

**ASSESSING THE ENVIRONMENTAL EFFECTS OF HOUSING  
DEVELOPMENT IN KUBWA FEDERAL HOUSING ESTATE FLOOD PLAIN,  
FEDERAL CAPITAL TERRITORY, NIGERIA**

**BY**

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**M.TECH/SSSE/2005/1482**

**DEPARTMENT OF GEOGRAPHY  
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**

**DECEMBER, 2010**

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**A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, FEDERAL  
UNIVERSITY OF TECHNOLOGY MINNA, IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF  
TECHNOLOGY (M.TECH) IN GEOGRAPHY (ENVIRONMENTAL  
MANAGEMENT)**

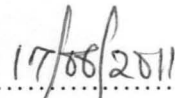
**DECEMBER, 2010**

## DECLARATION

I, AHUMIBE, Collins Kelechi, hereby declare that this thesis has been carried out solely by me under the supervision and guidance of Dr A.M. Jinadu. The work has not been, in part or whole, presented anywhere for the award of any postgraduate degree. All relevant works by other authors cited have been duly acknowledged in the reference.



.....  
AHUMIBE, Collins Kelech



.....  
Date

## CERTIFICATION

This thesis titled: Assessing the Environmental Effects of Housing Development in Kubwa Federal Housing Estate Flood Plain, Federal Capital Territory, Nigeria by: AHUMIBE, Collins Kelechi (M.Tech/SSSE/2005/1482) meets the regulations governing the award of the degree of M.Tech of the Federal University of Technology, Minna and is approved for its contribution to scientific knowledge and literary presentation.

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## DEDICATION

This project is dedicated to Almighty God for His help in ages past and to my little daughter, Princess Susan Anyiam-Ahumibe.

## ACKNOWLEDGEMENTS

My profound gratitude goes to Almighty God for His guidance and protection throughout the period of research and the actual write up of this thesis. I am highly indebted to my supervisor Dr. A.M. Jinadu, whose constructive criticisms, directives and cooperation made this research work a success. I also acknowledge all the lecturers in Geography Department who have contributed to my academic development, especially, Dr A.S. Abubakar, Dr. M.T. Usman, Prof. J.M. Baba, late Dr. P.S. Akinyeye, Prof. G.N. Nsofor, Dr. A. Okhimamhe and Mr. Salihu. I sincerely appreciate my lovely wife Princess Thelma Ahumibe, for her prayers, understanding and unflinching supports through out the duration of the entire programme. Also I am grateful to my sister, Mrs. Vivian Ogbonna whose help and supports proved a "wonderful sister". Finally, I am very grateful to the various authors whose works I consulted in writing this thesis, and to some of my colleagues and friends, like; Shuaibu, Julius and Dauda whose contributions will remain fresh in my memory.

## ABSTRACT

Physical development such as building construction is an integral part of man's environmental activity. All the environmental components are in constant interaction with each other with the physical component being the most active. Lack of physical planning often leads to misbalance in the environment and consequently results in multiple environmental problems. This study assessed the environmental effects of housing development in Kubwa Federal Housing Authority Estate Flood plain, Federal Capital Territory, Nigeria, with the major aim of proffering solutions to the associated problems. Survey method was adopted in the course of this research. This facilitated the generation of information about current situation. A purposive sampling technique was used in this study which ensured that only relevant elements to the research were included. Questionnaires containing structured questions were admitted to the residence of the study area. On spot assessments of the present situation were equally taken using pictorial capturing and physical measurements. All these with the base maps constitute the data used in this research. Data collected were subsequently presented and analyzed. Recommendations were made with the aim of proffering both short and long term solutions. The short term measures include; clearing of sand silt in all drainage gutters, proper and effective refuse disposal system in the estate and the introduction of a well articulated environmental sanitation program. While the long term measures include; Standardization of the existing set-backs, demolitions and structural methods of flood control which includes building of retaining wall behind the building adjoining the bank of the river. The importance of public enlightenment programme was equally highlighted.

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## CHAPTER ONE

### 1.0

### INTRODUCTION

#### 1.1 Background

Man's interaction with his environment produces some effects which could be negative or positive as man extensively alters his environment to suit his needs and desires. Next to food in priority ranking for man's basic need for survival is shelter. This is an integral part of man's environment. Shelter is a spatial enclave where man lives or performs one activity or the other.

From time immemorial, there has been an evolutionary trend in shelter development. From shading and living under trees, man learnt to take refuge in caves. Man's expanding knowledge has led to an improvement in his technological skills. Hence from geological settlement i.e. living in caves, man advanced into erecting miniature structure. This chronological trend in shelter development have reached a stage now where physical planning and building are considered highly technical as to be handled by professionals.

Over the ages, shelter as a means of accommodation for man has metamorphosed from unplanned accommodation to planned accommodation with supporting uses or facilities. This is a result of the emergence of physical or land use planning which can be defined as the art and science of ordering the use of land, the character and sitting of building and communication routes so as to secure the

maximum practicable degree of economy, convenience and beauty ( Keeble 1968)

Man alters the natural characteristics of his physical environment sometimes on a small scale but more often on a very large scale. For instance, he may clear a small patch of bush, build a vegetable garden or he may build large cities, drain swamps, irrigate arid zones, dam rivers and create large artificial lake. Such developments have proved beneficial to man but some aspects of these developments have created new hazards such as flood, erosion etc.

The main elements of an urban plan are the residential, industrial, commercial, educational, health, public administration, transportation and infrastructure (utilities, facilities and services). Inadequacy and indiscriminate siting of any of these elements will lead to environmental problems such as; flood, erosion and pollutions.

The drastic environmental and public health and safety consequences that can stem from riverside development are seen all over Kubwa Federal Capital Territory Abuja. In the last couple of years, in particular, developments have been pushing ever outward, putting people too close to river banks and flood plains. As a result, fragile river ecosystems are being affected in an attempt to control flooding, stop property loss, and prevent drinking water contamination. The end result is that valuable open space is disappearing, runoff is increasing, riparian habitat is vanishing, erosion rates are increasing, flood storage capacity is

the existing infrastructures, leading to their decay. These infrastructures include: - Culverts, drainage gutters, roads and refuse disposal. The cumulative effect of these factors has led to the flood episode and other environmental problems experienced in recent years.

These problems have also extended to some areas which are not originally regarded as risk areas, as a result of the underlying effects of the encroachment.

### **1.3 Aim and objectives**

The major aim of this study is to examine the phenomenon of flood plain encroachment in Kubwa with a view to assessing its effects on the environment.

Therefore the objectives of this project are:-

- i. To examine the nature and extent of river side/ flood plain development in the area.
- ii. To identify and analyse the factors responsible for such development in the area
- iii. To identify and examine various environmental problems resulting from the building development on the flood plain.
- iv. To suggest planning and environmental measures to solve the problems.

### **1.4 Scope and limitation of the study**

A reconnaissance survey of the area revealed that phases II, III and IV of

Kubwa as the endemic areas, with Phase III as the worst hit. Therefore for the purpose of this study, Phase III Kubwa was chosen as an element for detailed investigation. Emphasis was basically laid on those structures on phase III that are less than 100m from the bank of river Usuma.

### **1.5 Justification for the study**

The ravaging effect cannot be over emphasized especially when it becomes unpredictable. Over the years various measures adopted to combat flood in Kubwa is basically curative rather than preventive. A research of this nature is necessary in order to capture the extent of the problem and the factors responsible.

This research is expected to be very useful to planning authority in Estate management strategies and environmental policies formation. It will also form a vital academic record.

### **1.6 Background information of the study area**

#### **1.6.1 Kubwa settlement**

Kubwa is one of the resettlement towns in the Federal Capital Territory Abuja. It was established as a result of mandatory need to resettle those directly affected by the development of the capital City which comprises of Phase I – IV. However, Kubwa resettlement town accommodated the displaced inhabitants within the Phase I area of Abuja City.

Kubwa falls in Bwari Area Council along the northern borders of Federal Capital Territory. The site which is located on the Northern fringes of the Federal capital City, cover an approximate area of 860 hectares. It is bounded to the North by Bwari and the South by the outer Northern express way.

In the master plan, some land spaces were allotted for relocated villages, while the remaining size was subdivided for further residential development and other utilities and services required by the totality of the resettlement areas.

Kubwa Phase III was developed by Federal Housing Authority (FHA), although Federal Capital Development Authority (FCDA) provided the physical infrastructure namely: road, water and electricity. The general layout design reflect a clustered pattern of neighbourhood ideologies, where access roads end in closes or dead end to create sense of belonging and unity.



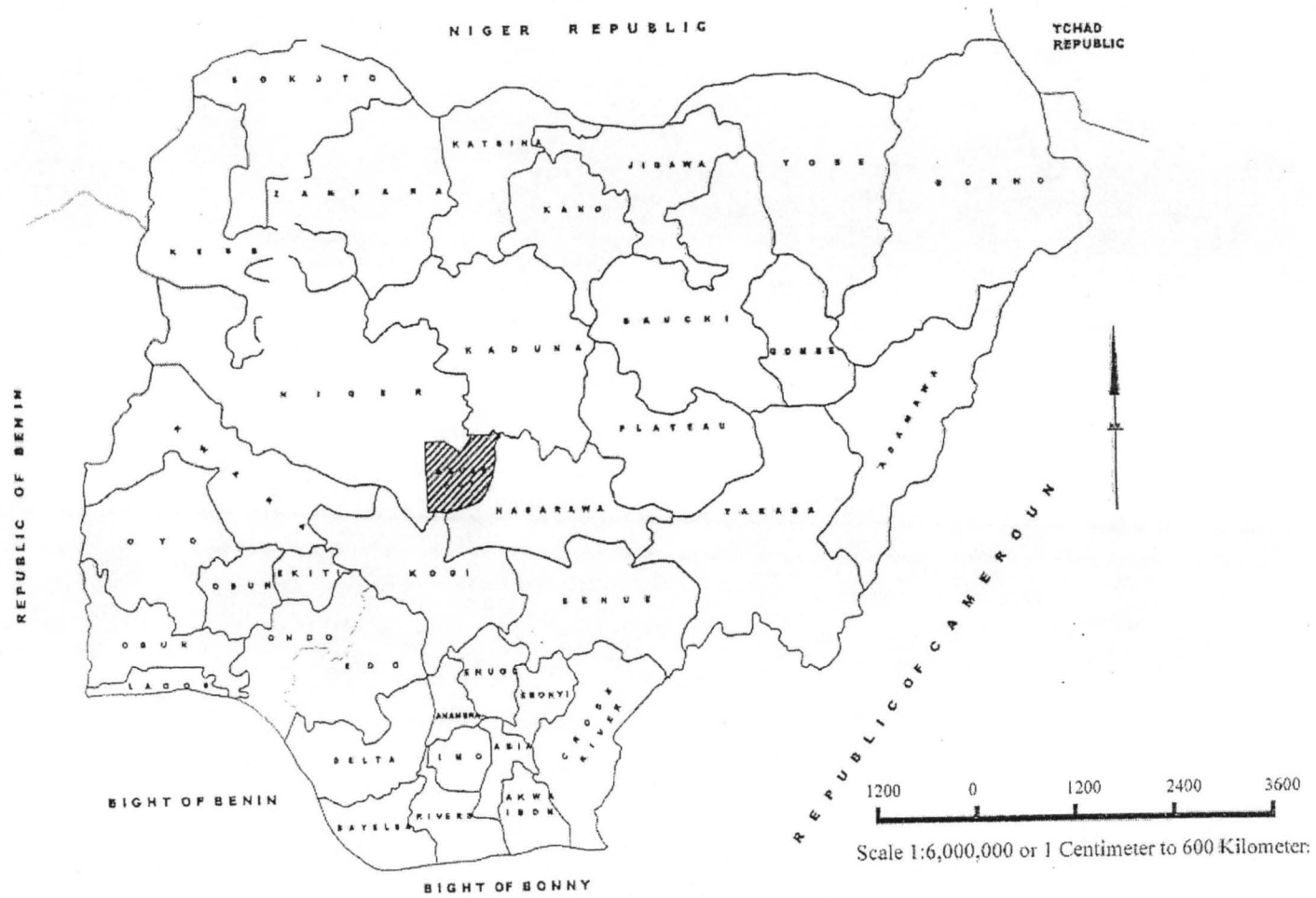
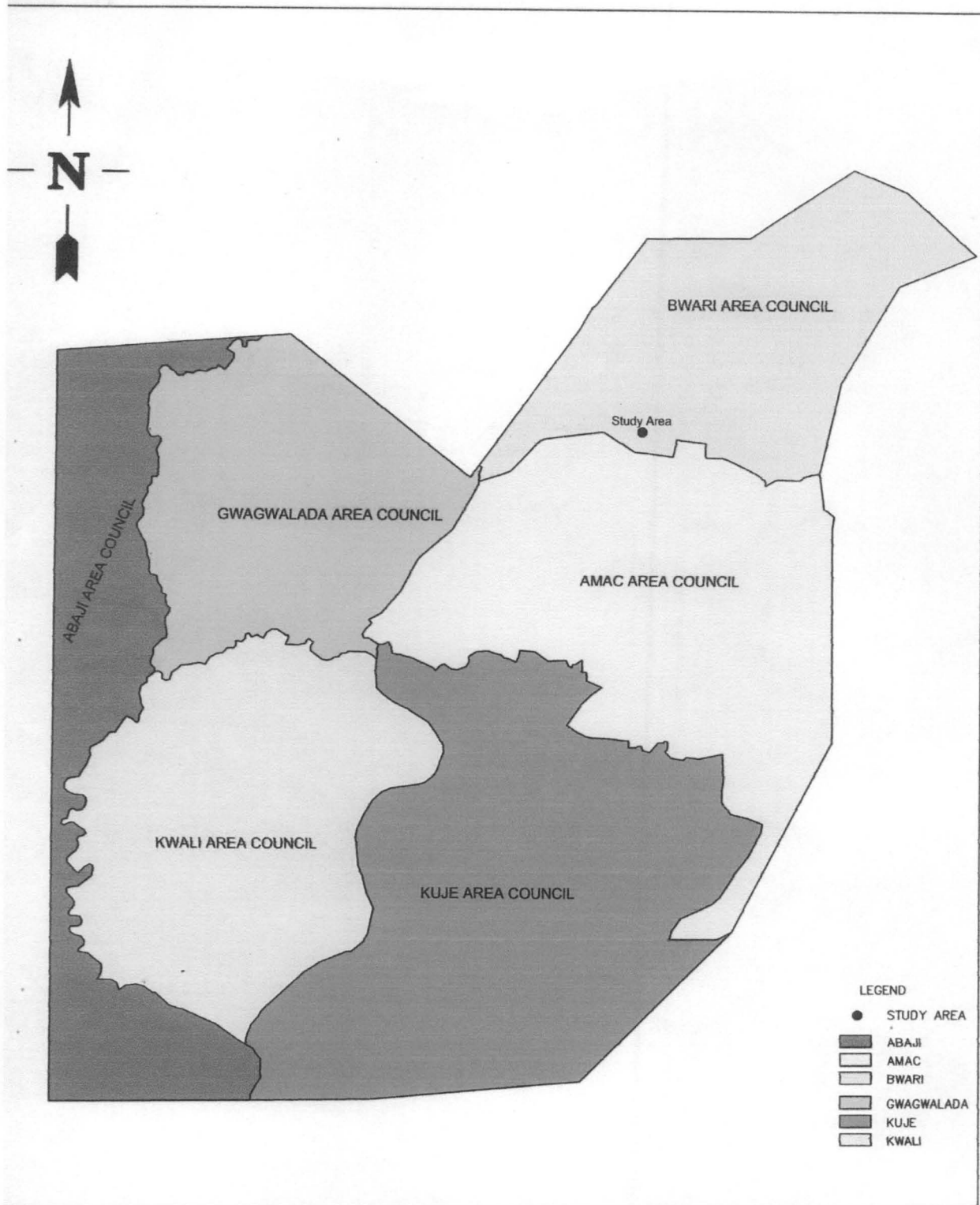


Fig. 1.1 Nigeria Showing Abuja F.C.T.

Source: Dept. of planning and Research Bwari Area Council



120 0 120 240 360

Scale 1:6,00,000 or 1 Centimeter to 60 Kilometers

Fig. 1.2 F.C.T. Showing Bwari Area Council

Source: Dept. of planning and Research Bwari Area Council

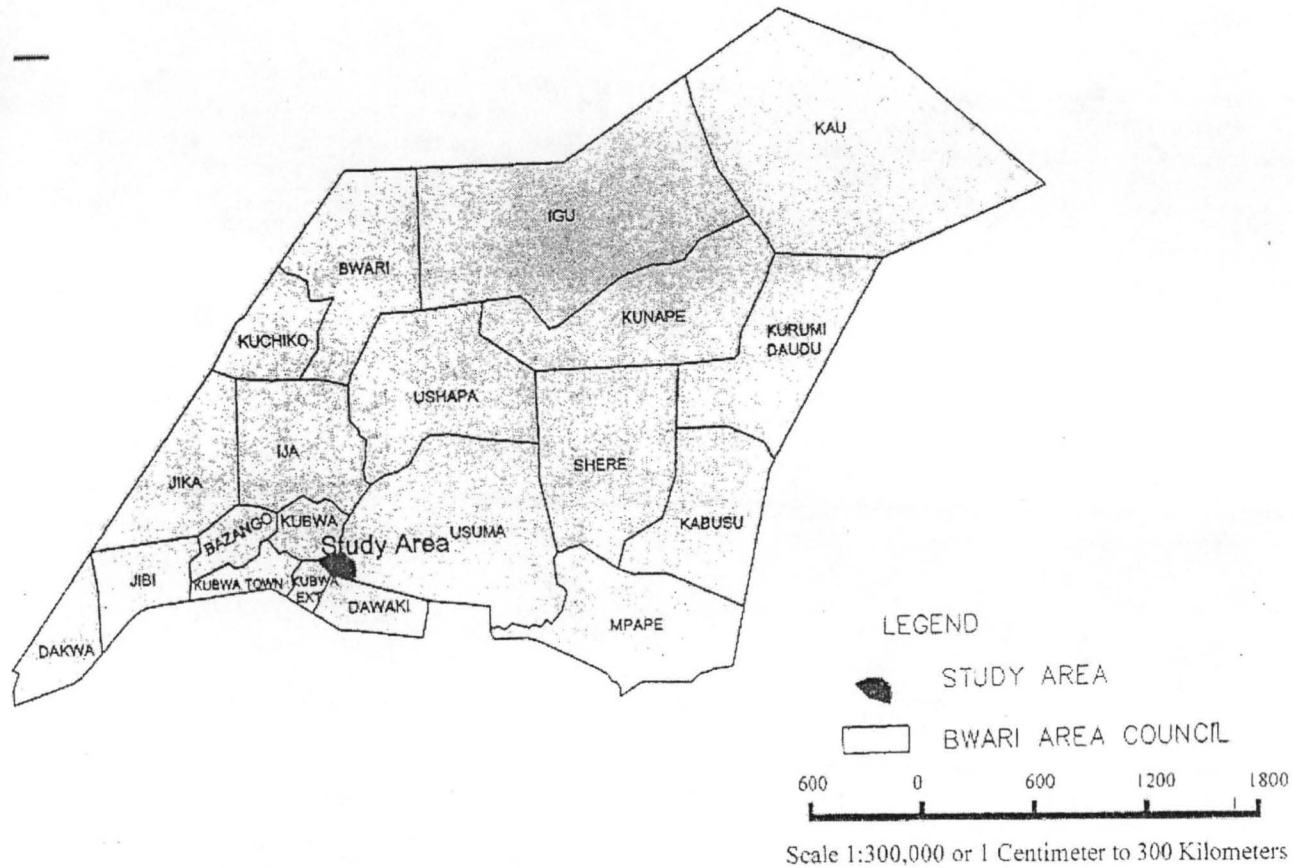
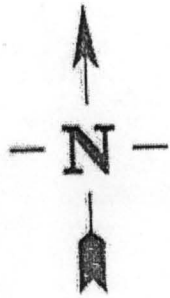


Fig. 1.3 Bwari Area Council showing Kubwa

Source: Dept. of planning and Research Bwari Area Council

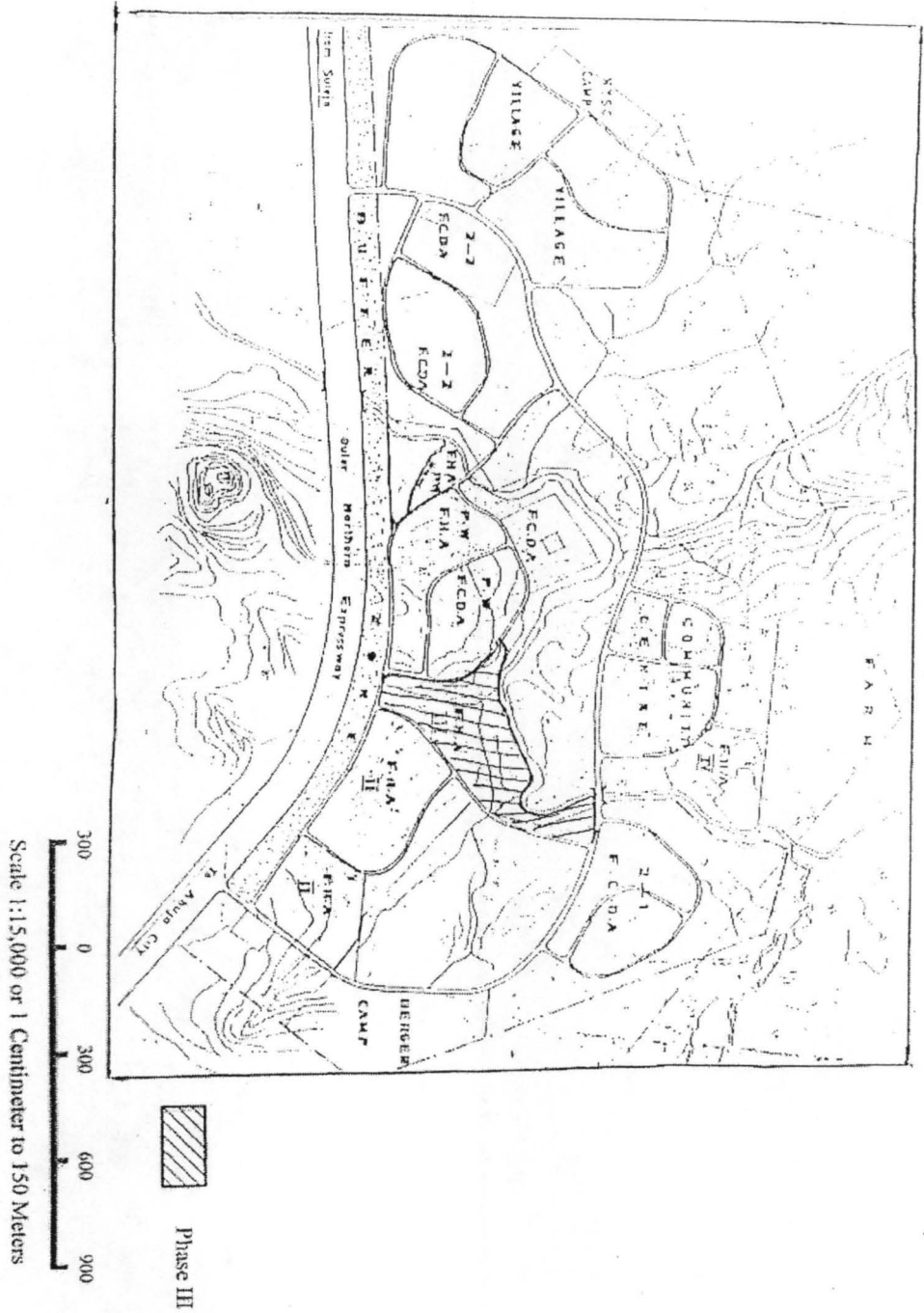


Fig. 1.4 Road network system of Kubwa master plan showing study area  
 Source: Town Planning Section, Federal Capital Development Authority Abuja

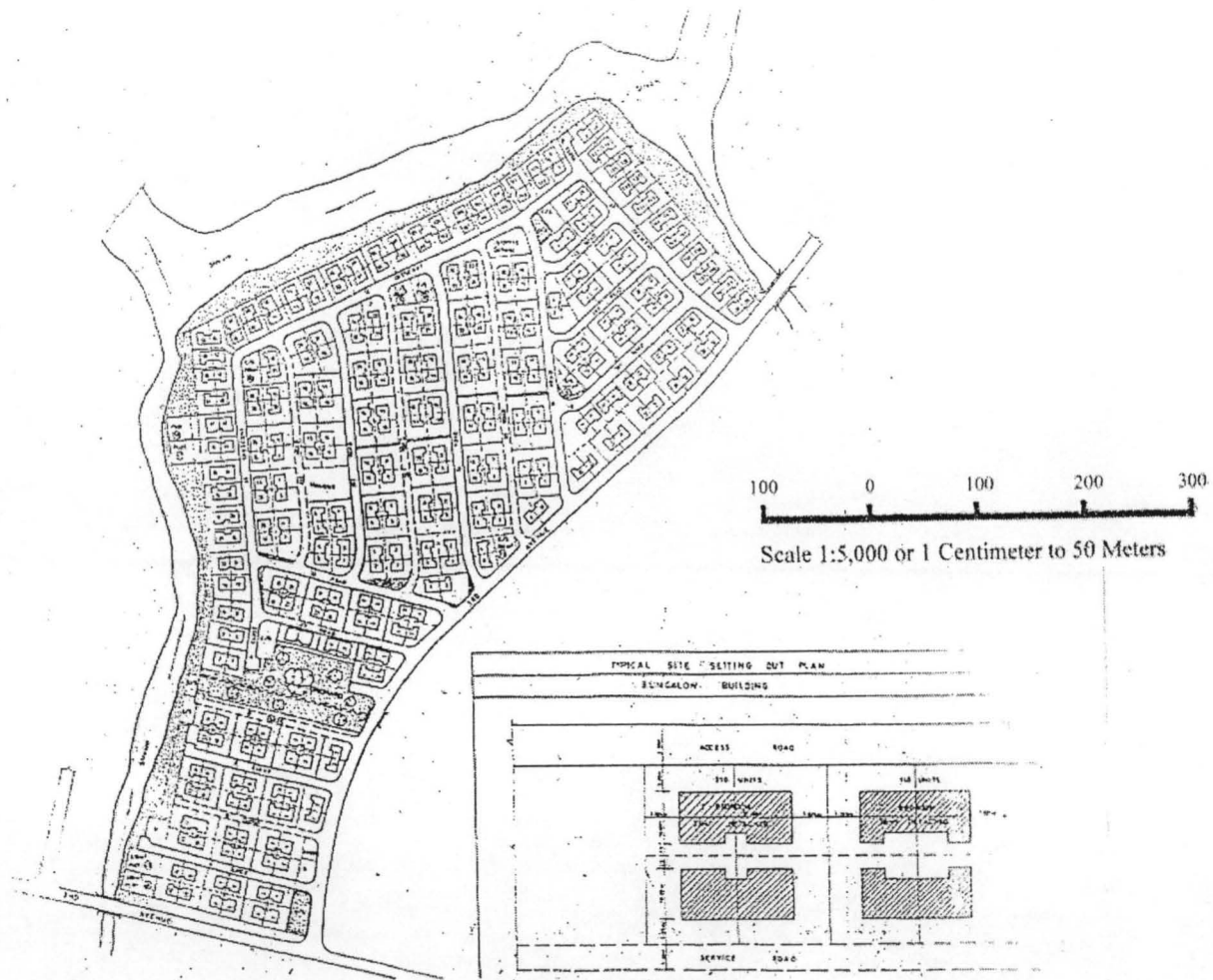


Fig. 1.5 F.H.A. Phase III Estate Kubwa layout

Source: Town Planning Section, Federal Housing Authority

### **1.6.2 Population**

Kubwa has a current population of about 220,000 (2006 census). The Kubwa Phase III estate plan was proposed for a population of little over 1200 people. This estimate was based on the number of house units proposed and provided and the average household size of 11 people. The proliferation of illegal structures and the influx of squatters which constitute a lot of problems to the estate now was not envisaged.

The population has almost triple as a result of unplanned exodus of workers to Abuja in recent times. Houses meant to accommodate a family are now being occupied by two or more families. With the monetization policy of the Federal Government, one would expect a reduction in the population, but reverse is the case as most of the beneficiaries now have the boldness to modify and rent the houses on rooms' basis.

### **1.6.3 Socio-economic characteristics of the people.**

More than 70% of the populations in Kubwa Phase III are civil servants with low and medium scale income. Their average income is about three hundred thousand naira (300,000.00) per annum. These categories of occupants are often characterized by large family size. and the average household size is 12 people.

The remaining number of the population (less than 30%) engages in one business or the other. These businesses range from groceries to real estate agencies. Corner shops are located strategically to provide accommodation for such business. Those who cannot afford the high cost of renting corner shops often erect

illegal batchers as provision stores. Few pocket markets in Kubwa are still regarded as temporary markets as government are still making efforts for their relocation.

Kubwa is not an industrialized town but there are few cottage industries in the area. These include:- Sachet water, production plants, paint manufacturing industries and few others.,

#### **1.6.4 Climate**

The climate of the study area is not significantly different from that of the FCT as a whole. Its annual temperature range between 21<sup>0</sup>C and 32<sup>0</sup>C. the annual rainfall is about 1390 millimeters with the highest rainfall recorded in the month of July, August and September. Another significant phenomena associated with the wet season is not only the occurrence of lightening, but also thunder storm, severe winds and intensive rainfalls. The thunderstorms and the high speed easterly winds have resulted from the Jos Plateau squall lines or the sudden up draft of wind due to the Bwari – Aso ranges enclosing the city.

#### **1.6.5 Topography**

The study area is generally low, undulating and dotted with rock out crops. The hills heights range from 406 meters at highest point. The slopes range from one to ten percent except in rocky out crops and valley sides where the slopes range from 20 – 30 %. Generally, the entire area slopes in a South ward direction.



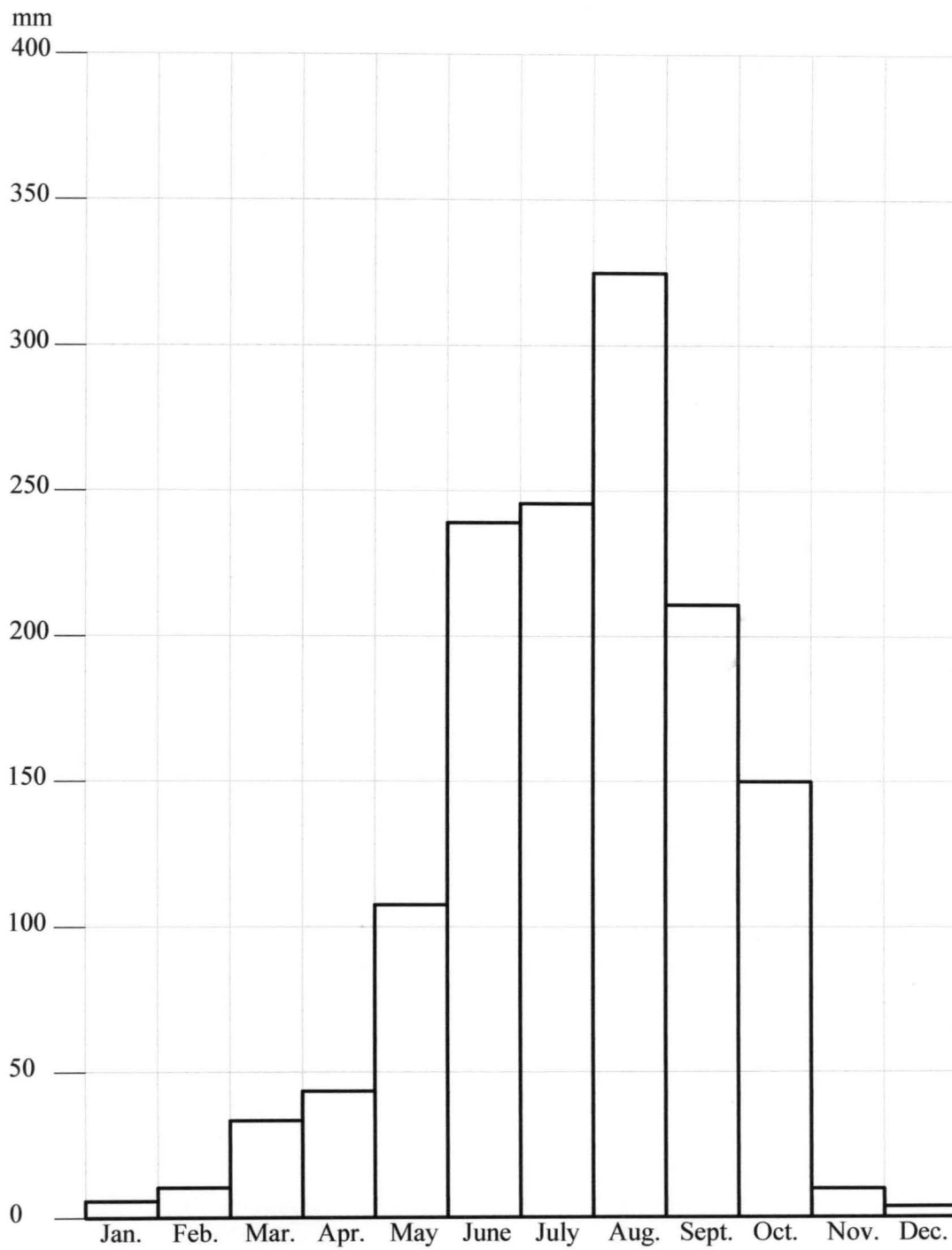


Fig. 1.6 Abuja mean montly rainfall

Source: Nigerian Meteological Agency (2010)



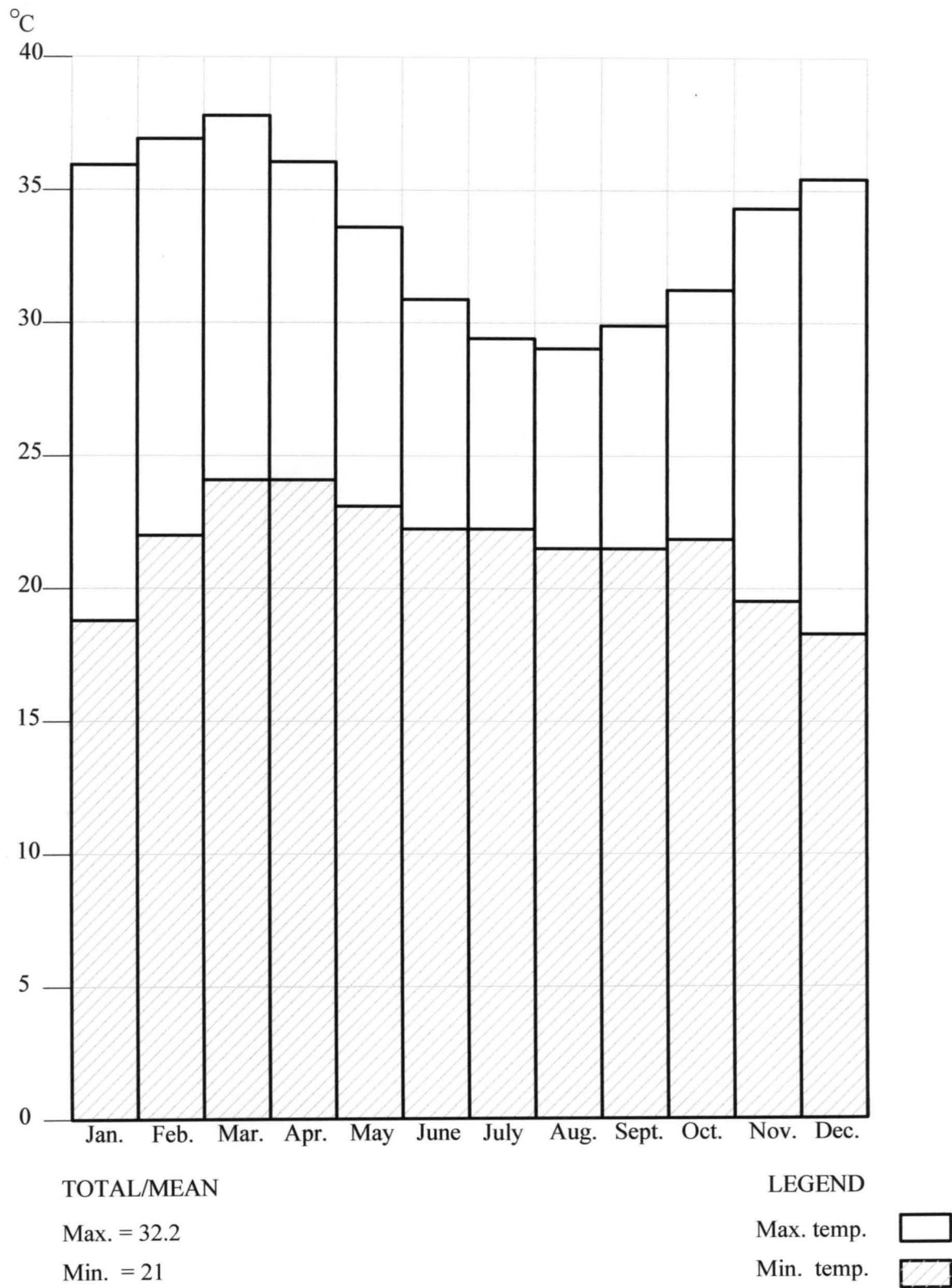


Fig. 1.7 Abuja mean montly maximum and minimum temperature

Source: Nigerian Meteological Agency (2010)

#### **1.6.6 Hydrology**

The Kubwa is bounded to the north by the tributary of usuma river. There are number of streams in their narrow sizes which traversed the estate. These smaller streams serve as collection channels and these obey the general slope characteristics of the land. Storm water during raining season collect in these channels and empty into the usuma river. It is important to not that the study area is located at the down stream of usuma river which is damed at the upper level to provide the Federal Capital Territory with pipe borne water.

#### **1.6.7 SOIL AND VEGETATION**

The soil here is found to contain large amount of humus which makes it considerably fertile and hence suitable for farming. The soil type in Kubwa can be described as Clayey-loamy. This is not too good for construction due to its water retention tendency. The vegetation can best be described as parkland savannah with scattered trees. There are galleries of forest along numerous river valleys and the landscape is heavily covered by tall elephant grasses especially during the rains.

#### **1.6.8 EXISTING PLANNING AUTHORITY (FHA)**

Although, Federal Housing Authority took over the site to develop the estate, federal Capital Development Authority remain the over all planning Authority (FCDA). They provide and maintain the physical infrastructures while Federal Housing Authority (FHA) is responsible for building constructions and maintenance of the social infrastructures.

## CHAPTER TWO

### 2.0 LITERATURE REWEIW

#### 2.1 Relationship between environmental planning and physical planning.

The environment is everything that surrounds us, both living and non-living things (Ogundipe, 2006) Environmental planning is the process and pattern of action through which the use of land is controlled in a nation state . Environmental planning is a dynamic continuous process dealing with both physical and social interactions that lie within the field of interest of many disciplines. For instance, social sciences such as Economics, Sociology and Political Science which are focus on understanding the working of society including growth of cities, the use of resources, development of trade and commerce, transport and social institutions. In the process of handing the issues, theories, principles and laws are developed to capture not only the processes in human activities which often have either environmental causes or effect.

On the other hand, we have such disciplines in technology as surveying, engineering, architecture and so on. in which the focus is to build or established information base for the building, structures and infrastructures as a response to social demand.

Physical planning on the other hand can be defined as the art and science of ordering the use of land, the character and siting of building and communication routes so as to secure the maximum practicable degree of economy,

convenience and beauty (Keeble 1968).

Physical planning is a subset of environmental planning. Nevertheless it has both social and economic aims. Socially, successful planning tends to make people live happier, because it results in a physical environment which is conducive to health and allows for convenient and safe passage from place to place, and facilitates social interaction and visual attractiveness. Also good planning results in happiness. A proper spatial relationship between the communities in a region and the constituent parts of town compactness of development and an efficient arrangement of communication routes result in human activities being carried out more efficiently and less wastefully and this increases wealth.

One of the main weaknesses of Nigeria's planning effort, hitherto, has been its heavy emphasis on sectoral and financial planning almost to the total neglect of physical planning. The effect of this is now becoming increasingly reflected in the form of disorderly spatial and environmental development despite the rapidly increasing level of economic activity and rising incomes which the country has achieved in recent years. It is therefore the main objective of policy-makers during this period to reverse this trend by paying greater attention to regional development, including physical and environmental planning. This will enhance the quality of life for all citizens a development progress (Third National Development Plan 1975)

## 2.2 Characteristics of physical planning

There are basically four characteristics of successful planning which are of prime importance (Keeble, 1968).and these include:

- a) The promotion of accessibility access from home to work, school, shops and entertainment is promoted.
- b) The employment of resources as economically as possible, in order to achieve the greatest possible measure of improvement with necessary limited means.
- c) The separation of incompatible land uses from each other and the association of compatible uses.
- d) The carrying out of all development in a visually pleasant manner as is practicable.

For the purpose of carrying out comprehensive planning process in any place, five levels of planning are desirable; national, state, regional, Urban and local physical planning. These mentioned levels of planning constitute a system, being a phenomenon made up of elements (parts) and links – the links connect the elements to foster interaction. These levels of planning not only inter-relate and interact but also form a spatial hierarchy, in which lower order level of planning occurs as a constituent element of higher order level of planning.

Our focal area among the levels of planning is the urban physical planning level. This level of planning attempts to solve the problem of urban growth and decay. The ultimate aim which urban planning attempts to achieve through the

physical form and structure of urban settlement is the creation of functionally efficient physical environment for living, working, circulation and recreation.

In the research work on “Infrastructural Decay and the Urban Environment in F.H.A. estate Kubwa” (Shuaibu, 2000), efforts were made by the author to highlight some of the environmental problems caused by the distortion of Kubwa master plan as a result of illegal construction. The basic similarity with the current work is that both highlight improper planning as the major cause of the problem. While the former’s focal point and goal was centered on the enhancement of a quality environment through conservation preservation and management strategies, this study concentrated on the developments on floodplain zone of the same area with view of identifying the environmental implications.

### **2.3 Development Control (Physical)**

Physical development control tends to establish a comprehensive planning framework for a country’s long range physical development, improving the government ability to;

- i) Track development trends and project future development needs,
- ii) Explore the opportunities and impacts of alternative development scenarios
- iii) Establish responsible and consistent development policies and regulations based on social values, community aspirations, and fiscal realities.
- iv) Control, monitor and access new development proposals and construction in keeping with government policies and priorities;
- v) Carefully manage government expenses related to infrastructure and service provision in support of new development.



- vi) Ensure ease of implementation and effectiveness co-ordination between many governmental entities that play a role in the development process, and perhaps most importantly
- vii) Improve the quality of built environment for the benefit of all its residents.

Rapid urban growth experienced by most countries including Nigeria during the past few decades made effective and coordinated planning difficult which in turn resulted in several problems such as urban sprawl, traffic congestion and improper spatial allocation and distribution of public facilities and infrastructure. Some of the main planning issues that existed can be summarized as follows:

- i) Inadequate comprehensive physical development strategy that guides the type and direction of urban growth at different level; national, regional, urban and rural.
- ii) Urgent need to have a coordinated plan to utilize natural and human resources fro physical development.
- iii) Need to achieve a physical development pattern that is consistent with the social and cultural characteristics and values.
- iv) Insufficient control development and disparity between direction of physical development and infrastructure expansion
- v) Wide spread inconsistency between the land use types especially in the city centre which lead socio-economic and environmental problems.
- vi) Urgent need to provide adequate land for various urban activities such as housing, industries, commerce etc.
- vii) Need to prepare a long range and detailed

population forecast and its distribution in various parts of the country within a planning framework that will take into consideration availability of economic resources and upon which future development requirements can be assessed.

- viii) Need to have areas of high environmental value at national level and need to take measures to protect them from urban and industrial development.
- ix) Need to identify adequate sites for waste disposal at national level which satisfy environmental requirement and safeguard public health.
- x) Address public issues in a dynamic way through the preparation of the physical development plan on the GIS thus make them accessible and easy to update.

#### **2.4 The concept of Environmental Planning and Management (EPM)**

Environmental planning is the process of facilitating decision making to carry out development with due consideration given to the natural environmental, social, political, economic and governance factors and provides a holistic frame work to achieve sustainable out comes (Olugbesan, 1998). Environmental planning is the analysis of how people impact on natural resources. Decisions made regarding development and conservation, zoning and land use may have visible and invisible impact on the environment. Visible impacts include major land disturbances, loss of natural areas and wildlife or pollution. Invisible impacts may be contamination of land, water and air by point or non-point source pollution. Environmental planning projects involve protecting natural resources for future generation, identifying problem areas (such as storm water, erosion, hazards



and threatened sensitive areas) and developing strategies for correcting those problems.

Environmental planning and Management (EPM) approach promotes a city management process that is built on the following premises

- i) Sustainable cities are fundamental to social and economic development; they are engine of growth.
- ii) Environmental degradation adversely affects economic efficiency and social equity and hence obstructs the development contribution of cities.
- iii) Environmental degradation is not inevitable; what is required is a proactive management approach built on an understanding of the complex interaction between development and environment.

The EPM approach allows priority environmental issues in a city to be effectively addressed. It is a process – oriented framework that permits the different stakeholders to negotiate strategies and seek solutions collectively to common priority issues. ([www.unhabitat.org](http://www.unhabitat.org) July, 2008)

## **2.5 Flood**

A flood is regarded as any relatively high water level or discharge above an arbitrarily selected flood level discharge (Ahaman, 1997). Thus a general definition of flood may be given as a body of water which rises to overflow condition exists when discharge of river cannot be accommodated within the margins of its normal channels, so that the water spread over adjoining ground (Uchegbu, 2002). During floods, water fills up channels, submerges the cliffs and destroys villages, farmlands and properties.

Among all natural disaster, flood produce some of the highest death tolls material damage.

### **2.5.1. Causes of Flood**

Floods result from two basic causes namely: natural and man-made (Oguike, 1988). Climate – induced floods are the most common types of floods, usually resulting from either short – duration intensive rainstorms or excessively long periods of rainfall. Floods in this category can also result from seasonal or sporadic melting of ice or snow.

Flooding may also result from causes that are not directly related to particular climatic event ( e.g. a severe rainstorm ) but are indirectly related to climate. Such floods are called; part – climatological and include floods caused by tides and storm surges.

Structural disturbances or failures provide another opportunity for water to inundate adjacent land. Included in this category are floods caused by terrestrial and submarines earthquakes, landslides, the failure of dams and other structural works designed to confine water.

### **2.5.2 Types of rain flood**

**Flash flood:** These are short floods, often less than one hour in length with a single peak which responds rapidly to intense convective storms. These storms are usually localized and their effects are most noticeable in head water streams.

**Single – event floods:** These have a single main peak but are of longer duration than flash floods. This is the most common type of flooding in most parts of the world and may result from a variety of rainfall conditions in which wide spread rain of several hours or days duration move over the drainage, such rain are commonly associated with cyclonic storms.

**Multiple – event floods:** As the name suggest, exhibit a series of peak flows during a relatively long-period of generally increased discharge. For example, synoptic rainfall will lead to increase river discharge. Successive flood peaks follow closely on each other in response to a more complex weather situation than is normal in the case of single event floods. In such cases, although the individuals flood peaks may not exceed or even closely approach previous maxima, the flooding is often severe because its duration extends over a period of several weeks or months. On rare occasions, record peak discharges combine with the extended duration of flooding to make multiple event floods the most disastrous of all flood occurrences.

**Seasonal flood:** In many parts of the world multiple-event flooding recurs annually in the wet season on a massive scale, with the period of high water often extending over several months and with the area of inundation counted in tens of thousands of square kilometers. According to the level of man's adaptation to them, these seasonal floods may bring great benefit or catastrophe.

### 2.5.3 Effects of flooding

Floods not only damage property and endanger the lives of humans and animals, they have other effects as well. Rapid runoff causes soil erosion as well as sediment deposition problems downstream. Spawning grounds for fish and other wildlife habitat are often destroyed. High-velocity currents increase flood damage; prolonged high floods delay traffic and interfere with drainage and economic use of lands. Bridge abutments, bank lines, sewer outfalls, and other structures within floodways are damaged, and navigation and hydroelectric power are often impaired. Financial losses due to floods are commonly in millions of dollars each year (Rashid, 1982).

Factors that control the damage caused by floods include:

- Land use on the floodplain.
- Magnitude (depth and velocity of the water and frequency of flooding)
- Rate of rise and duration of flooding.
- Season (for example crops on flood plain)
- Sediment load deposited.
- Effectiveness of forecasting, warning and emergency system.

Effect of flooding may be primary, that is, caused by flood or secondary; caused by disruption and malfunction of services and systems associated with the flood. Primary effects include injury and loss of life and damage caused by swift currents debris and sediments to farms, homes, buildings, railroads, bridges, roads and communication system. Erosion and deposition of sediments in rural

and urban landscape may also involve a loss of considerable soil and vegetation.

Secondary effects may include short term pollution of rivers, hunger, diseases and displacement of persons who have lost their homes. In addition fires may be caused by short circuit or broken gas mains.

(Uchegbu, 2002)

## **2.6 Flood plain development or encroachment**

Floodplain, are regions of a valley floor located on either side of a river channel. A floodplain is built of sediments deposited by the river that flows through it and is covered by water during floods when the river overflows its banks (Montgomery, 2000). During most floods, just a portion of the floodplain is covered with water and only during infrequent, very large floods is the whole floodplain covered. Floodplains tend to develop on the lower and less steep sections of rivers.

Large floodplains are found in the lower reaches of most of the world's major rivers. The active floodplain of the lower Mississippi River, the zone that is subject to flooding at the present time, is about 16 km (about 10 miles) across. As with most large floodplains, however, the active floodplain lies within a much broader floodplain formed by deposits laid down by the river earlier in its history. The Nile River in Egypt also has an extensive floodplain, which is regularly flooded each year because of heavy rains in the upper part of the Nile Basin. The Ganges and Brahmaputra rivers in India and Bangladesh respectively and the Yangtze River in China have very large floodplains

that support a dense population engaged in agriculture using their fertile floodplain soils.

Flood plain encroachment is more often described as a destructive development, with its assaults on river banks, riparian corridors, flood plains, stream banks, fish habitat and water quality. This involves building of houses on flood prone areas which are generally regarded as unsafe. Many factors are usually responsible for such development. Such factors range from economic to social inclination. Socially, most people are highly inclined to a particular river for religious or recreational purposes; hence urge to live very close to that river. Economically, some river form major economic forts in some area. People tend to develop closer the river to enhance their economic base. For instance, river Niger in Lokoja. The drastic environmental and public health and safety consequences that can stem from riverside development are enormous. Fragile river ecosystems end up being manhandled. As a result, valuable open space disappears, run off increases, riparian habitat vanishes, erosion rates goes up, flood storage capacity decreases and water quality loses ground.

Floods play a central role in creating and shaping floodplains (Summerfield, 2006). During a flood, the flow of a river is both deeper and faster, allowing it to carry more sediment. Some of this material comes from upstream of the floodplain, but some of it is also eroded from the floodplain itself. As the flood recedes, the depth and speed of the river diminishes and the river deposits some of its load of sediment. Since floodplains are constructed of the material



being carried by the river, they are composed of relatively fine sediment. Most floodplains are composed of sand, silt, and clay, but floodplains of gravel occur where the water flows especially fast.

The sediments in a floodplain are constantly being eroded and redeposit as the river channel shifts position within the floodplain. For example, when a river makes a bend, the water on the outside of the bend speeds up while the water on the inside of the bend slows down. Consequently, material is eroded from the outside of bends where the flow is a little faster and deposited along the inside of bends where the flow is slower. These low, arc-shaped deposits on the inside of bends are called point bars.

During floods, the water level rises until it overflows the banks of the channel. The water flowing over the floodplain is much shallower than the water flowing in the channel and will flow slower than the water in the channel. As the water that has overflowed the banks slows, it deposits some of its sediments. This leads to a build-up of sediment, which produces ridges running parallel to the channel. Along large rivers, these ridges, known as levees, can rise 5 to 10 m (15 to 30 ft) above the floodplain. Once formed, levees have the effect of confining flood waters close to the channel, but during large floods, these levee barriers are breached and the flood waters pour on to the floodplain area behind. These high floodwaters carry with them sediment that is then deposited on the floodplain beyond the levee. In this way, the floodplain deposits build up vertically. (Summerfield, 2006).

## CHAPTER THREE

### 3.0 MATERIALS AND METHODS

#### 3.1 Design of the study

This study was designed to examine the phenomenon of flood plain encroachment in phase III (F.H.A) estate Kubwa.

In this project, the survey method was employed. This design was considered appropriate because it is a fact finding technique and will facilitate the generation of information about current situation.

#### 3.2 Sources of data

Two main sources were adopted in gathering data for this study. They are: primary and secondary Sources.

##### 3.2.1 Primary data

###### i) Questionnaire

This involved the use of structured questions which were prepared in printed form and administered through personal interview on the respondents. The questions were asked with a set of answers from which respondents ticked the alternative which represent their opinion.

Data gathered through this method include; the residents perception of the existing infrastructure in terms of their adequacy, quality and



structural condition, the various environmental problems experienced by respondents. The socio-economic status of the residents are measured using the part of the questionnaire which required to know their economic and social background as these would determine the type and quality of infrastructure required and the ability to value and maintain them.

**ii) Reconnaissance Survey:**

This process involves direct personal assessment of the existing condition of Kubwa Phase III. The physical condition of the building on the flood plain was determined. Photographs and measurement of buildings set backs with respect to the river banks are equally taken.

The secondary data gathered under this method included : the base map and other related plan obtained of the study area.

**3.2.2 Secondary data**

This involves the collection of data through an in depth study of the works done by some academicians, theorists, professionals and authors alike. Information from text books, newspapers, journals and other publication materials were also gathered for the purpose of this research.

The secondary data also include collection of the base maps and other related plan obtained fro the study area which provides the guide in the assessment of the

existing infrastructure.

### **3.3 Sample size and sampling procedure**

A purposive sampling technique was adopted in this study. This ensured that only those elements that are relevant to the research are included (Nworgu, 1991).

A total of 300 questionnaires were distributed to almost all the residents living not more than 100m from the river bank. This was achieved with the help of the base map in fig.1.5. The answered questionnaires were collected upon appointments. A total of 220 buildings were visited and their various set backs from the adjoining river bank were also measured to ascertain their distances in meters.

### **3.4 Instrumentation**

The basic tools used for this research include: hand camera for picture information, measuring tape for measuring distances and computer hard and soft wares for data analysis and presentation of report.

### **3.4 Method of data analysis**

Statistical methods were used in data analysis. Descriptive method of statistical analysis was adopted. These include: tabulation, percentages and diagrammatic illustration. This ensured simplicity and easy understanding.

## CHAPTER FOUR

### 4.0

### RESULTS

#### 4.1 The questionnaire results

Having carried out the necessary survey to acquire the required data and information for the study, the results from the questionnaire are presented in a tabular format for easy analysis. Some of the important scenes were equally captioned in photos.

From about 800 households in Kubwa Phase III housing Estate my study area, 300 household living no more than 100m from the river were distributed the questionnaires. Out of the 300 questionnaire distributed to both land lords and tenants, 284 were returned, representing about 95% responses.

Section B of the questionnaire was exclusively for landlords, while Section A and C were answered by both landlords and tenants.

#### 4.2 Results on residents personal information

**Table 4.1: Occupation of respondents**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Civil Servant	176	62
Business	34	12
Artisan	20	7
Retiree	46	16
Others	8	3
<b>Total</b>	<b>284</b>	<b>100</b>

Source: Field Survey, 2008

The residents of F.H.A. estate phase III Kubwa are engaged in various occupations which include: civil service, business, artisans and others trades.

The above table shows occupational distributions of respondents. The first column shows the various trade options, the second column highlighted the responses on the various options while the last column shows the various percentages of the response.

**Table 4.2: Marital Status of respondents**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Single	68	24
Married	216	76
<b>Total</b>	<b>284</b>	<b>100</b>

Source: Field Survey, 2008

The residents are of different marital status. While some are married, others are single. The above table highlighted the respondents marital status. The first column shows the various status options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.3: Years of occupation**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
1 – 5 years	52	18
6 – 10 years	76	27
Over 10 years	156	55
<b>Total</b>	<b>284</b>	<b>100</b>

Source: Field Survey, 2008

The residents have been staying in the estate for different number of years.

The above table shows various range of years which the respondents has been occupying the existing building. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.4: Household size of respondents**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
1 – 5 persons	36	13
6 – 10 persons	172	60
Over 10 persons	76	27
<b>Total</b>	<b>284</b>	<b>100</b>

Source: Field Survey, 2008

The above table highlighted the respondents household size range. Although the F.H.A. estate phase III Kubwa was designed with specific average number per household, the household sizes still vary. The first column shows the various household size options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.



**Table 4.5: Mode of occupancy**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Tenant	72	25
Owner occupier	212	75
<b>Total</b>	<b>284</b>	<b>100</b>

Source: Field Survey, 2008

While some residents of F.H.A. estate phase III Kubwa are landlords others are tenants. The above table highlighted the respondents mode of occupancy in the existing building. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.



**4.3 Results on the physical and statutory state of the building in F.H.A. estate phase III Kubwa.**

**Table 4.6: Age of respondents buildings**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
1 – 5 years	12	6
6 – 10 years	42	20
Over 10 years	158	74
<b>Total</b>	<b>212</b>	<b>100</b>

Source: Field Survey, 2008

The buildings in F.H.A. estate phase III Kubwa were constructed at one time or the other. While some are less than 10 years of age others are more than 10 years. Table 4.6 above shows the various age range of the respondents buildings. The first column shows the various age options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.7: Types of Building**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Bungalow	212	100
Storey building	-	-
<b>Total</b>	<b>212</b>	<b>100</b>

Source: Field Survey, 2008

There are various building type, which ranges from bungalow to high rising

The above table highlighted the respondents various building type. The first column shows the various status options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.8: Purpose of buildings**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Residential	208	98
Commercial	4	2
Religious	-	-
<b>Total</b>	<b>212</b>	<b>100</b>

Source: Field Survey, 2008

The above table highlighted various purpose and functions of the respondents building. The first column shows the various purpose options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.9: Sources of plots**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Planning Authority	184	87
Land vendors (Agents)	28	13
Indigenes	-	-
<b>Total</b>	<b>212</b>	<b>100</b>

Source: Field Survey, 2008

Land can be acquired through various means. The above table shows various sources through which respondents acquired their plots. The first column shows the various source options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.10: Year of land acquisition**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
1 – 5 years ago	12	6
6 – 10 years ago	42	20
Over 10 years ago	158	74
<b>Total</b>	<b>212</b>	<b>100</b>

Source: Field Survey, 2008

The above table highlighted the various years range in which respondents acquired their plots. The first column shows the various years options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.11: Whether building approval was obtained**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Yes	188	89
No	24	11
<b>Total</b>	<b>212</b>	<b>100</b>

Source: Field Survey, 2008

Most landlords often take their time in obtaining building approval before erecting their structures, while others usually build without necessary approval. Table 4.11 shows whether respondents obtained building approval or not. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.12: Safety of respondents building**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Yes	180	88
No	32	12
<b>Total</b>	<b>212</b>	<b>100</b>

Source: Field Survey, 2008

Some buildings are very sound structurally, while others in one level of deterioration or the other. The above table shows respondents perceptions on the safety of their building. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.13: Reasons for choice of site**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Social amenities	196	92
Affordability	-	-
Others (specify)	16	8
<b>Total</b>	<b>212</b>	<b>100</b>

Source: Field Survey, 2008

A lot of reasons may influence the choice of building site. The above table highlighted the respondent reason for the choice of their building site. The first column shows the various choice options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.



4.4 Results on the environmental problems experienced by the residents of F.H.A. estate phase III Kubwa.

Table 4.14: Whether respondents have experienced any environmental problem

Options	Responses	% Response
Yes	236	83
No	48	17
<b>Total</b>	<b>284</b>	<b>100</b>

Source: Field Survey, 2008

The experience of environmental problems may vary from one point to another. The above table shows if respondents have experienced any environmental problem. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages

**Table 4.15: Types of environmental problem experience**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Flood	136	58
Erosion	24	10
Flood/Erosion	76	32
Others (specify)	-	-
<b>Total</b>	<b>236</b>	<b>100</b>

Source: Field Survey, 2008

The above table highlighted various environmental problems as experienced by respondents. The first column shows the various choice options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages.

**Table 4.16: Whether it is an annual occurrence**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Yes	224	95
No	12	5
<b>Total</b>	<b>236</b>	<b>100</b>

Source: Field Survey, 2008

The above table shows whether the environmental problems experienced by respondents occur annually. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages

**Table 4.17: Peak period of such environmental problem**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
January - March	-	-
April - June	-	-
July - September	224	100
October - December	-	-
<b>Total</b>	<b>236</b>	<b>100</b>

Source: Field Survey, 2008

The above table highlighted the peak period of the environmental problems as experienced by respondents. The first column shows the various months options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages

**Table 4.18: Whether affected by the problem**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Yes	224	100
No	-	-
<b>Total</b>	<b>224</b>	<b>100</b>

Source: Field Survey, 2008

The above table shows whether the respondents is affected by the environmental problem. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages

**Table 4.19: How the respondents are affected**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Destruction of properties	116	51
Partial Displacement	84	38
Others (specify)	24	11
<b>Total</b>	<b>224</b>	<b>100</b>

Source: Field Survey, 2008

The above table highlighted various ways in which respondents are affected by the environmental problems. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages

4.5 Results on the impacts and effects of environmental problems on the residents of F.H.A. estate phase III Kubwa.

**TABLE 4.20: Impact of the problem on respondents building**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Structural defects	128	57
Facial deterioration	96	43
<b>Total</b>	<b>224</b>	<b>100</b>

Source: Field Survey, 2008

The above table shows the impact of the environmental problems on respondents buildings. The first column shows the various impact options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages

**TABLE 4.21: Other problems associated with the area**

<b>Options</b>	<b>Responses</b>	<b>% Response</b>
Noise pollution	-	-
Over-stretched infrastr.	108	85
Social vices	12	9
Epidemic	-	-
Others (specify)	8	6
<b>Total</b>	<b>128</b>	<b>100</b>

Source: Field Survey, 2008

The above table highlighted other problems associated with the respondents area. The first column shows the various options, the second column highlighted the responses on the various options while the last column shows the correspondent percentages



#### 4.6 On spot assessment of physical conditions of F.H.A. estate phase III Kubwa

**TABLE 4.22: Various building set backs from the river bank in F.H.A. estate phase III Kubwa.**

<b>Set back (m)</b>	<b>No. of building</b>	<b>% Coverage</b>
0 – 4.9	7	3
5 – 9.9	11	5
10 – 14.9	9	4
15 – 19.9	51	23
20 and above	142	65
<b>Total</b>	<b>220</b>	<b>100</b>

Source: Field Survey, 2008

The above table highlighted various building set backs from the river bank in F.H.A. Estate phase III Kubwa. The first column shows the various setbacks options, the second column highlighted the number of buildings in the various options while the last column shows the correspondent percentages



Plate I: Broken drainage gutter caused by constant flood in F.H.A. estate phase III Kubwa



Plate II: Ravaging effect of flood in F.H.A. estate phase III Kubwa



Plate V: Partially collapsed fence of an existing building in F.H.A. estate phase III Kub



Plate VI: A typical house constructed in floodplain zone in F.H.A. estate phase III Kubwa



Plate VII: Deplorable state of some of the buildings in F.H.A. estate phase III Kubwa



Plate VIII: Indiscriminate dumping of refuse in the phase III Kubwa river by the adjoining buildings in the flood plain

## CHAPTER FIVE

### 5.0 DISCUSSION, CONCLUSION AND RECOMMENDATIONS.

#### 5.1 Discussion

Having presented the results of the survey carried, it become very imperative to discuss, analyze and interpret the data and information used for this study.

##### 5.1.1 Residents personal information

From table 4.1 in chapter four, 62% are civil servants, 12% are into one business or the other, 7% are artisans, while 16% have retired from active service. 3% falls into other occupations which are not listed in the options.

This shows that the estate is predominantly habited by Civil Servants. Although it is a residential area, on the spot assessment shows that some of the civil servants still engage in petty trading in front of their houses. This shows the socio – economic activities in the status of the occupants. From table 4.2, 24% are single, while 76% are married. This shows that the occupants are mostly family men and women. Most of them reside in the estate with their entire household majority of the singles still live with squatters and some of their dependents.

Table 4.3 highlighted the period of occupation of the various residents from the table, 18% stated that they have been residing in the estate for between one and five years, 27% have been living there for the past 6 to 10 years while 55% have lived in the estate for over 10 years. This shows that the estate is habited by the people at various periods. Majority of the occupants have been living in the

estate since inception. This made it possible for them to have in-depth knowledge of the situation of things in the estate.

Table 4.4 highlighted the household size range of the estate. From the table, 18% of the total respondents are from 1 to 5 persons in a household; 60% are from 6 to 10 persons per household while 27% of the total respondents stated to be over 10 in population per household. This shows that the estate is fairly dense in population.

Table 4.5 of Chapter four shows the mode of occupancy of respondents. 27% are tenants while 75% are landlords. This shows that majority of the occupants are landlords. This is as a result of recent monetization policy of the Federal Government which afforded Civil servants the right to acquire Government houses they were living in.

### **5.1.2 Physical and statutory state of the buildings in F.H.A. estate phase III Kubwa**

Table 4.6 highlighted the ages of the various building. From the table, 6% are of age 1 to 5, 20% are of 6 to 10 years, while 74% are over 10 years of age. This shows that majority of the buildings are among the ones originally constructed by the federal Housing Authority from the inception of the layout. Few of the buildings were built on carve-out lands in the layout. Hence are not in the original master plan.



Table 4.7 shows the various building type in the estate. From the table, all the 212 building representing 100% are bungalows. The estate was designed to accommodate bungalows only. There is no storey building in the estate. This configuration has been maintained.

Table 4.8 shows the usage of the buildings. From the table 98% are for residential purpose, while the remaining 2% are for commercial purpose. This proves that the estate is basically for residential purposes with very few corner shops. This shows the socio-economic status of the area.

Table 4.9 highlighted the various sources of the respondents land allocation. From the table, 87% stated that they got their plots through the Planning Authority (FHA), while 13% got theirs through land vendors (Agents). Meanwhile, none of the respondents acquired through the indigenes.

This shows that most of the occupants were among the original allottees of the Federal Housing Authority. Some secured their buildings with the plots as a result of government monetization policy while few of them that secured through land vendors (Agents) are those that acquired the carve-out lands, especially in the flood plain zone. Hence, this caused great distortion to the original master plan.

Table 4.10 shows various years of land acquisition. Form the table, about 6 % secured their land 1 to 5 years ago, 20% secured theirs 6 to 10 years age, while 74% secured their plots more than 10 years ago. Again, most of the occupants

got their land together with the buildings through purchase or allocation from Federal Housing Authority immediately the buildings were constructed.

Table 4.11 shows, their response as regards to building approval. From the table, 89% stated they obtained building plan approval from the planning Authority before erecting their structures, while the remaining 11% did not obtain building approval before constructing theirs. Majority of these claimed to have obtained building approval from the planning Authority before erecting their structures are the original allottees and those that benefited from the monetization policy. Few of the buildings are illegal structures since they did not have building plan approval.

Table 4.12 highlighted respondents' views on the safety of the building with respect to the site. From the table, 89% considered their site safe for building while 11% believe their site are not safe for buildings. This shows the level of uncertainty in the minds of the occupants about the safety of their buildings.

Table 4.13 shows various reasons that affected the respondents' choice of site for building. From the table, 92% stated that availability of social amenities was their major reason for choice of building site, while about 8% specified other reasons ranging from accessibility to proximity as their main reason for the choice of their building site. This shows that availability of social amenities is a key factor in choice of building site.



### **5.1.3 Environmental problems experience by residents of F.H.A. estate phase III**

#### **Kubwa**

Table 4.14 shows whether the respondents have experienced any environmental problem in the estate. From the table, 83% stated that they have experienced one environmental problem or the other while 17% stated otherwise.

Table 4.15 highlighted various environmental problems experienced by respondents. From the table, 136 respondents representing 58% respondents representing stated that flood is the environment problem they have experienced. 24 respondents representing 10% stated Erosion as their major environmental problem, while 32% stated both Erosion and flood as the environmental problem experienced. The above data shows that flood is the major environmental problem encountered by Kubwa Phase 3 residents. One way or the other about 90% of the respondents have experienced flood. This percentage is taken from the 236 respondents who stated that they have experienced one environmental problem or the other.

Table 4.16 shows how often the environmental problem occurs. From the table, 95% stated that the environmental episodes are an annual event while 5% stated otherwise. This shows that flood episode have become an annual event which requires urgent attention.

Table 4.17 highlighted the peak period of the environmental problem from the table, 224 respondents representing 100% of those who experienced flood and erosion incidents as annual events stated July to September as the peak period of their problems. The above data shows that what the residents are experiencing is seasonal flood. In this case, multiple-event flooding which recurs annually in the wet season. This exhibit a series of peak flows during a relatively long – period of generally increased discharge.

From table 4.18, 224 respondents representing 100% stated that they have been affected one way or the other by the already mentioned environmental problems.

Table 4.19 highlighted how the respondents are affected by the environmental problems. From the table, 51% stated that their properties were destroyed during such environmental episode. 38% stated that they were partially displaced while 11% specified problems ranging from inaccessibility of their homes to other inconveniencies as the way they were affected. The above data shows that flood not only affect our physical environment but also to a great extent our social environment.

#### **5.1.4 Impacts and effects of environmental problems on the Residents of F.H.A. estate phase III Kubwa**

Table 4.20 highlighted the various impact of the problem on respondents

building, from the table, 57% stated that the flood/erosion episodes in the estate affected their building structurally; while 43% stated that the aesthetic qualities of their buildings have been affected. This shows the ranging effect of flood on buildings. On spot investigation revealed some dangerous cracks on walls (plate VI in chapter 4) as a result of weaken foundation, paints and other wall finishes of most building in the study area have started peeling off.

Apart from erosion and flood, the residents still experience other problems. 85% of respondents stated that apart from erosion and flood, the infrastructures in the estate have been over stretched. 9% indicated that social vices are another major problem associated with the Estate. While 6% specified other problems ranging from lack of recreation centers to lack of educational and worship centers.

#### **5.1.5 On spot assessment of physical condition of F.H.A. estate phase III Kubwa**

Plate I revealed the total decay in the basic infrastructures. This is evidence by dilapidated roads, blocked and broken gutters and culverts, and also improper refuse disposals as shown in plate VIII.

These have been as a result of repeated flood over the years. Most of the buildings constitute great obstruction to water channels there by extending the flood to areas which ordinarily does not supposed to be in danger zone. The domestic

activities of those buildings in the floodplain also impose serious threats to the adjoining river and the riparian habitats. This is evidenced in plate 4 where the river has been turned to refuse dump.

The underlying effects of these activities cannot be over emphasized. Apart from causing misbalance in the general eco-system of the river, epidemic also looms. This is because there is the tendency of the community to resort to the river as an alternative in the event of water shortage.

Table 4.22 in chapter four highlighted various set backs of sampled buildings in F.H.A. estate phase III Kubwa from the adjoining river. From the table 7 buildings representing 3% have between 1 and 4.9 m as set back. 11 buildings have 5 to 9.9 m as set backs, this represents 5%, 9 buildings have between 10 and 14.9 as set back, representing 4%. 51 buildings representing 23% have between 15 and 19.9m set back, while a total of 142 buildings which represent about 65% have 20m and above as set back.

Going by Federal Capital Development Authority standard of 15m set back from the river back as the minimum (Abuja Development Control Manual), about 12% of the sampled buildings are supposed to be in danger zone. On spot assessment revealed that the activities of this few building in the flood plain zone have further aggravated the flood to extend to buildings as far as 100m from the river bank. This is evidenced by F.C.D.A. marks for demolition on those buildings.

## **5.2 Summary**

This research was centered on riverside development and floodplain encroachment in phase 3 housing estate Kubwa FCT, and the implication of these for environmental management. The research was carried out and the data collected analyzed. The study revealed that floodplain encroachment is the major cause of recurring flood incident in the estate. The research also show that the flood not just affect the buildings in the floodplain zones, but the menace extends even to the area which are ordinarily considered as safe zones.

The study also revealed that the area is over developed and green belts and organized open playgrounds have been converted to residential use. This has resulted in congestion and subsequently decays in some basic infrastructure in the area.

It was also revealed in cause of the research that the estate lack environmental management strategies. This evidenced by the indiscriminate dumping of refuse along the river shores, blocked and broken gutters were left unattended to.

## **5.3 Conclusion**

The drastic environmental and public health and safety consequences that can stem from riverside development are written all over phase 3 estate Kubwa, Abuja. In the last couple of years, in particular, development have been pushing



ever outward, putting people too close to river banks and floodplains. From there, fragile river ecosystems end up being manhandled to try and control flooding, stop property loss, and prevent drinking water contamination. The end result includes; disappearance of valuable open space, increase in runoff, vanishing of riparian habitat, increase in erosion rate, reduction in flood storage capacity, an loss in water quality. In a nutshell, we must respect how rivers work and learn about what they need to remain healthy, dynamic, and stable.

When we make land-use decisions, floodplain protection is also an imperative. River system health is tied to floodplain and their ability to function. Periodically inundated by floodwaters, these riverside lands are natural sponges. They soak up high water, and store and slowly release it, reducing the velocity of the river and letting channels move floodwaters downstream. Floodplains also improve water quality. For instance, as water moves through the floodplain, plants act as natural filters, trapping sediments and capturing pollutants. Floodplain trees and plants also anchor the river's banks, guarding against erosion, creating shade, and lowering water temperatures.

Moreover, floodplain trees and shrubs are the foundation of the food chain-feeding bugs and other aquatic organisms and creating a vegetated transition zone between rivers and uplands habitats providing shelter, food, and migration of corridors for river wildlife.

This study was well conceived and carried out with a clear goal of achieving an

improvement on the quality of the environment of the study area. An environmental manager perceives an urban environment as a complex entity. In his opinion, the planner should not forget while planning the urban area, to always be mindful of the consequences it may bring to the natural environment. The planner on the other hand, believes that man's idealized uses should be shared over space with caution in case of future use. His major aim is to meet man's need without much concern on the manipulated environment. Hence, planners are futuristic but environmental managers are more futuristic.

Urban environment should be well planned and managed as it is pleasing. It is monumentally important that we respect the rules of the river and make land-use decisions that enhance the natural tendencies of our watershed.

#### **5.4 Recommendations**

Having carried the research on riverside development and floodplain encroachment in phase 3 estate Kubwa, and highlighting the various environmental implications associated with such development, it becomes imperative to proffer solutions to the problems. From an environmental point of view, the best approach to flood problem lies in a planned combination of water control structures, floodplain zoning, adequate forecasting and insurance.

The following steps should be taken to check flood and its overlying effects on the estate.

1. All building sited less than 15m from the river bank should be listed as unsafe, therefore should be removed (Abuja Development Control). However since majority of them got their allocation from the appropriate planning authority, it is necessary to carry out proper evaluation of the affected buildings in order to workout their real values before embarking on their demolition. They should be relocated before the demolition.
2. A proper retaining wall should be constructed behind the remaining building adjoining the 15 meter setback from bank of the river. On spot assessment shows that what most residents constructed as embankments behind their building are not structural retaining walls. Construction of an outright canal is not only expensive but will create imbalance in the ecosystem of the river. The project should be jointly carried by the Federal Housing Authority (F.H.A) which is the Estate manager and Federal Capital Development Authority (F.C.D.A.) which provides infrastructure to the estate. The retaining wall should act as a means of flood confinement.
3. All gutters and drainages in the estate should be cleared of sand silt to ensure free flow of runoff. This should be done with the mandate of Abuja Environmental Protection Agency (A.E.P.A.). They should also ensure proper refuse disposal and clear all debris downstream to prevent blockages which usually lead to flood. A well articulated environmental sanitation programme should be introduced in the estate to ensures a more healthy environment. Proper and effective refuse disposal system should be adopted in the estate.
4. The remaining green belt at the northern boundary of the stream



should be preserved. It can be developed into a recreational centre. This will further enhance the quality of the environment.

5. There should be public enlightenment on danger of floodplain encroachment. This can be done through bills and posters. Adequate forecast and early warning system of flood prevention should be equally included in the enlightenment program (Federal Ministry of Environment Abuja). 2006 flood episode claimed a lot of lives and properties because people were taken unaware.

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## INDEX 1

### RIVER SIDE DEVELOPMENT AND FLOOD PLAN ENCROACHMENT A CASE STUDY OF PHASE 3 ESTATE KUBWA FCT.

#### DESIGN OF QUESTIONNAIRE

##### INTRODUCTION

I, an Environmental management student of Federal University of technology Minna, as part of the requirements for the award of masters degree, is writing a research project on "River side development and flood plain encroachment" and have used Kubwa Phase 3 as my study area.

In view of this, I have designed this questionnaire to help me source information as regards to your safety and comfort for the successful completion of the project. I assure you that any information given to me would be used for the simple purpose of this project and your persona; information shall be treated with utmost confidence.

##### SECTION A (LAND LORDS AND TENANTS)

1. What is your occupation  
(a) Civil Servant (b) Business (c) Artisan (d) Retiree (e) Others (specify) .....
2. Marital Status  
(a) Single (b) Married
3. How long have been living in this estate  
(a) 1-5 years (b) 6 – 10 years (c) Over 10 years
4. What is the size of your household  
(a) 1-5 (b) 6-10 (c) Over 10
5. What is your mode of occupancy  
(a) Tenant (b) Owner Occupier

##### SECTION B (LAND LORD ONLY)

6. What is the age of your building  
(a) 1-5 years (b) 6-10 years (c) Overt 10 years

7. What is your building type  
(a) Bungalow (b) Storey Building
8. What is the purpose of the building  
(a) Residential (b) Commercial (c) religious
9. How did you secure the plot your Building?  
a. Through the planning Authority  
b. Through the Land Vendors (agent)  
c. Through the indigene
10. Did you obtain building approval from the planning Authority before erecting this structure  
(a) Yes (b) No
11. Which year did you secure the Land  
(a) 1-5 years ago (b) 6-10 years ago (c) Over 10 years ago.
12. Do you consider this site safe for building  
(a) Yes (b) No
13. Give reasons for the choice of this site for your building  
(a) Availability of social amenities (b) Affordability (c) Others  
(specify)

#### **SECTION C (LANDLORDS AND TENANTS)**

14. Have you experienced any environmental problem in this area  
(a) Yes (b) No
15. If yes specify type  
(a) Flood (b) Erosion (c) Flood/Erosion (d) Others Specify
16. Is it an annual occurrence  
(a) Yes (b) No
17. If yes, what period of the year is the peak of such environmental problem?  
(a) Jan – March (b) April – June (c) July – Sept. (d) Oct-Dec
18. Have you been affected before  
(a) Yes (b) No
19. If yes, how are you affected

(a) Destruction of Properties (Specify)      (b) Partial Displacement      (c) Others

20. What is the impact of this problem on your building/property?  
(a) Structural Defects      (b) Facial (Aesthetic) Deterioration      (c) Both

21. State other problems associated with this area apart from erosion and flooding.  
(a) Noise pollution      (b) Over stretched infrastructures      (c) Social Vices  
(d) Epidemic      (e) Others (Specify).