly understood.



A study conducted by Ekblad et al (1991) suggests the need to focus on three aspects of physical environment, when considering its effects on people's psychosocial health that is:-

The dweller level of satisfaction with the house and its neighbourhood and its location within the urban area.

The dwellings physical structure (like the amount of space, state of repair, facilities – which may influence the level of privacy).

The Neighbourhood (including the quality of services and facilities and the level of security).

Many characteristics of urban neighbourhoods which are not easily identified or defined may have important influences on each individual level of satisfaction and on the incidence of crime, vandalism and interpersonal violence.

Built environment also influences child development. Poor physical environments can inhibit or permanently damage a child's physical and mental development.

High-rise buildings have contributed greatly to deficiencies in provision for play grounds (instead they struggle to provide parking areas which children compete for with cars for play). This denies the children an opportunity for informal learning from their peers. The needs for older children are also compromised (i.e. teenagers). Highrise developments have denied them access to indoor and outdoor space for games, sports and socializing. This is in spite of the fact that the importance of safe and stimulating play in for instance, the evolution of a child's motor skills and communication skills, problem solving, logical thinking and emotional development is highly recognized in health circles.

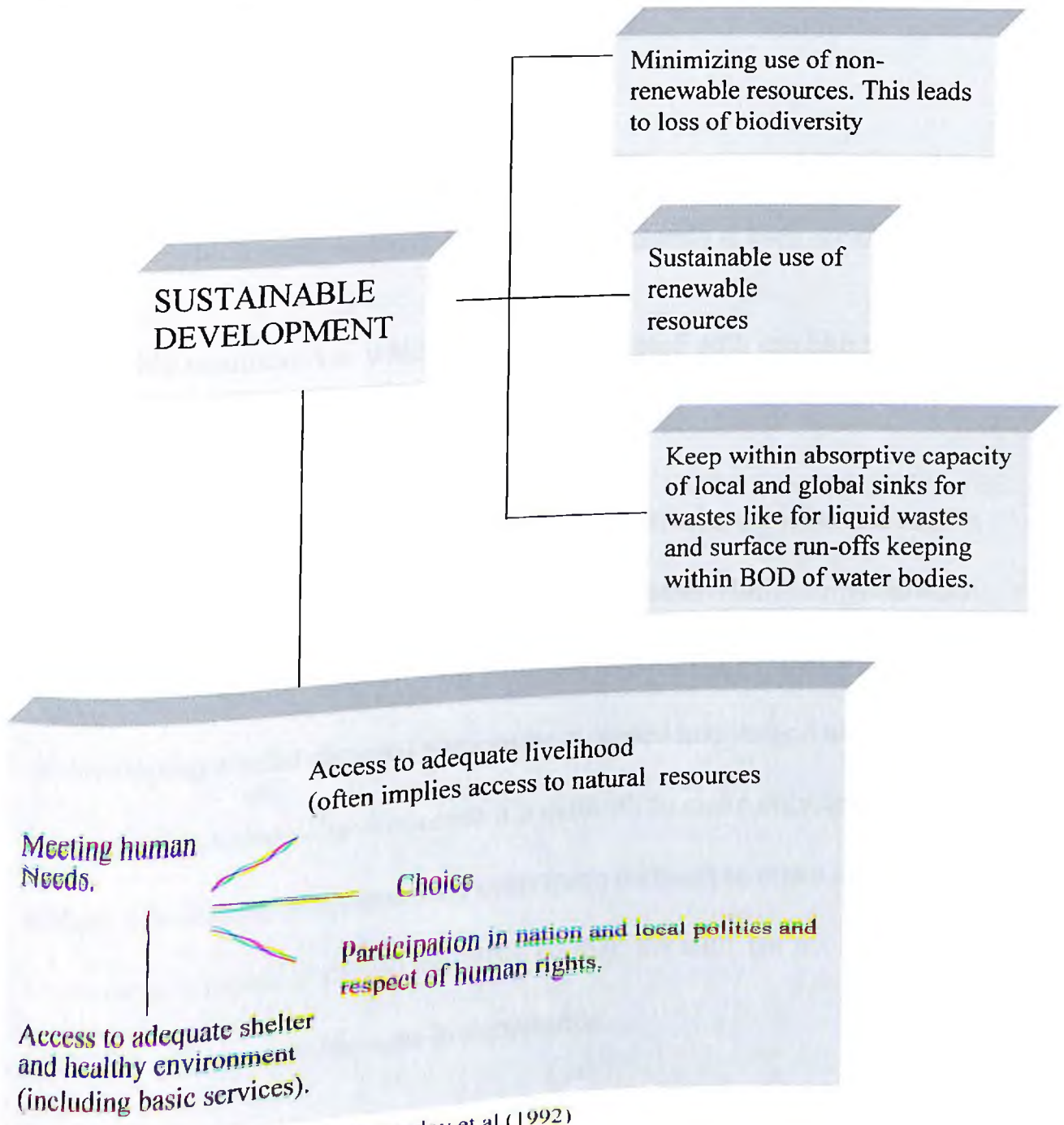
Parents and teachers are now increasingly concerned about the obesity phenomenon among children. It's important to state here that precise linkages between different elements of the physical environment and health are difficult to ascertain and to separate from other influences.

## **2.9 THE CONCEPT OF SUSTAINABLE DEVELOPMENT**

Discussions of economic social and cultural sustainability are full of ambiguities which lead to the suggestion that sustainable component can only be associated with the utilization of natural resources.

Although there are powerful synergies between various development goals and achievement of sustainable development, crucial trade offs are necessary if positive results are to be obtained. The diagram below summarizes the components of sustainable development.

**DIAGRAM 3.1 COMPONENTS OF SUSTAINABLE DEVELOPMENT**



Source: adopted from Jorge E. Hardoy et al (1992)

### 2.9.1 SUSTAINABLE DEVELOPMENT AND ENVIRONMENT

The sustainable component of development requires that there is no depletion of environmental capital. Environmental capital can be classified into 3 broad categories: -

The natural sink i.e. the natural systems, which absorbs or break down human wastes.

The finite stock of non-renewable resources, like the natural species of flora and fauna which once destroyed cannot be replaced i.e. they are depleted.

Renewable resources i.e. which cannot be depleted with use like solar power.

The term sustainable can be applied both for particular projects and also in reference to larger systems. For instance simple interrelationships between specific development activities for example expanding a piped water supply or developing a solid disposal site can be assessed and judged using the criterion of sustainability. However it's difficult to make only one part of the system sustainable. Moreover, it's even more difficult to make all activities sustainable. Emphasis should therefore be that, the sum (or net effect) of the activities within a specific area is sustainable.

## CONCLUSION

Re-zoning a previously low-density estate like Kileleshwa to or high density as is the case currently, calls for scrutiny and assessment of sustainability of projected developments, in respect of the local environment. To bring about practical environment development nexus. It is necessary that focus on the interaction between human activities and the natural environment form the basic consideration.

The key issues which deserve objective redress prior to adopting a re-zoning policy which increases the density of an estate include:

Practicability of the systems to be adopted for management of fragile ecosystems like riparian sections. These sections are endangered by the high likelihood of encroachment due to increased demand for land as population within the estate increase.

Infrastructural crisis - At one point, this is inevitable unless precautionary measures are taken to boost the operational efficiency and expansion.

Holistic view of environmental transition - This is necessary, so that various issues such as solid and liquid waste management, air pollution, etc can be addressed, in the light of expected change in population density.

As literature review shows, sustainable development cannot be achieved unless proper environmental management systems are put in place. This is because land as a resource is finite and the functional capacity of ecosystems is affected by human activities. Environmental management for sustainable development therefore requires that development activities must be kept within the limit of the local environment. Usually, environmental quality will be compromised when these activities exceed sustainable limits.

## CHAPTER THREE

### 3.0 SAFEGUARDING ENVIRONMENTAL QUALITY VERSUS DENSIFICATION OF KILELESHWA ESTATE:

#### 3.1 INTRODUCTION

This chapter seeks to demonstrate the degraded state of infrastructure and services in Kileleshwa Estate and make an effort to link the same to highrise developments in the City of Nairobi in General. The observations backed by responses from interviews with various categories of residents (i.e.) those occupying recently completed highrise building, and those still living in the old type single storey residences), the developers and the Nairobi City Council forward planning officials, will be utilized in shedding light to the extent of how environmental quality has been compromised in this estate, as a direct consequence of highrise developments.

The variables considered in this study are pollution (in all its forms), state of road network, adherence to planning regulations, crime rates within the estate, power supply, effectiveness of sewer services. Critical examination of these variables will help in testing the hypothesis of the study.

Although most of the highrise developments in this estate are approved by the city council of Nairobi, it was noted that only a few had received

development approvals from the National Environment Management Authority (NEMA). The researcher visited 15 No. randomly selected upcoming developments and only Seven (7 No.) had conducted Environmental Impact Assessment (E.I.A) and obtained approvals from NEMA.

However, this study limits itself to: air and water pollution, road congestion, degradation of environmentally fragile sections of the estate, and increased crime rate as indicators of environmental quality.

The main objectives of this study are to identify the factors aggravating environmental degradation in Kileleshwa estate, and to establish key environmental impacts being experienced as a result of these factors.

The study will also endeavour to establish whether rezoning of Kileleshwa estate was a planning accident engineered by stakeholders lacking in foresight and understanding of sustainable development concept. Kileleshwa being one of the oldest, high-income estates (established since 1940's by colonialists), required cautious replanning before increasing the density of its population to the magnitude currently being experienced.



It is well known in planning circles that, availability of sufficient basic infrastructure viz a viz population projections form major considerations in replanning of estates.

The objectives of this study will be achieved on practical basis by using the information obtained from the field survey to determine the state of Environmental quality in the estate. The information will be collected by use of interviews and questionnaires administered to randomly selected respondents.

A survey map of the whole estate indicating the specific location of plots, road networks and sewer networks was used to select randomly which properties to visit with a view to arrange for an interview and/or administer the questionnaire. Further information was sought through discussions with planning officials at City Hall, Provincial Director of Environment (Nairobi Province) and National Environmental Management Authority (NEMA) officials.

The main concern in this Chapter is therefore to gather information on environmental quality and it' s relationship with the infrastructure services giving due consideration to the information obtained from primary and secondary data.

## **3.2 RESEARCH METHODOLOGY**

### **3.2.1 RESEARCH DESIGN**

This research effort is a survey, which investigates the impact of highrise residential developments in Kileleshwa estate. These developments are perceived to have contributed to the negative effect on environmental quality within the estate. The survey collected data in respect to various infrastructural services within the estate as indicators of environmental quality. This approach was based on the fact that critical and most immediate environmental problems facing residential estates within the City derive from inadequate water, sanitation, drainage, air pollution and poor solid waste management. These problems have always been associated with low cost Residential estates but not a high-income estate like Kileleshwa.

These problems are also related to what may be considered more particularly the 'green' and the 'social' issues of urban areas, such as degradation of environmentally fragile lands, the occupation of areas prone to flooding (along riparian land), overcrowding, noise pollution among other problems.

The survey took cognizance of the fact that environmental quality in an estate is determined largely by the interaction of numerous public, private and household actors who have an important effect on environmental

problems and their solutions. This survey sought to relate environmental quality to observed operational deficiencies of various infrastructural services in the estate. This was done in line with the guidelines and standards established in the conceptual framework in Chapter two of this study.

The survey benefited from the experiences of residents in terms of sufficiency and reliability of infrastructural services. Information was also sought from the City Council regarding the factors, which were considered in approving the densification process. Other considerations included the state of solid waste management within the estate and the willingness of residents to participate on environmental matters affecting the estate.

### **3.3 POPULATION AND SAMPLE**

The population of this study mainly comprised of Kileleshwa estate residents. Selected number of environmental experts and planning officials were also considered. The properties considered were as recorded by Nairobi City Council – water and sewerage department.

The targeted properties were those developed with single storey residences and which were owner occupied, and those developed with highrise units and either rented out or owner occupied.

In the case of single storey residences, emphasis was put on owner occupied categories for the purposes of enabling the researcher develop a balanced opinion from responses. Only those property owners who are not living in Highrise apartment blocks could be relied on to give a reliable insight.

The author did not see the need of categorizing occupiers of highrise blocks into tenants and owners, they are deemed to be experiencing the same effects of environmental degradation for example lack of well co-ordinated solid waste disposal systems, blockage and sporadic power supply due to overloading.

Thirty (30 No.) occupants of randomly selected highrise blocks were selected for administering the questionnaire and engage in discussions. The Residential Blocks were randomly selected as well as the residents to participate in the study. In the case of owner-occupier residences only 15 properties were considered. Due to the time constraint, Thirty (30 No.) occupants of highrise blocks and fifteen (15 No.) owners and occupiers of single storey residences were considered representative of the target

population, a sample consisting of less than 30 and 15 respectively would not represent the characteristics of the population in question.

*This study assumes that the highrise buildings in Kileleshwa are properly designed and approved and therefore the malfunctioning of infrastructure services is as a result of un-envisaged phenomenon by the planners. This is because the approval requirements were found to consider such aspects as availability of basic infrastructural services as well as detailed environmental impact assessment.*

### **3.4 INSTRUMENTATION**

For the purpose of this study, data were collected by use of questionnaires and interviews. Both methods were used in collecting data within the case study area both methods were also used to collect data from planners, environmental experts and developers. Validity and clarity of questionnaires to respondents was tested, including their ability to enable the author meet the study objectives.

Adopted themes in the questionnaires basically revolved around the stated research problem as well as issues arising from the conceptual framework of the study.

In particular the questionnaires addressed matters of environmental quality and performance of basic infrastructure services in the estate.

Some respondents did not complete the questionnaires in time, however a combination of information obtained from the answered questionnaires and results from conducted personal interviews, was considered sufficient to meet the study objectives.

To facilitate wide coverage of the study area within the shortest time possible, the researcher engaged two assistants, who were very helpful in administering the questionnaires and explaining to respondents the importance of their participation to the overall success of the research effort.

In regard to secondary data, much of it was obtained from the Nairobi City Council, National Environmental Management Authority, offices (and in particular the Public complaints committee section). Also further information was obtained from provincial environmental offices at Nyayo House. These data enabled the researcher to know whether there have been any complaints from residents of the study area and generally the expected planning and development standards.

Interviews and discussions with various persons also generated a lot of secondary data, which was useful to the study.

### **3.5 DATA COLLECTION**

Questionnaires, scheduled and un-scheduled informal discussions and studying relevant material were the main methods used to collect data.

The author ensured that questionnaires were accompanied by cover letter for the purpose of explaining to the respondents briefly about the significance of the study and assuring them that their responses would be utilized for the purpose of research only and that confidentiality would be observed.

Interviews and discussions with planners were useful in obtaining information about the rationale behind increasing the density of Kileleshwa estate by approving highrise developments; through interviews and discussions, the researcher was also able to know the main concerns about the whole issue of 'the Kileleshwa phenomena' and their opinion on what should be the way forward.

Also, interviews and discussions enabled most respondents to open up, as some of them were uncomfortable putting down their responses in writing. Others especially the developers were simply un-cooperative.

While collecting the data, the researcher concentrated in several aspects, which he considered important for the purposes of the study. They include; insecurity issues which residents are exposed to, diversion of river courses, illegal and unplanned developments on riparian land, efficiency or otherwise of solid waste disposal within the estate, repair and maintenance condition of road network within the estate, traffic congestion, loss of privacy in respect of single storey residents, aspects of water pollution such as directing effluents into the river and dumping of solid wastes into the river.

The questionnaires were administered in such a way that the first attempt was aimed at testing the respondents understanding of the contents and context of the questionnaire. The second meeting was arranged within Two (2 No.) and Four (4 No.) days after the first meeting. This was useful and important because the researcher wanted to ensure that all the necessary information had been collected and that the respondents answered all the questions to the best of their ability.

### **3.6 DATA ANALYSIS**

Data collected for the purpose of this study were analyzed with the aim of addressing the stated objectives. Descriptive and inferential statistics were used.



By use of frequency distributions, the researcher was able to establish the most critical urban environmental concerns including those problems associated to access to basic environmental infrastructure and services and pollution, loss or destruction of natural resources.

Data presentation for this study will also include photo displays capturing various indicators of environmental degradation in the estate, hence helping form relationships among various study variables and thereby helping to explain phenomena more deeply and exhaustively.

In summary, therefore data from field survey will basically address; infrastructural service provision, Land and ecosystem degradation and Solid waste management.

The categories above will ideally enable the researcher deal with the raw data and make comparisons and look for similarities and differences among the various concepts and statements obtained from the respondents.

### 3.7 FINDINGS FROM FIELD SURVEY

#### 3.7.1 LACK OF PUBLIC PARTICIPATION ON ENVIRONMENTAL MATTERS

Most of the highrise blocks and single storey residences considered for the purpose of this study exhibited some of the prevalent environmental concerns within the estate.

It was noted that most of the respondents had a general idea of the environmental issues affecting the estate, but lacked the willingness to participate in forums organized to address these issues. For instance all the 45 sampled respondents were asked about their willingness to participate in public hearings organized to address environmental issues in the estate. Only Twenty-seven (27 No.) i.e. 60% expressed their willingness to participate.

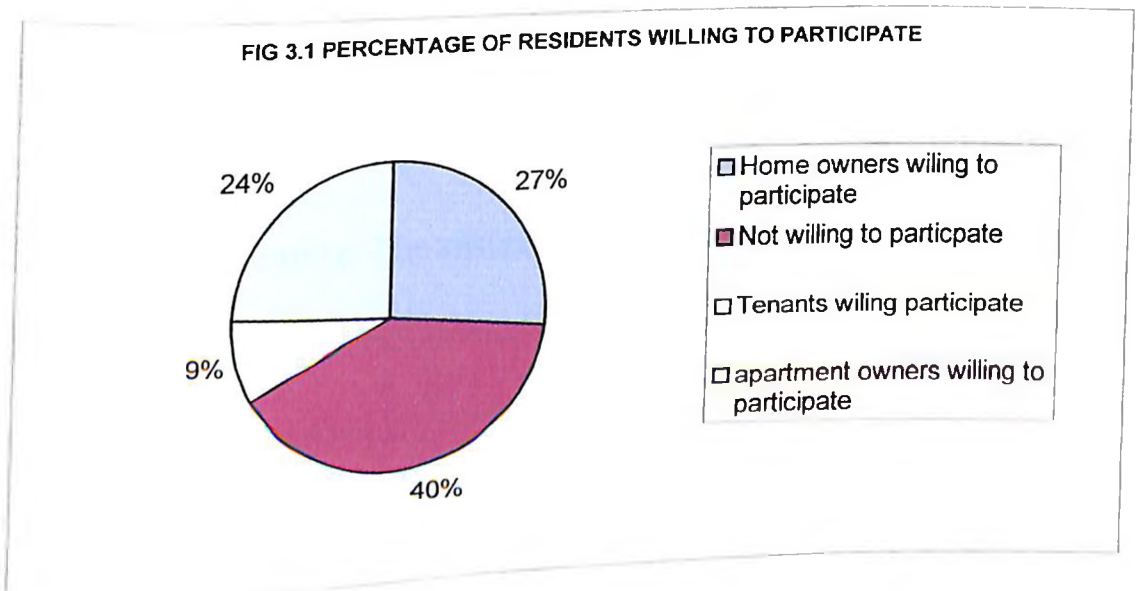
It was further noted that out of these Twenty-seven (27 No.), Twelve (12 No.) were owners of single residences while 15 No. were occupants of apartment blocks. Given that only 15 No. of single storey owners were interviewed, it follows that 80% were willing to participate and only 50% of the apartment block occupants were willing.

It is interesting to note that of the 15 No. Apartment block occupants willing to participate, 11 No. were apartment owners and 4 No. were tenants.

This means that the tenants felt less obliged to be concerned about environmental issues affecting the estate.

The pie chart below shows the overall willingness to participate among residents regardless of their residence status.

#### OVERALL WILLINGNESS TO PARTICIPATE IN PUBLIC FORUM TO DISCUSS ENVIRONMENTAL ISSUES



It is clear from the pie chart that a large number of residents have no willingness to participate. The reasons given range from lack of faith in government officials to implement their resolutions to lack of time due to work commitment and poor scheduling of such meetings.

### 3.7.2 LAND AND ECOSYSTEM DEGRADATION

Efforts were made to access and assess riparian sections within the estate.

The researcher concentrated on sections along Kirichwa Kubwa River from the Junction of Githunguri road and Tebere crescent all the way to sections below Suguta Road/Kikambala Road.

It was observed that some of highrise developments had spilled over to the riparian section. Although this was a clear case of flouted environmental rules and regulations, the developers insisted they had legal titles to the plots they were developing. The researcher however managed to obtain letters from the National Environmental Management Authority stopping one such construction (see annex).

Cases of diverted and obstructed river courses were observed as well as the destruction of natural vegetation to pave way for both highrise constructions. (See plate No. 1 and 3.2).

**DESTRUCTION OF FRAGILE ECOSYSTEMS AND DUMPING OF WASTES ONTO THE RIVER**

**PLATE NO. 3.1**



Source: Field Survey (June 2005)

**A VIEW OF A COMMON SCENE IN MOST DEVELOPMENT SITES. NOTE THE DIVERTED RIVER COURSE**

**PLATE NO. 3.2**

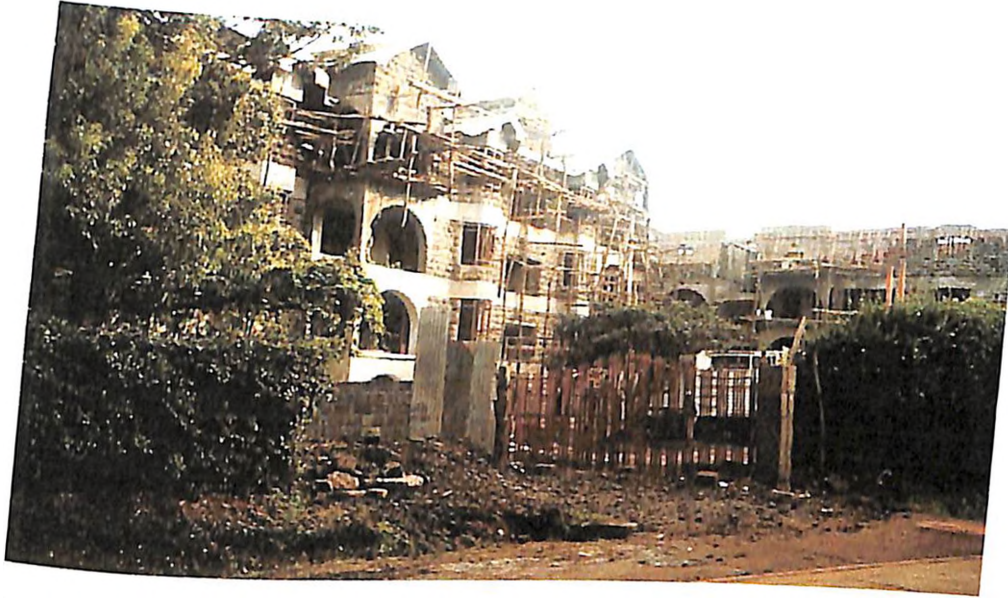


Source: Field Survey (June 2005)

These sensitive areas were clearly being exhausted and in their place concrete villages were coming up.

**CONSTRUCTION WORKS IN PROGRESS WITHIN THE ESTATE**

**PLATE NO.3.3**



Source: Field Survey (June 2005)

Also noted along these sections was that the apartments could not empty their effluents into the main sewer line by use of gravity as it was at a higher elevation. The researcher managed to observe effluents being directed onto Kirichwa Kubwa River.

Informal discussions with the developers revealed that they had managed to convince the Nairobi City Council Officials that they would force the effluents onto the main sewer using electric pumps.

However this is impractical and facts on the ground reveal that none of those developments have managed to do so. Also observed was that, effluent pipes from these developments were highly concealed raising questions of their functional acceptability. Further discussions with occupants revealed that most of them experienced problems of blocked sewer pipes on a regular basis. Also no pumps or pipes were visible at the time of our field survey, meaning that underground pipes were directing raw sewage into the river. This means that the Nairobi City Council forward planning officials were compromised and therefore corrupt.

### **3.7.3 INFRASTRUCTURAL SERVICES**

Performance of infrastructural services is a strong indicator of environmental quality. The study concentrated on the following, as indicators of environmental quality; Road network, water supply and solid waste management.

#### **3.7.3.1 ROAD NETWORK**

The road network in the estate was observed to be in very poor state of repair and maintenance. Potholes, tattered road ends, missing kerbs were all visible. Although the problem was common basically on all the sections in the estates, the following roads were noted to be seriously affected: -

Githunguri Road, Kandara Road, Gichugu Road, Olekejuado Road and sections of Vihiga, Suguta and Gatundu Road. It was noted that construction activities were concentrated more on these sections. (Refer to Plate No. 3.4)

**A VIEW OF TATTERED ROAD SECTION. THIS IS A COMMON FEATURE WITHIN KILELESHWA ESTATE**

**PLATE NO. 3.4**



Source: Field Survey (June 2005)

Our study established that most residents in this estate utilize own means of transport. To link this problem to highrise apartments, the researcher asked apartment block occupants what was their means of commuting to and from their work places and whether they owned cars or not.

It's important to note that prior to approval of highrise developments, each residence could have an average of two to three cars. (An observation made on single storey residences). This means that if the whole of Kileleshwa



estate has 400 No.  $\frac{1}{2}$  acre plots (estimated), then the estate had a traffic volume within the range of 800 to 1200. However, with the new developments coming up, similar  $\frac{1}{2}$  acre plot is currently being developed with at least two blocks of 5-7 storey highrise apartments. This translates to approximately 42 No. 'new homes' being created per plot! If each occupant has a car, it means that we are moving from an average of 2-3 cars per plot to over 42 cars per plot, not forgetting that, some residents have more than one car! This is an enormous burden to road network in the estate. It actually means that the traffic volume has increased 17 times, but the road network remains the same without widening i.e. create an entrance or improving in any significant way to ensure frequent road maintenance to address the increased wear and tear of the road surfaces.

**A VIEW OF COMPLETE AND OCCUPIED HIGHRISE DEVELOPMENTS. THEY HAVE CONTRIBUTED GREATLY TO TRAFFIC CONGESTION IN THE ESTATE**

**PLATE NO. 3.5**

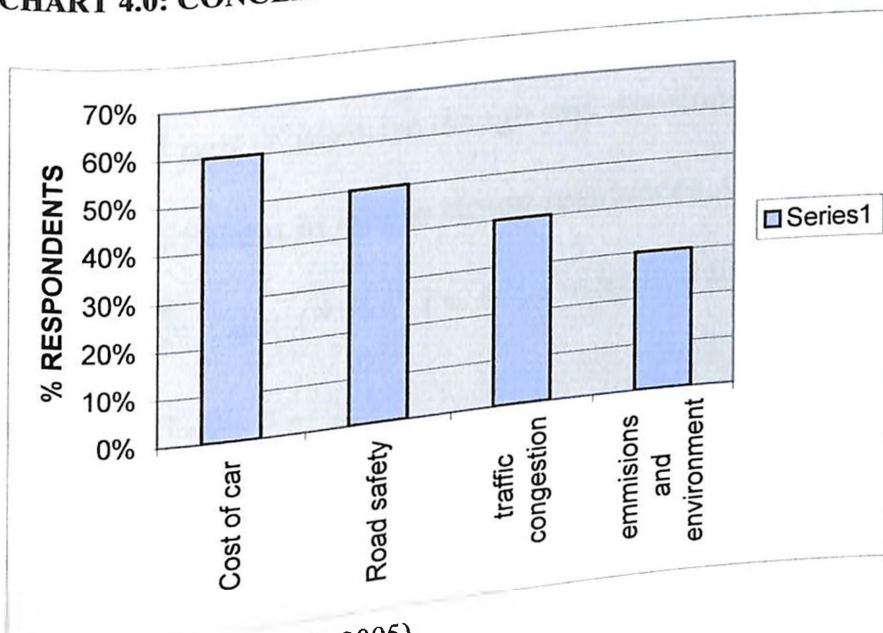


Source: Field Survey (June 2005)

This culminates to increased road congestion, especially during rush hours, air pollution, particularly from car fumes and noise pollution basically from hooting and screeching. In our conceptual framework, it was noted that transport is the main source of urban air pollution. It was further noted that pollution per vehicle increases as the speed decreases.

Transport concerns among Kileleshwa residents were however not environmental oriented. Cars are mainly purchased for status and convenience. Most residents felt that an environmental approach to reducing traffic congestion will likely to be less effective. The bar chart below captures the concerns of Kileleshwa residents where car ownership is concerned.

**CHART 4.0: CONCERNS IN PURCHASING A CAR AMONG RESIDENTS**



Source: Field survey (June 2005)

From the bar graph, it's obvious that most residents attach little significance to environmental issues where transport is concerned. This is in spite of the fact that a typical morning on Mander Road between 7.00 am to 8.30 am is a kind of technological Armageddon as vehicles flow at an average of 5-10 kph towards the city centre (Source: Author)

### 3.7.3.2 WATER SUPPLY

Although it was expected that highrise apartments would be experiencing severe water shortages this was not the case. Of the Thirty (30 No.) Apartment blocks visited, only Four (4 No.) had experienced water shortage within the last 3 months prior to our survey.

The consistency in water supply within highrise developments can be attributed to underground and rooftop storage tanks, which were noted to be an integral part of highrise design and development. The observation was however different in single storey residences. Out of the Fifteen (15 No.) respondents, Nine (9 No.) i.e. 60% indicated that they experienced frequent water shortage.

Thirteen (13 No.) of single storey home owners i.e. 86.7% blamed highrise block developers of illegal water connections, blocking the supply network as well as the use of powerful pumps to interfere with natural water flow.

The reason they gave for this was that the developers had to meet the extra demand caused by large number of occupants on their plots. Our survey revealed that apart from high consumption demands, a lot of water was also being used to clean paved areas like parking and common areas. This is due to the fact that unlike the single storey cases where most of the compound was planted with grass and flowers, compounds in highrise developments were either cabro paved or tarmac. These areas are cleaned at least once a day and the residents also clean their cars at least once within the compound.

Environmentalists and forward planners in Nairobi City Council supported the idea that there is a looming water crisis in Kileleshwa if nothing is done to address issues of illegal connections and unorthodox pumping techniques. Experts cited Kilimani estate, which has had a perennial water shortage problem and reckoned that this is likely to be seen in Kileleshwa.

#### **3.7.4 SOLID WASTE MANAGEMENT**

Necessary facilities such as disposal bins and services for solid waste management to support an adequate quality of life were not available in the estate. Solid waste collection services are provided by private garbage collectors. Forty (40 No.) of the Forty-five (45 No.) residents interviewed indicated that garbage collection either from the City council or private

company was unreliable. This was evident by the many un-collected garbage heaps from the gates of some residences.

The problem of poor solid waste management was also manifested in the growing number of garbage heaps within the estates undeveloped plots (see plate No. 3.6).

**A VIEW OF THE GARBAGE HEAPS ON OPEN/VACANT SITES**

**PLATE NO. 3.6**



Source: Field Survey (June 2005)

Although most residents were aware of environmental dangers posed by poor handling of solid wastes, they hoped that the government would do something about it. It's worth noting that poor solid management was a major issue in highrise blocks and not with single storey residences. Of the Thirty (30 No.) highrise apartments visited, only 8 No. had incinerators. The rest relied on the services of private garbage collector. Refuse collection was

done once or twice a week and the frequency in collection could not cope with the rate of solid waste generation in these blocks. Our spot check in between the collection dates revealed that most of the solid litter had scattered within the compound while others were dumped by the roadside. Further confirmation of poor solid waste management within the estate is evidenced by presence of garbage dumps along the riverbanks.

### **SOLID WASTE ALONG RIVER BANKS**

**PLATE NO. 3.7**



Source: Field survey (June 2005).

As aforementioned most single storey residences seemed to have well organized solid waste management programmes within the compound. The gardeners kept the compound clean trimmed the flowers and hedges on a daily basis. Out of the 15 No. residences visited, 13 had well organized systems (private arrangements) to keep their compounds clean.

Relevant secondary data reveals that solid waste is not only harmful in blocking sewer and water systems, but most of the wastes turn toxic over time due to oxidation process and exposure to elements, inevitably, human contact to these wastes whether inhaled, ingested or absorbed through the skin – may result in ‘short term acute effects, long term irreversible chronic diseases and in some cases genetic mutations affecting future generations may arise. Cooper (1992).

A large quantity of solid wastes in the estate were noted to be of plastic and polythene material which means that their contribution to environmental degradation in the estate is likely to be long term as they are not easily degradable.

It is the author’s view that children raised in highrise blocks are likely to be most affected by poor solid waste management. This is because they lack enough space to play and therefore are likely to utilize open spaces, where these wastes are dumped as their playing fields. Studies conducted by Kreimer and Munasinge, 1991, Bernstein, 1992 and Clarke 1991, support this observation.

Residents of highrise apartments (especially the tenants) also lacked proper systems where management of solid waste is concerned. Only 3% of those interviewed felt that they had a personal responsibility to ensure that garbage was properly disposed. 97% felt that they pay for these services and so long as garbage is outside their house and on designated areas, the rest was up to the garbage collector. Further enquiries revealed that most residents did not take the issue of garbage collection seriously as they spent most of their time at work places. This demonstrated a clear case of conflict between common versus personal responsibilities.

Home owners on the other hand, felt that they had 'personal responsibilities' to keep the compound clean. 75% of those interviewed had at one particular time or another taken an initiative to clean the road reserves outside their residences. This commitment to cleanliness was totally lacking from highrise occupants and especially the tenants.

### **3.8 CONCLUSION**

This chapter has sought to answer the objectives of the study by critically looking into environmental concerns brought about by approval of highrise developments in Kileleshwa.



The chapter has revealed that although most residents of the subject estate are aware of deteriorating environmental quality, they continue to stay due to proximity to their work places i.e. the central business districts (CBD).

Most occupants of highrise buildings were however dissatisfied with the general state of the neighbourhood. Their expectations in respect of infrastructural services though still high have decreased over time. The following table gives a summary of how residents felt about provision of selected infrastructural services in the estate.

**TABLE 3.0: A SUMMARY OF RESIDENTS ATTITUDE TOWARDS INFRASTRUCTURE SERVICES IN KILELESHWA**

INFRASTRUCTURAL SERVICE	VERY SATISFIED	SATISFIED	DISATISFIED	STRONGLY DISATISFIED
Road network	12%	24%	30%	34%
Sewer services	18%	33%	40%	9%
Water supply	21%	24%	27%	28%
Solid waste disposal	5%	7%	14%	74%
Security	18%	26%	18%	38%

Source: Field Survey (June 2005)

The table clearly shows that most residents are dissatisfied with provision of various services. In contrast very few residents are dissatisfied with sewer services. It is the researchers view that this can be attributed to the developers endeavour to ensure that effluents from these developments are

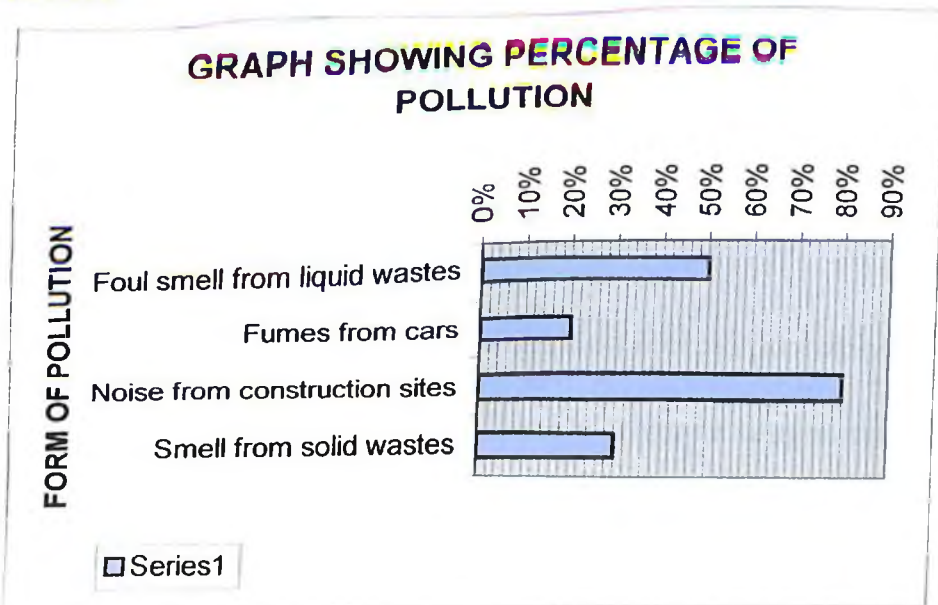
'efficiently' removed from the buildings even if it means disposing them off to a nearby river. This is a gross violation of City by-laws.

Solid waste topped the list as the most visible environmental degradation indicator among residents. 74% are strongly dissatisfied with the management of solid wastes in the estate.

It's worth noting that most residents were oblivious of dangers posed by air pollution especially from car emissions.

When asked what they thought contributed to air quality, the responses were as shown in Chart 4.

**CHART 4: RESIDENTS PERCEPTION ON AIR QUALITY AND POLLUTANTS IN THE ESTATE**



Source: Field Survey (June 2005)

From the bar graph, most residents attributed air pollution to noise from construction sites and sited blasting, vibration from concrete mixers, delivery lorries and gangs of workers. This is probably because currently (as at the time of this study) Kileleshwa is simply a beehive of construction activities. Some construction works continue late into the night, respondents revealed.

**HEAVY MACHINERY AT A CONSTRUCTION SITE. THEY CONTRIBUTE TO NOISE POLLUTION**

**PLATE NO. 3.8**



Source: Field survey (June 2005).

Foul smell from liquid wastes was rated second probably due to its widespread nature (smell from liquids covers a longer area than smell from solids – Glaeser, 1984).

Although according to experts, car fumes are more dangerous forms of air pollution due to the presence of carbon monoxide gases, residents rated them fourth. This is probably because of the misconception that they encounter them only twice a day i.e. during the morning and evening rush hours.

However, environmental experts warn that car fumes are basically anthropogenic carbon monoxide/dioxide emissions, which are difficult to clean from the atmosphere. (Ibid).

The experts are further concerned that currently, air pollution arising from particulates resulting from burning fossil fuels could be at their peak in the estate. The reason given for this is that there are many construction sites where heavy, earth moving machines are in use. The author concurs with this position on the basis of field observations.

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**A VIEW OF EARTHMOVERS IN USE AT A CONSTRUCTION SITE****PLATE NO. 3.9**

Source: Field survey (June 2005).

It is clear that most of the environmental degradation indicators being experienced and observed in Kileleshwa are directly associated with the unprecedented population increase in the estate which in many ways, is culminating from the highrise developments in the estate.

## CHAPTER FOUR

### 4.0 CONCLUSION AND RECOMMENDATIONS

#### 4.1 SUMMARY OF THE STUDY

The level of understanding the complex world of environmental jargons is low among many residents. This study was an investigation to analyze the effects of multi-storey buildings on infrastructure (provision and efficiency), the main theme being environmental quality.

The researcher used indicators of environmental quality such as state of road network, traffic congestion, provision of water and sewer services to enable respondents participate effectively. By and large, this study is therefore a major effort to extend understanding of the urban environmental concerns especially among high-income residential estates, which were previously perceived to be relatively free of environmental degradation. This perception has been changed by the dynamics of economic realities in provision of housing and changes and revisions of existing planning rules and regulations, which have seen approval of high-density developments in those estates.

The reviewed literature, revealed several examples in other parts of the world including Mexico City, City of Jakarta, Metropolitan Manilla, Bihar

and Delhi where similar policies have proved unsustainable in the light of environmental considerations.

Alongside these examples, were various sub-topics particularly on health and safety, productivity, equity, ecology as well as amenity all of which served to demonstrate the importance of adopting a holistic and integrated approach on environmental matters and more particularly where development is concerned.

Key principles such as win-win principle, cost effectiveness and effective technologies were explored. The main aim was to widen understanding of environment – development issues commonly referred to as the ‘green and social’ issues of urban areas.

It was clearly stated in the problem statement section, that environmental quality will be addressed against the background of degenerating physical infrastructure, degradation of environmentally fragile land, air pollution, water pollution and aspects of solid waste management. These issues formed the basis of the questionnaires used in the study and helped form the agenda for various interview sessions and informal discussions organized throughout the period of this study.

It is in the cognizance of the fact that clear understanding of various factors contributing to environmental degradation is the foundation to formulating economically viable development policies and most importantly an impetus to enforcing the laid down rules and regulations to curb exploitation of environmental impacts associated with development.

The guiding question for the study was that highrise developments have contributed to environmental degradation in Kileleshwa estate. Formulations of conceptual framework revolving around this question revealed various



Through data collection and analysis, the researcher was able to identify the various factors associated with highrise buildings, which are the main contributors to environmental degradation.

Factors aggravating environment problems in the estate were identified as:-

Lack of participation by residents in forums organized either by the developers, their association or other interested parties to address environmental issues in the estate.

Lack of public pressure and political will to enforce laid down environmental rules and regulations. For instance, it was noted that although the highrise developments were allowed up to Four (4 No.) floors, a number of developers had put up higher structures, some up to seven floors for example The Taj apartments along Githunguri Road are over 7 floors, and arboretum view apartments are in excess of 6 floors.

Inadequate environmental Governance – Governance in this case means sharing and exercising powers. This was identified as one of the major principal constraint to effectively curb environmental degradation in Kileleshwa, for instance although NEMA was taking bold steps to curb

environmental degradation (see annexures), the Nairobi City Council had done virtually nothing to back them up.

Weak institutional capacity was also noted as hampering most efforts to improve environmental conditions. Lack of adequate staff both in City Council and institutions such as NEMA, Civil society environmental Advocacy Institutions and the greenbelt movement was noted as contributing to lack of enforcement of environmental rules.

**Jurisdictional complexity** – There was poor co-ordination among the institutions responsible for environmental management. For instance provincial environmental officers didn't seem to co-ordinate well with either the City Council officers or even the District Environmental officers. This usually frustrated their efforts to carry out their mandates.

**Insufficient knowledge on land rights** – This was noted to contribute to degradation of land and natural resources especially in respect of riparian sections and open spaces. Due to poor knowledge of the provision of sectional properties Act, most respondents were unaware that these sections belonged to all of them for their conservation and enjoyment. Unscrupulous developers have taken advantage of this and destroyed landscapes, views, vegetation and ecological systems in these areas.

The key impacts identified in line with the objectives of the study included; surface water pollution, poor solid waste management, sporadic piped water supply, traffic congestion, disrupted local systems, inefficient sewer systems and illegal land use practices.

Throughout the study, historical, geophysical and social economic perspectives have helped understand trends in environmental quality since the adoption and approval of highrise development in this estate in 1987. Summaries of existing information, as well as use of analyzed primary data helped the researcher develop a broad information base on the quality of environmental media in the study area.

## **4.2 TEST OF HYPOTHESIS**

**Hypothesis:** The hypothesis of the study was that development of multi-storey residential dwellings has contributed to decline in physical infrastructure in Kileleshwa Estate.

As can be seen from the above explanations, the study supports the hypothesis.

Efficiency in performance of infrastructure services in a residential area is a key indicator for environmental quality within the neighbourhood. Further

adherence to planning regulation such as respecting the key role played by open spaces and riparian section in stabilizing and balancing local ecosystems, also help to improve the local environmental media.

Cognisance of the fact that increasing population densities of residential estate require paralleled improvement and expansion of infrastructure services and strict adherence to environmental rules is key to sustainable residential developments.

The above issues were not sufficiently addressed while approving highrise developments in Kileleshwa.

As we all share common environmental media, locally – in our residential neighbourhood, our work places, regionally and nationally, given that all our Environmental systems are entangled, it is difficult to recommend a singularly oriented way forward to generate sustainable environmental quality in our residential estates. However, it is now possible to make conclusions and recommendations based on the study findings.

### **4.3 CONCLUSION**

The main reason why people aspire to dwell in high-income estates is to improve their standard of living. Their primary objective is that their

families will be able to enjoy good road networks (well maintained), reliable water supply, beautiful scenic views and efficient vehicular flows. For this reason they pay a relatively high price in terms of rent or purchase price compared to residents of lower income bracket estates. When construction of highrise residential developments in Kileleshwa were approved and a few initial apartment blocks were completed, people rushed to seize the opportunity to enjoy the benefits of high-income living. The population increase in this estate as depicted in Figure I confirms this.

However, as more and more of this highrise developments continue to come up and either sold off or rented out, infrastructure and other services have been under great pressure to perform, though reasonably beyond their designed capacities. This has culminated into gradual deterioration of environmental quality within this once 'the envy of the many estates'.

Many people including developers – who are making millions of shillings out of the sale of these apartments, and planners who are keen to cover their role in turning this once 'leafy suburb' into a 'concrete jungle' have zealously defended these new developments. It doesn't take a rocket scientist to realize that something has gone awfully wrong with Kileleshwa and it's environs.

The researcher 'accidentally' stumbled onto pipes directing grey water directly onto the rivers. This was too much! It was more than the researcher had envisaged. Finally, cases of 'growing' garbage heaps were noted, indicating that solid waste management in this estate was inefficient.

To get a balanced view of responses, the researcher engaged single storey residential owners in in-depth interviews, discussions and administered questionnaires. This group was able to give the researcher a chronological account of how and when things started going wrong. With the entry of highrise developers in the estate, the spirit of community cohesiveness fizzled away and it became increasingly difficult to get the large numbers of new occupants to participate in any forum. If at all to address their common plight.

Social problems also set in. Crime escalated in the estate and residents are forced to engage the services of private guards in large numbers. Facts from Kileleshwa police station, obtained through informal discussions confirm that petty criminal activities have been on increase. The nearby arboretum was cited both by residents and the security personnel (both the police and security guards) as a hide out for many of criminals in this estate.

Although the rental and sales market for apartments is vibrant in this estate, the environmental problems associated with these developments that the government and the residents will have to bear, requires further scrutiny to ensure sustainability of these developments in as far as environmental quality is concerned. It is for this reason that the researcher recommends a study to address the cost and benefit of such approvals, in respect to development and environmental considerations in this and other similar estates.

#### **4.4 RECOMMENDATIONS OF THE STUDY**

Basically, options for confronting urban environmental degradation correspond with its basic causes and include efforts to focus various issues.

For instance, there is need to adopt cost effective approaches which encompass mobilization of public support and participation.

There is need to improve environmental governance, improve the existing and develop new policy intervention measures, which aim at stopping gradual environmental degradation. However, for these measures to work, they must be in line with previously adopted policies with the main aim being to achieve minimum compliance as stressing 100% compliance will only catalyse indulgence in vices such as corruption and resentment.

The government should team up with non-governmental organizations and civil society organizations in dealing with environmental issues to sensitize members of the public on the importance of mitigating negative environmental impacts. This can be achieved through organized public meetings, campaigns in print and electronic media.

Awareness is likely to increase and improve public participation and support, hence improve effectiveness of environmental decision making.

In this regard, the key actors who should participate are those whose interests are affected by environmental problems; strategies and plans as well as those who control relevant implementation instruments, information and expertise.

Raising awareness of problems caused by environmental degradation for example, releasing figures of deaths caused by negative environmental impacts can be very instrumental in changing people's attitudes towards environmental issues.

There is need to upgrade the management and delivery of key urban services for example, collection of solid wastes and maintenance of basic



infrastructure can be outsourced to private companies. The co-ordination of such programmes should be vested in resident associations through their umbrella organization – the Kenya Alliance of Resident Association, (K.A.R.A) which should have representatives in respective government agencies dealing with environment and development matters.

Since vehicular emissions have been identified as major contributors to air pollution, there is need to assess transport policy options. The goals of such a policy should be to reduce vehicle emissions by use of catalytic converters and to influence increased use of public transport. Although the 1980 structure plan by Nairobi City Council aimed partly in achieving this, its goals and objectives are yet to be fulfilled.

As regards inefficient sewer services, this study recommends construction of small treatment plants within the estates to avoid the cost associated with the laying and maintenance of trunk sewers and the problems that go with it. Since the residents will pay for the operational costs of such a treatment plant, it is the researchers opinion that it's benefits in terms of ensuring environmental quality within the estate is sustainable. World bank research involving field studies in 39 communities in 14 nations supports this

suggestion. These studies were conducted to explore alternatives to conventional sewers and sewerage treatment plants.

#### **4.5 AREAS OF FURTHER STUDY**

Further studies need to be undertaken to establish costs and benefits of development projects in residential areas in respect of environmental concerns.

Further study should be carried out to identify trends in the cities demographic changes, with particular reference to selected residential areas with a view to advising on the development requirements in such estates so that environmental quality is not compromised through haphazard planning and development.

Further study is also necessary to model environment – development relationships or nexus with the main objective being to advise on acceptable population thresholds which allow for sustainable environmental quality assurance.

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## ANNEXTURE 1

### **Effects of Highrise Residential Blocks on Environmental Quality – Kileleshwa Estate**

#### *Questionnaire for Residents of Highrise/Apartment Blocks*

1. What is the size of your apartment? (Tick as appropriate)

One Bedroom unit                       Three Bedroomed

Two Bedroom unit                       Four Bedroomed

Others (specify \_\_\_\_\_)

2. Are you a tenant or owner of the apartment? \_\_\_\_\_

3. When did you move in? Year 19\_\_\_\_ or 20\_\_\_\_

4. State the reasons why you rented or bought the apartment.

(i) \_\_\_\_\_

(ii) \_\_\_\_\_

(iii) \_\_\_\_\_

(iv) \_\_\_\_\_

5. How would you rate the efficiency and/or provisions of the following services?  
(Tick as appropriate).

5. (i) Water?  V. Good  Good  Poor  V. Poor

Reason \_\_\_\_\_

(ii) Electricity  V. Good  Good  Poor  V. Poor

Reason \_\_\_\_\_

(iii) Sewer services  V. Good  Good  Poor  V. Poor

Reason \_\_\_\_\_

(iv) Garbage collection?  V. Good  Good  Poor  V. Poor

(v) Security services since you occupied the house have you had any security problems? \_\_\_\_\_ specify \_\_\_\_\_

6. (i) What means of transport do you use to go to work? (Tick as appropriate)  
 private  Public

(ii) What is your experience on transit to and from your work place?

Extremely hectic  Hectic  Smooth  Very smooth

7. How would you describe the state of Road network within the estate  
 Well maintained  Very poorly maintained  
 Poorly maintained  Simply pathetic

8. What is your feeling about Highrise Apartment blocks in Kileleshwa?

Strongly satisfied

Dissatisfied

Satisfied

Strongly Dissatisfied

Not sure

Please give reasons

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9. What are some of the problems you experience which you never associated with an Estate of the caliber of Kileleshwa?

- (i) \_\_\_\_\_
- (ii) \_\_\_\_\_
- (iii) \_\_\_\_\_
- (iv) \_\_\_\_\_
- (v) \_\_\_\_\_

10. (i) What do you think is the cause of above problems?

- (i) \_\_\_\_\_
- (ii) \_\_\_\_\_
- (iii) \_\_\_\_\_
- (iv) \_\_\_\_\_
- (v) \_\_\_\_\_

(ii) In your opinion, what do you think is the practical solution?

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11. (i) Do you know the meaning of abbreviation NEMA? [ ] Yes [ ] No

(ii) What does it mean and what does it stand for?

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12. (i) Are you a member of any Residents organization? [ ] Yes [ ] No

If yes, which one? \_\_\_\_\_

12. (ii) How often do you participate in meetings organized to discuss various issues?

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13. Since you occupied the house, has anyone sought any information about developments in this estate?

[ ] Yes [ ] No

13. (ii) If yes, what information was sought and how was it sought?

Type of information

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How it was sought    ( ) Questionnaires  
                          ( ) Participation in public meeting  
                          ( ) letters  
                          ( ) Others (specify) \_\_\_\_\_

14. In brief, and in environmental context, what makes you a very satisfied Resident of Kileleshwa Estate?

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14. (ii) In the same context, what makes you most dissatisfied?

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**ALL INFORMATION IS TREATED CONFIDENTIALLY**

**E\_\_N\_\_D**

**THANK YOU FOR YOUR PARTICIPATION**



(ii) Over the last Five years?

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(iii) After the approval of highrise flats?

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8. (i) In your opinion, do you think the new Highrise blocks have had any contribution to your answer in No. 7

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(ii) In what way?

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9. Has anyone ever consulted you, sought your opinion about the new developments? Yes/No

If yes, what kind of information? How was it sought?

- Through questionnaires
- Interviews
- Participation in a public meeting
- Written mail
- Others (specify) \_\_\_\_\_

10. What do you intend to do in light of the new developments?

- Move to another estate
- Put up similar apartments
- Seek court injunction
- Others (specify)

(You may tick more than one option).

11. What do you miss about Kileleshwa estate in terms of environmental quality that is no longer there?

- (i) \_\_\_\_\_ (iv) \_\_\_\_\_  
(ii) \_\_\_\_\_ (v) \_\_\_\_\_  
(iii) \_\_\_\_\_

12. Please comment on the efficiency of infrastructural services in the estate?

	Extremely inefficient	Inefficient	Efficient	Extremely efficient
Water				
Roads				
Sewerage				
Waste disposal				
Electricity				
Security				

13. What would you say about security aspect since you moved in until now?

- Has improved  
 Remained the same  
 Has become worse

14. What is your mode of transport from one point to another?

- Private       Public

15. Comment on the public transport within the estate?

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16. In your opinion what do you think is the solution about the various environmental concerns in the estate? Please give reasons

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**ALL INFORMATION IS TREATED CONFIDENTIALLY**

**E\_\_N\_\_D**

**THANK YOU FOR YOUR PARTICIPATION**



## ANNEXTURE III

### **Effects of Highrise Residential Apartment Blocks on environmental quality – Kileleshwa estate**

#### *Questionnaire for Environmental Institutions and Environmental Authority*

1. Your name (optional) \_\_\_\_\_
  
2. (i) Name of your organization \_\_\_\_\_  
  
(ii) When was the organization started? \_\_\_\_\_
  
3. What are the goals and objectives of your organization?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
4. In your view, have you achieved the objectives stated in 3 above? Give reasons and examples in your answer/  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
5. (i) What have been the main challenge towards achieving your goals and objectives? (If possible, prioritize them according to their levels of importance).  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
- (ii) Does your organization liaise with other environmental bodies and/or Government agencies to ensure that your objectives and goals are met? Yes [ ]  
No [ ]

If yes, please give details including name of agency and mechanisms used.

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If no, please explain why

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(iii) What are some of the challenges that you have been facing ( in respect to No. ii above?)

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6. Striking a practical level of environmental and development nexus (relationship) is key to achieving sustainable developments, what in your view has been the major handicap towards achieving this?

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7. In your opinion, are the planning rules and regulations currently in operation are sufficient to safeguard against environmental degradation?

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8. In your view, is the enactment of the Environmental management and co-ordination Act (EMCA), going to help in waging war against environmental degradation? Yes [ ] No [ ]

Please give reasons for your answer

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9. In most cases, environmental organizations, claim that lack of resources and insufficient legal framework is a major handicap towards achieving their main goals and objectives? How true is this statement and what in your view is the best way forward?

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Please identify what you consider to be the handicaps, which prevent environmental organizations from achieving their main goals and objectives.

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In your view, how best can these handicaps be dealt with?

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Any other comments/observations

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**ALL INFORMATION IS TREATED CONFIDENTIALLY**

**E\_\_N\_\_D**

**THANK YOU FOR YOUR PARTICIPATION**

## ANNEXTURE IV

### **Effects of Highrise Residential Apartment Blocks on environmental quality – Kileleshwa estate**

#### *Questionnaire For Environmental Experts Registered with NEMA*

Name (optional) \_\_\_\_\_

Designation \_\_\_\_\_

Name of institution \_\_\_\_\_

1. How long has your organization been involved in environmental matters?  
\_\_\_\_\_

2. For how long have you been with the organization?  
\_\_\_\_\_

3. It's now mandatory that various projects undertake environmental impact assessment (E.I.A) prior to approval, what's your comment?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Various City Estates have undergone a serious densification process over the recent years, what are the environmental implications/impacts are we experiencing or likely to experience in the near future as a result of this?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Most city Estates consume treated piped water, in your opinion, is water pollution a serious threat for residents in such estates? Give reasons  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. In your opinion how serious is air pollution especially in light of traffic congestion in our roads? Give reasons  
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\_\_\_\_\_  
\_\_\_\_\_

7. Environmental quality and the need for development has always been a subject with a large number of proponents and opponents, what is your opinion?

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8. In light of budgetary constraints, what in your view is the best approach to achieve sustainable development?

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9. As an expert, what would you say are the unique environmental concerns brought about by highrise apartments compared to single storey residences?

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10. Sometimes environmental experts seem to 'cry over spilt milk' when commenting on environmental implication of developments which have already taken place. What do you think is a practical remedy to some of the environmental problems in our estates?

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11. How would you say the densification process in residential estates have been handled in respect to sustaining environmental quality?

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**ALL INFORMATION IS TREATED CONFIDENTIALLY**

**E\_\_N\_\_D**

**THANK YOU FOR YOUR PARTICIPATION**

## ANNEXTURE V

### **Effects of Highrise Residential Apartment Blocks on environmental quality – Kileleshwa estate**

#### *Questionnaire for Forward Planning Department – Nairobi City Council*

1. Name (optional) \_\_\_\_\_

2. Position in the Department \_\_\_\_\_

3. What are the main duties of Forward Planning Department?

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4. (i) How does the department ensure that developers comply with the laid down planning rules and regulations?

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(ii) The procedures for obtaining approval for development plans requires that other departments such as water and sewerage, fire, public health e.t.c are involved, why is it necessary yet zoning rules are explicit? Give reasons

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5. In your view what is the explanation regarding massive lack of adherence to planning rules yet your procedures are water tight?

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6. Does the Nairobi City Council have any elaborate programmes aimed at ensuring that there is close liaison with other private, government and non-government organizations with a view to achieving minimum compliance with the rules as they are?

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7. (i) In your opinion, has your department been able to carry out its mandate effectively? Yes [ ] No [ ]

Please give reasons for your answer

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(ii) What problems or challenges have you faced?

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(iii) How did you deal(t) with these problems?

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(iii) In your view, what is the best way forward?

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8. (i) Over the years, illegal developments have been carried out within Nairobi City. Does this reflect the inability of your Department to cope effectively with its mandate? Yes [ ] No [ ]

Please give reasons

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(ii) What does the Council intend to do with those developments not complying with planning regulations?

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(ii) Is there a programme for awareness raising (to the general public property owners) on the requirements of property act and EMCA act.

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9. (i) How does the Department deal with public complaints regarding illegal developments?

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(ii) What immediate steps does the department take upon receiving the complaints pending determination of the case?

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(iii) How many developments have been stopped in the last two years as a result of public complaints and how many cases are still pending?

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10. (i) In your opinion, what is the solution to achieving minimum compliance with rules and regulations?

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(ii) To what extent does the Council take responsibility to planning malpractices in Nairobi?

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**ALL INFORMATION IS TREATED CONFIDENTIALLY**

**E\_\_N\_\_D**

**THANK YOU FOR YOUR PARTICIPATION**



# NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Telephone: (254-020) 333551 Ext 21060/20597  
Fax: 254-020- 608997  
P. O. Box 67839, Nairobi, Kenya

Provincial Director of Environment Nairobi  
25th Floor, Nyayo House, Room 20-22  
Website. www.nema.go.ke

15<sup>th</sup> February 2005

PDE/NBI/ENF/VOL.1/78

The Director

SIESTA LTD

.....  
YAYA CENTRE

## RE: STOP ORDER FOR THE ON-GOING CONSTRUCTION ALONG KIRICHWA KUBWA RIVER BETWEEN GITUNGURI ROAD AND STATE HOUSE STAFF QUARTERS

Following the ground inspection by National Environment Management Authority on 15<sup>th</sup> February 2005, we found out that you are constructing on an ecologically fragile riparian reserve in disregard to the environmental laws. Though the whole project is located within the riparian area, you have gone further to build the perimeter wall right on the river bed. The team that visited your site got a very hostile reception from a person who referred himself as a site engineer and even threatened to throw us out. Section 137 of the Environment Management and Coordination Act, 1999 renders it an offense for any person who hinders or obstructs an environmental inspector in the exercise of his duties under this Act.

Section 58 (1) of the Environment Management and Coordination Act, 1999 states that “ Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carried out, executed or conducted by another person any undertaking specified in the second schedule of the Act, submit Environmental Impact Assessment project Report to the Authority...”

Pursuant to the provisions of the Environment Management and coordination Act, 1999, the National Environment Management Authority (NEMA) hereby issues **A STOP ORDER** to any further development of your project until an environmental Impact Assessment is carried out and reviewed to the satisfaction of the Authority on such terms and conditions as may be deemed appropriate and necessary to facilitate sustainable development and sound environmental management.

Make sure you comply with the **ORDER**.



**ROBERT ORINA SITEKI**  
**PROVINCIAL DIRECTOR OF ENVIRONMENT**  
**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY**

Cc: Permanent Secretary  
Ministry of Environment and Natural Resources  
MAJI HOUSE

Director General  
NEMA

Director of City Planning  
Nairobi City Council  
CITY HALL

District Environment Officer  
Westlands Division

To follow up

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