IMPACT OF THE ELEMENT OF CLIMATE CHANGE ON BUILDING.

A CASE STUDY OF SHIRORO LOCAL GOVERNMENT KUTA SETTLEMENTS NIGER STATE

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CHAPTER ONE

1.1 INTRODUCTION

Human settlements respond to environmental demands, which serve as tools in ensuring that there is ecosystem balance.

Among the essential factors is climate, which is defined as the average weather conditions throughout the seasons over a fairly wide or very extensive area of the earth surface and considered over many years usually 30 – 35 "(WMO, 1968)"

Climate is studied in relation to buildings because of its effect on the environment

Climate of an area is dynamic, evidence are show that the present day climate are some – what different from what "obtained" a few thousand years ago – hence climate changes which is currently engaging the attention of the international community "

The early man worked in environment in order to survive, cleared land, In order to plant and gather wood to make shelter and use in use in energy source. The modern man is even more aggressive with application of advanced Technology. Some of the side effects of these experiment and inventions (aimed at making life more conformable) have created significant reverses in ecosystem balance.

Human induced climate change, due to deforestation and burning of fossil fuels and uncontrolled emission will accentuate these impacts.

Climate change will lead to more precipitation there by reinforcing their damaging effects on buildings and materials.

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All glory and honour, I returned back to almighty God for his protection, wisdom , knowledge and understanding to complete this study.

My gratitude to my lectures, I say a big thank you for imparting their knowledge into me.

This project would not have been written without the help of my supervisor Prof. D. O Adefolalu. He gave his time , Knowledge, material encouragement and above all his understanding . Thank you for motivating me during the course of the project.

Special thanks to my sisters, Brothers, niece, nephews and friends.

20th March 2002

ABSTRACT

Climate and development vary in every geographical region. So it is important to understand the local and spatial variation in climate. The Urban climate models quantitatively describe the difference, which exist with regards to various climate elements between densely – built areas and the surrounding rural or open area.

This study focuses on elements of climate on Shiroro Local Government Kuta settlement Niger State particularly on how it makes the place habitable for the populace.

The findings of this study showed that Kuta is prone to Erosion and flood, but due to problem of data acquisition it is difficult to discuss, But from the available data there is high moisture content in the area , and causing defect on the buildings.

The recommendations made by the researcher suggests that any meaningful development to take place in Kuta , there has to be a well planned format on the stages of construction.

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Damages can occur in foundations, because the soil will be too wet and their by causing differential settlement in building which can cause collapse to the building .

And also in the substructure that is the walls. Elements of climate change can cause cracks to appear on the walls and in the paintings. Too much of moisture can cause painting to form blisters and the building be disfigured

Precipitation can also affect the timber members in the building by causing decay

Climate as a natural phenomenon deserves maximum attention, so as to reduce the impact on buildings. This becomes possible if climate sensitive designs are carried out to reduced the possible negative consequences that may arise due to lack of planning. therefore any development in environmental management strategies and approaches considering the Technological , socio – economic and political needs of the populace.with the aforementioned problems of climate change I set to examine the likely impacts of elements of climate change on buildings.

1.2 OBJECTIVES

(1) To identify the extent of infrastructural damage through the elements of climate change .

(2) To proffers solution to problems of infrastuctural decay in solution local Government Area – Kuta settlement.

(3) To quantify the impact of element at climate change as they affect shelter and human settlements. It is therefore expedient to identify such data and their consequences in Nigeria.

(4) To provide the information to one in determine the vulnerability of Environment in relation to element of climate change using Shiroro Local Government Kuta settlements Niger State as a case study.

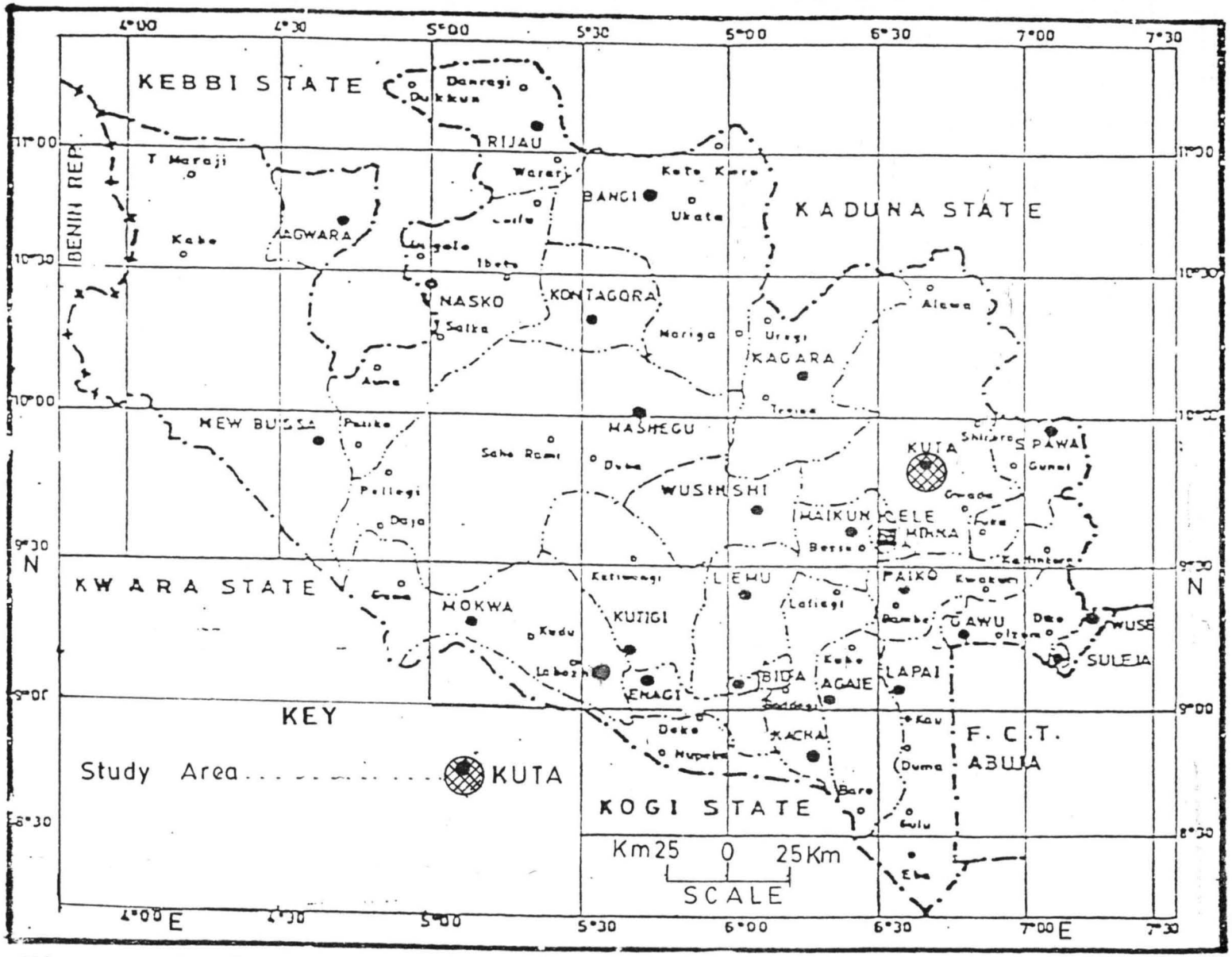
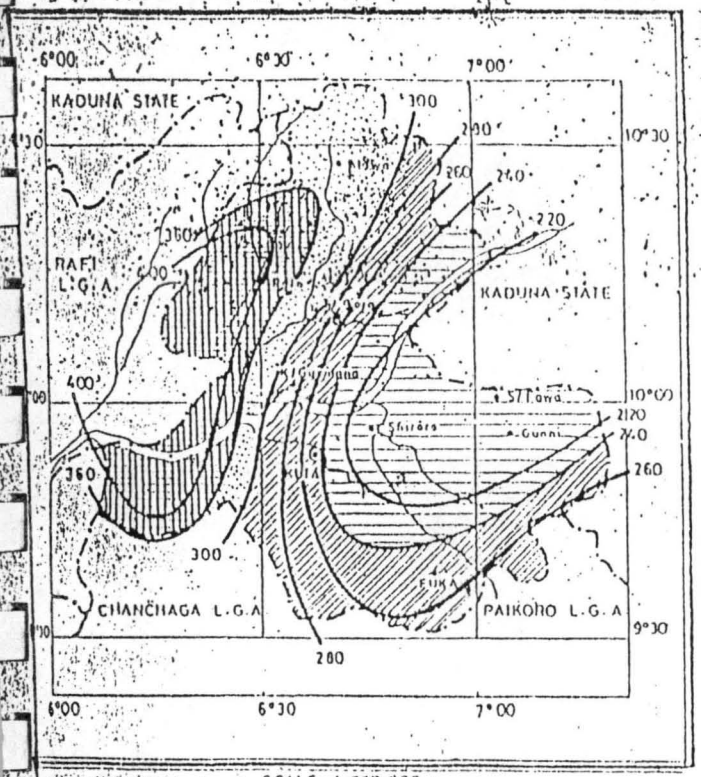


Fig. MAP OF NIGER STATE SHOWING THE STUDY AREA

Source: Adapted from Niger State Admistrative map (2000)

Fig. 2.3(i) SEPTEMBER (in mm)

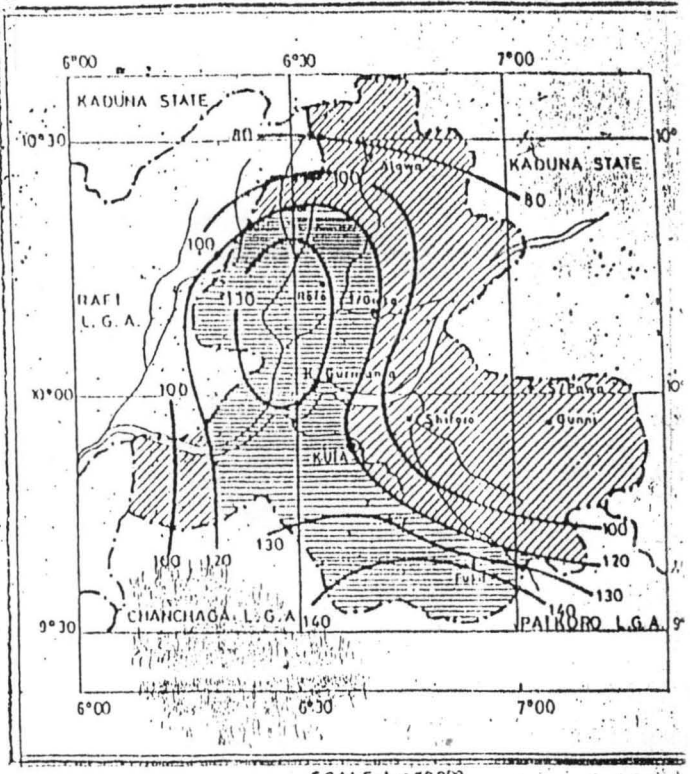


SCALE:-1:500,000

LEGEND

≤ 240mm | 240 - 300mm | 300 - 360mm | > 360mm

Fig. 2.3(j) OCTOBER (in mm)

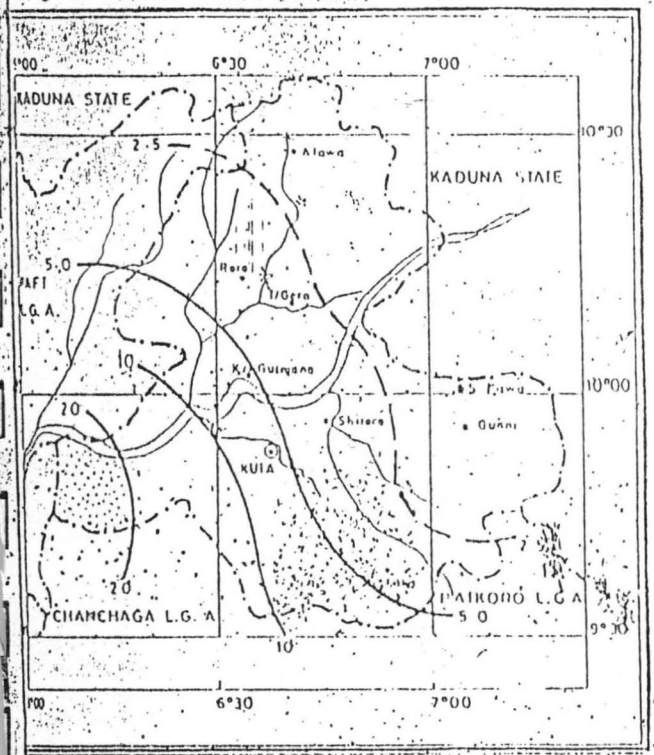


SCALE:-1:500,000

LEGEND

< 120mm | > 120mm

Fig. 2.3(k) NOVEMBER (in mm)

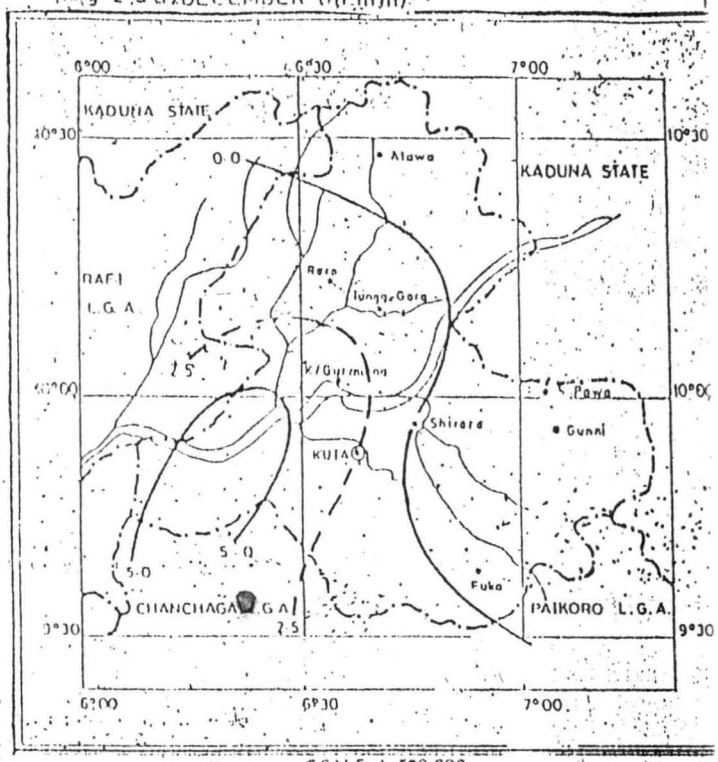


SCALE:-1:500,000

LEGEND

≤ 20mm | > 20mm

Fig. 2.3(l) DECEMBER (in mm)



SCALE:-1:500,000

LEGEND

< 10mm

(Adapted from Adefolalu 1992)

1.3 STATEMENT OF PROBLEM

Countries like Nigeria do not have high technology to obtain advance data on severe weather system , so as to give early information that could guide in planning of buildings . This infrastructure advisories lacking for solving problems of sever climate events

1.4 JUSTIFICATION OF STUDY

It is important to note Environmental hazard that rainfall can cause to our buildings, showing problem of erosion flood and high moisture content which can lead to further decay.

1.5 STUDY AREA

Adefolalu (1992) has summarized the rainfall characteristics of the study area from January to December.

He said that rainfall in January to March (Figures 2,3 abc) is very low ranging from 5mm in January to about 40mm in the extreme south west. In March by April (figure 2,3.d) rainfall of 70mm or more covers the central parts of the study area while the lowest value is 40mm in the extreme north west corner. In the catchment basins of River Kaduna, the amount of rainfall to be expected as from April is between 60 and 80 mm. Between May and July (figures (2.2 efg) the shiroro lake watershed receives in excess of 100mm. With a peak value of about 280 to 300mm in July in the south west of Shiroro and Kuta respectively.

Further, there is no part of the water shed that receives less than 180 – 200mm of rainfall in July, August and September, Figures (2,3, h,I) constitute the peak of the rainy season within the Shiroro lake water shed with amounts in excess of 300mm in the western

half of the Shiroro L.G.A. Highest rainfall of over 400mm is to be expected in September (see Figure 2.31) during normal rainy years. This is contrary to the popular belief that maximum rainfall is to be expected in August a factor which may create recharge problems if proper care is not taken.

The above characteristics are severally contrasted with the situation in October (Fig. 2.3) which ought to have similar features with July. However, rainfall does sharply to a maximum of mere 130 – 150mm in contrast to the 400mm maximum in September as may be expected November and December are very similar to January – March when monthly rainfall is as low as 5-100mm (Fig. 2.3 abc).

The onset of the rain is between 20 – 30th of April and the length of rainy season (LRS) is between 161-200 days.

1.5.1 CHILL FACTOR

The combine effect of wind dive and low temperature has been estimated to give the chill factors that is effective cold condition. The northern half of the study area has a very cold air advection possibilities while the lower half relatively cooling the dry season. This is because of the very strong and dominant north easterly wind flow experienced in the north which decreases substantially to the south.

1.6 THE SCOPE OF THE WORK

The projects will focus attention on impact of elements of climate change on building with particular reference to Shiroro local Government Area – Kuta settlement Niger State.

The thesis consists of two-man parts nameley.1.element of climate change .2. defects and causes of Defects in buildings, each of which volumes and volumes can be within on.

CHAPTER TWO

2.1 LITERATURE REVIEW

Environmental pollution and the increase in green noise gases associated with enhanced human activities are expected to result in climate change. The wmo/united National Environment programme (UNED), has projected that the global mean temperature over the needs century will increase by 1°C to 3.5°C with a most likely value of a bad 2C. The projected sea level rise is about 15 to 95 cm, with a best estimate of about 50cm. Such change may adversely affect agriculture and food security, ecosystems, coastal zones human self-element, health, the environment and the availability of fresh water reservoirs.

A doubting of atmospheric CO_2 is likely to increase the global mean surface temperature by 1.5 – 4.5C, observed by later governmental panel on climate change (IPCC) In 1990, IPCC also observed that there was warming of about 2 - 4°C over the last two centuries. In the arctic's should this trend continue, there would be an increased serenity of storms and droughts, and an overall rise in sea level in the order to 50 – 60 cm by the year 2100, caused by the thermal expansion of ocean and the melting of Ice caps and glaciers.

In recent time, examination of instrumental records has indicated some inconsistency of estimate locally and globally. On the global scale, the best estimates of observed mean temperature records has been that of rising in the range of 0.3. In the last 100 years with the warmest six years on record being in the 1980s (Wino 1990). International action on global atmosphere pollution has resulted in attempts to reduce ozone depletion.

In September 1987, the leading industrial nations, including Britain, were signatures to the montreal protocol in which they agreed to specific reductions in the production and use

five of the most harmful chloro-fluorocarbon (cfcs) which contribute to ozone depletion, known at the time.

These cfcs are used in many aerosol sprays, refrigerants, solvents and plastic foam.

These nations agreed to attempt to find substitute chemicals to replace the most dangerous cfcs, one of which is called cfc-11. It's substitute is cfc 22 which although less toxic, all the same represents a considerable threat to ozone depletion. For example, it has been calculated that cfc-22 is about 20 times less harmful than cfc-11, cfc-11 has half life of about 75 years compared to 20 years for cfc-22. Therefore, in the next 20 – 30 years from then (i.e. by year 2002 – 2017) when the ozone layer will be most rapidly depleted, it is estimated that cfc-22 is likely to be only 20% as damaging as cfc-11. In fact, Peter Fabian of max planck institute for Aenenomy Gattiniger, believes that if cfc is released into the atmosphere at this rate of that time, then it will have destroyed as much ozone as the two most common cfc; cfc-11, cfc 12.

Though safer than cfc-11, cfc-22 is still harmful but was not included in montreal protocol 1987. Moreover, the wisdom of repairing one dangerous cfc with another that is perhaps cumulatively just as harmful should be questioned or re-examined seriously something that indeed made the British government in early March 1989, to convene on international. Conference on atmosphere ozone depletion at which representative from 124 other nations attended. Even before the conference opened, the European commission (EC), U.S.A., and Canada had agreed to a complete phasing out of the fire cfcs, and three halons covered by the montreal protocol. The protocol stipulated a 50% reduction in the production and consumption of these materials by year (2000). This development was justifiably seen by the media and general public as a resounding success story.

Sequel to this, 81 nations met in Helsinki in early May, 1989, to agree in principle, to ban eight industrial chemicals by the year 2000. These chemicals include five cfcs and three halon gases, as mentioned above.

At this meeting Eileen Claussen, of the USA's environmental protection Agency, predicted that even if cfcs are totally phased out and banned by the then of the twenty first century, Chlorine concentrations will still treble from that years existing levels of 2-7-89 parts per billion by volume (ppb) by the year 2010, mainly because of time taken for cfcs to breakdown in the atmosphere.

Therefore at an international meeting of parties to the Montreal Protocol, in November 1992 in Copenhagen, revised controls of ozone depleting substances and the deed lines for the global phase out for most chemicals was brought forward. The Copenhagen Package consisted of the following agreement:

For cfcs the phase-out date was brought forward from January, 2000 to 1st January, 1996, with 75% reduction, based on 1986 levels, by 1st January 1994. The EC has proposed an interim 85% reduction by 1st January1994.

carbon tetrachloride should be phased out by January 1996 rather than 2000 as originally proposed, with an 85% reduction based on 1989 levels by 1st January 1995. The EC has proposed interim 85% reduction by 1st January 1994.

Halons should be phased out by January 1996, again brought forward from the January 2000 target date. The EC has proposed a phase-out by January 1994.

Methy chloroform should be phased out by January 1996, brought forward from January 2005, with 50% reduction on 1989 levels by January 1994. However, the halons may constitute beyond the new proposed phase out dates and a united Nation Environmental program (UNEP) Panel will prepare an assessment of such essential usage, with the announcement of a decision schedule for 1994

Methyl bromide consumption is to be pegged at 1991 levels by 1995 more stringent controls must await scientific evaluation by two UNEP panels which are scheduled to report in 1995.

Hydro bromo fluorocarbons (HBFCS) although, not in general use, should be phased and by January 1996 – this is the first tone that HBFC, have come under any control.

HCFC we as to be capped in January 1996 consumption in 1989 and 3.1% of the level of consumption cfcs in 1989. This formulae arose in order to take into account Hao than existing consumption of Hcfcs which were already high in some countries in 1989 and also in recognition of their role as transitional substitutes for cfcs. The Copenhagen amendments incorporated controls for the first time on Hcfc use, which is to be 1996 consumption level by year 2004, by a 65% reduction by 2010, and a total base by 2030.

In February 1991, the US government proposed a strategy to limit global green house warming by signing that nations should seek comprehensive framework for the emission of greenhouse gases. In preference to focussing on a simple gas. This led the united Nations framework convention on climate chase 1992, to adopt its governments suggestion.

2.2 HUMAN SETTLEMENTS AND CLIMATE

Settlement are the most visible sign that human culture has been imposed on nature. They can be classified by size, form, function, site and situation age, building materials and cultural characteristics.

Most commonly, settlements are divided in "rural and urban" categories. These are two term s used since they attempt recognizes and distinguish the physical and human characteristics of man made structures in the environment. There are different types of rural and urban settlements as seen by the attributes highlighted above.

Rural settlement forms an essential part of human landscape where the inhabitants depend largely on agriculture for their livelihood. All plants and animals species are sensitive to climate change and when unable to adapt fast enough to the change environment will become extinct. The changing environment of plant is mainly caused by the rainfall, variability. The agricultural yields of any rural area depends greatly on this factor. Depending on the classification, rural settlements are fond every where and they accommodate well over half the world's population. They exists in form of isolated dwellings, hamlet, small village and large towns one of the many factors, which brought about congested urban settlement is economic development, which attracts rural – urban migration. Urban centers grow due to imposed market potentials. Natural population growth, social and cultural attractions transport improvements, industrialization increased service activities, improved education e.t.c. urban settlement can be defined based on the various classifications by function sees urban settlement as a term loosely supplies to a relatively densely built up area with it's associated open spaces where the inhabitants are engaged in such activities

urban settlements are engaged in such activities urban settlement are distributed regularly over the earth's surface and over their location to numerous and diverse factors. The urban settlement have been explained with reference to these development and spatial distribution.

In particular, three main theories of urban structures are: The concentric theory by Burgess sector theory by Hovt and the mullti-nuclei model by Homs and Ulman.

Urban climate is a typical product of human activities – generally, urban climate analysis is considered essential because since urban climate whole equation of mesoscale and micro scale atmosphere circulation systems, such analysis will enable us put the man-atmosphere relationship in the right perspectives.

2.3 HUMAN SETTLEMENTS IN AFRICA

For a large extent, buildings and human sell emanate were designed in response to environmental demands within available in response to environmental demands within available resources, and settlements. In Africa were more amenable to climate that they are today.

To advent of colonization brought cultural; confusion by mixing up and changing the mode of buildings and settlement layout. As a result, the so-called modern buildings in Africa today are rather more suitable in temperate climates than in tropical and sub-tropical areas.

The direct and indirect control of economic base of Africa foreign interests leaves nothing for housing finances and settlements planners to command, in terms of planning and ultimate decision on what to build, where and the material to be used.

The problems of human settlements are multifarious; part which have to do with the reckless abandoned abuse of the atmosphere researches. Another face of the problems as they relate to the atmosphere is that building design and settlement, planning and management do not take adequate advantage of the resourcefulness of the atmosphere expectedly these enables one more serious in Africa, where in lie many of the undeveloped countries.

2.4 HUMAN SETTLEMENT IN NIGERIA

In Nigeria, like most countries of the world have these buildings according to the cultural tastes of the different parts but all have the characteristics of building a design peculiar to the tropics.

Urban cities however have their settlement divided into three major parts;: slum, government reserve areas and the "Big men" estates.

Slum is described by a state of urban squalidness and deterioration of structures with physiological efforts on the dweller. It is characterized inadequate housing, overcrowding and congestion it is a way of life reflected in poor sanitation and health practices, deviant behaviour and characteristics, articles of aptly and social isolation. The social conditions in a slim area include acute poverty, high ratio of mental and family deficiency, high proportion of unemployment, high rate of residential mobility, high of juvenile delinquency and high rate of residence on government assistance.

Slums are both physically and socially appalling and are majorly caused by rural urban drift of the population, level of inflation etc.

The "Big men" estate is the area of low-density high-income corner living in quality or high-grade houses with high rent. That takes advantages of new and better standard of housing and new areas of living. They segregate themselves according to their income and social position.

However, reserved area (GPA) falls in zone 4 of the Burgess concentric zone theory when constituted the better class residents with single family dwelling with occasional exclusive districts restricted to the highest income group government executives with certain minor commercial concentration. They have good road network. These areas are zoned, planned and designed to have the necessary infrastructures needed in such zones.

2.5 THE URBAN "CANOPY" AND AIR-DOME".

It is possible to compare the fabric of the structure of a city to a "canopy" of a trees, where the solar radiation is gradually absorbed and where the specific conditions of our temperature and humidity may exist unique from those practicing in the surrounding space. The urban concept can therefore be regarded as the space banded by the urban buildings up to roofs.

However, because of the size of the city, the unique properties of its air extend higher than the buildings', roofs and further downward.

This phenomenon can actually be seen in many cities from a distance, outside the city, in form of layer or turbid air over the city's boundaries.

The volume of car affected by the city is the urban boundary layer, also referred to as urban air dome'.

The urban canopy operates with the micro-scale concept, the climate condition at any given part within a canopy is influenced by the nature of the immediate surroundings. Thin is to say that the material geometry and surface purposes of structures. In an area determined or influenced the ambient climate. The upper boundary of the urban canopy abuses from one spot to another because of the variable height of the building.

The wind speed also affects the boundary of the canopy. The high and penetrates deeper below the riots levels than the light winds.

The air dome layer is more homogenous units properties over the urban area at large as defined. It is that portion of the planetary boundary layer whose characteristics are effected by the presence of an urban area at its lower boundary (Okie, 1976).

It is important to differentiate between the urban canopy and air dome when the mathematical simulation models of the urban climate are dealt with and the application to urban design and human comfort are considered.

2.6 RADIATION BALANCE IN URBAN AREA

In densely built-up urban area, the solar radiation, which reaches the ground levels, is relatively small. A significant part impinges upon roofs, another part hits vertical surface, i.e. the walls of buildings. In the urban environment, the taller the buildings and the small the

buildings between them, the smaller the amount of solar radiation reaching the streets and other open spaces between the buildings.

The vertical walls in an urban area reflect solar radiation to adjacent buildings some solar radiation impinging on walls ore reflected upwards to the sky while most of it is absorbed in the walls of buildings regardless of the colour of such walls. These are released in the evening and night houses.

The amount of solar radiation reflected off the roof towards outer species depends upon the colour of the roofs and there vary greatly: from 80% in the case of white painted roofs, to only 20% in the case of black-tarred roofs. This shows that the magnitude of the part of solar radiation deports upon the percentage of the urban area which is covered by buildings. The discharge of the radiation from the roofs as buildings.

The discharge of the radiation from the roofs of buildings as equal heights is like that from the open space and the intensity of the radiation loss is maximized but in buildings with different height the higher buildings block the sky thereby reducing the amount of solar reflection and long wave radiation from the roofs of lower buildings thus reducing the overall amount of radiant heat loss from within the urban camps.

The radiant loss by the combination of reflected solar outgoing emitted long-wave radiation from within the urban canopy (vertical walls, roofs open spaces etc) is much less than the radiant loss from the open fields. In the densely built urban area, the long-wave radiation, emitted is reabsorbed by the walls or emitted from roofs, resulting in but little cooking effect of the space near the grand level. The higher and more dense the built-up area

is, the slower the rate of right time cooling. This is one of the major factors causing the urban "Head Island".

The variation; i.e. charges in radiation balance influences the comfort of the people directly in the streets and open areas, once a person standing outside a building discharges less head by long-vehicle radiation and thus is exposed to a higher heat load in the urban area. Most of the absorbed solar radiation is converted to sensible head and thus raised the air temperature and contributes to the heat Island effect. The reduced long-wave radiant heat loss near the grand in an urban area may be a more significant factor. In the development of the heat Island than the modification in the solar energy absorption.

It should be pointed out that the overall amount of solar energy absorbed with the urban canopy is not higher and may be even lower than the amount of solar energy absorbed in a "Green" vegetation covered, open counting area. The main difference is in the thermal results of the absorbed radiation.

2.7 URBAN CLIMATE MODEL

Urban climate models describe quantitatively the difference, which exist with regards to various climate elements between density built urban areas and the surrounding areas or open country.

Bomstein (1984) distinguishes between below roof level models (canopy layer) and meso-scale models dealing with conditions. In the urban boundary layer above roofs level.

Boundary models deal with relative scale. They integrate the 'inputs' of the smaller micro-scale areas to estimate the climatic properties of the air flowing over the city canopy. Because of the relatively large gradients in the properties of the urban atmosphere above the roof levels the conditions kin the boundary larger may be different from these existing near street level below.

CHAPTER THREE

3.1 DEFECT IN BUILDINGS

3.11 DEFECT IN FOUNDATION

The cause of defect in foundation occurs as a result of ground movement that may cause settlement. Unequal settlement usually results in cracks on the buildings.

Shrinkage of soil can also lead to defeat in foundation.

3.12 DEFECT IN THE BLOCK WORK

"Exfoliation" This is the removal of rendering work on block work of a building.

Rain can cause defect in block work there by removing the renderings, moment of moisture may cause cracking of applied finishes such as rendering since block units are comparatively large, an settlement movement in a wall will show more pronounced cracking in mortar joints.

Other defeat which may occur in block work are

(a) Sulphate attack in mortar and rendering sulphate attach on mortar expounds and causes deformation and cracking of blocks. Patterns of cracks on rendered walls are caused by shrinkage of renderings as it dries as is followed by the formation of horizontal cracks along the lines of the mortal joints. This is due chemical action between sulphate salt in the building materials.

(b) Use of unsound materials for the construction.

(c) Crystallization of salt disfigures building walls upon the weather face of the walls. This can be recognized as white or deposited of salt on exposed surfaces of

(1) Block work containing some water-soluble salts.

(2) Atmosphere pollution on lime stone bounded in block.

(3) Contamination with seawater on salt-water spray.

(4) Moisture rising up the wall from adjacent ground.

(5) Rain passing down from the top of wall .

(6) Rain beating against the wall which absorb the water to such an extent that will show dampness on the internal and eternal faces of the walls

3.13 DEFECT IN PAINTING WORK

In paintwork, these are change, which occurs neither immediately after application nor over a period of time. There fall generally into four main categories.

(a) Change of colour (bleaching, bleeding)

(b) Loss of gloss (Blooming, chalking, loss of face)

(c) Non –drying (Tackiness or sweating, winkling)

(d) Surface defeats (Blistering, Cracking)

3.14 CHANGE OF COLOUR

(1) Bleaching – loss of colour or fading are send by ray of sunlight. It is more marked in strong dark colours than in light ones.

(2) Bleeding – This occur by discoloration of painted surface due to materials penetrating freshly applied paint.

3.15 LOSS OF GLOSS

(1) Blooming – This is referred to as slow drying , it is cloudy or mildly in appearance of vanish enamel and gloss paints this is caused by delayed or defective drying which may arise by painting over damp surfaces or painting during unfavorable weather conditions

(2) Chalking: - This occur as a result of insufficient oil in primary coat which then came powdering condition of a painted surface fading or bleaching of the colour is usually the first indication severe chalking erosion.

(3) Loose of face: - This result when painting surfaces loses it gloss due to rapid fall in temperature or is applied over a surface whose function has not been completely satisfied.

3.16 NON – DRYING

(1) Tackiness or sweating:- Permanently sticking finish due to oily matter excluding through, Defining coat of paid or vanish caned by applying the finishing which coat too soon upon on under coat which has not properly deride.

(2) Wrinkling: - This often occur due to too thick paint film or painting over gloss surface sometimes paint do not dry became of the building and the faulty acids of the paint. Usually blisters discoloration and dark tears down the surface indicate this action, which is known as Estericatio n.

3.17 SURFACE DEFECT

(1) Blistering and peeling: This is carried by painting on surfaces with high moisture content. It is also caused by exposure of paint rich in oil to excessive heat.

(2) Cracking : Defeat in paint surface generally due to in capability of various layers of paints for instance the application of sharp or quick drying paint over a slow drying or more elastic one , or movements of the surfaces itself , the formation of crack usually indicates the cause and degree of the defeat when the surface is covered with fine cracks which do not penetrate the paint or polish film is known as cracking.

3.1.8 DEFECT IN ROOF STRUCTURE

Adverse condition of climate condition which include effect of radiant temperature, rain, strings, wind speed can lead to serious damage in roof structures and contents, and this can affect the heading of the occupants.

3.1.9 DEFECT IN OPENINGS

(1) Doors and windows; the most obvious defeat is the deterioration in pain work and tiny decay.

Decay is common in subsill, bases of Jambs and million, lower nails of openings light and glazing bars.

(2) lintels:- Fine cracks in concrete lintels are common and at 10.2mm wide. Externally concrete lintel will have defeat due to weatherizing

3.2.0 DEFECT IN SKIRTINGS

Dampness in building can affect skirtings and there by causing decay to skirtings.

3.2.1 DEFECTS IN STAIRS

Stairs may shifts with settlement in building and timber stairs may decay if it comes in contact against damp walls.

3.3.0 THE CAUSES OF DEFECT

Defect according to the Longman Dictionary mean, "fault" imperfection". Something lacking in completeness or perfection. Defect in building occur at a greater or lesser rate depending on method of construction, materials used, environmental condition.

Among agencies causing defect in building include

3.3.1 SOLAR RADIATION

Solar radiation is received at the earth surface it is absorbed when it strikes the opaque surface, this absorptivity depend on the nature and colours the surface. Degradation is the effect and is mostly in organic materials for example plastic, paints, and bituminous based.

3.3.2 MOISTURE

Moisture in solid, liquid or vapour farm can be regarded as the principal agent casting defeat, since it is always present in the atmosphere and when temperature drops condensation occurs and therefore corroding materials surfaces

it however create bigger problems where moisture condensation is at inaccessible services from the subsequent, evaporation is slow in temperate regions water freezes in pone causing surface cracking and disintegrate, also changes in materials causing deformation, cracking and fungi growth.

3.2.3 BIOLOGICAL AGENCIES;

Into (1) defeats caused by insects attack or by fungi (0) defeats caused insect attacking timber will make the timber to be very weak and will not allow timber to serve it functional requirements some common insects which attack timber include be termite beetles e.t.c .

3.2.4 GASEOUS CONSTITUENTS AND POLLUTANTS:

Carbondioxide is produce when fossil field are sued to generate energy and when forest are cut down and burned.

Sulphur emissions from coal and oil fired stations produce clouds of microscopic particles that reflect sunlight back out into space. This party compensate for green house warming.

This sulphate aerosols, however, remain in the atmosphere for a relatively short time compared to the long-lived green house gases. They also cause problem, such as acid rain.

3.2.5 GROUND SALT AND WATER:

Salt present in the ground can rise in solution by capillary action into porous materials with which they are in contact; usually efflorescence occurs if magnesium sulphate is present, disintegration of renderings and removal of painted surface can occur.

3.2.6 MANUFACTURED PRODUCT:

Some manufactured material for example calcium chloride as an accelerator I addition to building material (concrete) has adverse effect on the durability and performance though, it facilitate early strength development and demoulding. It has corrosive effect on metals causing damages to reinforcements and prestressed concretes.

Inorganic salt used as fare retardant and as preservatives in wood, assist the corrosion of metal fastener used in timber construction.

3.2.7 JUXTAPOSING OF MATERIALS AND COMPONENTS:

The use of some building materials in proximity to each other can lead to weathering effects.

Sulphate IV oxide from back can cause break down of mortar, corrosion of materials or disintegration of stones, some timber are acidic containing volatile acetic acid which can corrode some metal.

3.2.8 COST

Another factor causing defect in building is cost, when talking about building cost, people think principally of capital cost of providing a new building, and thus has been a contributing factor to the reason why building owners undue and often ignore cost of repairs and replacement of building components and materials forgetting that building expenditure does not stop or based only on initial cost.

Many building owners do not pay attention to provision for maintenance, in the late period sustain losses which cannot be ascertained for in their estimate, therefore the building owners to be made aware of the losses they suffer at present and those loses that are yet to come as well as the gain that they could make if their building are durable and constructed to specification and properly maintained.

3.2.9 SIGN OF INSTABILITY:

Overall buildings are very much stronger than structurally essential, so can tolerate considerable changes in load distribution without noticeable defect. When movement does occur the prevalence of timber and the elasticity of lime mortars often accommodate it without marked crackly.

Eventually cracking, deflecting and distortion can occur, but even these may still be tolerated. Many openings in walls are out of square and cracks have being maintained leaving buildings acceptably stable often one source of defect is acceptable serious problems arise when defects occur of continuing movement.

3.3.10 SHRINKAGE AND MOVEMENT OF MATERIALS:

Shrinkage of materials is rare after the first few years but many continue in a minor way. Shrinkage or something will occur with changing weather.

And also dissimilar materials shrink and swell and move under load differentially, so that will be minor cracks.

3.2.11 MAN-MADE DEFECTS:

Loss of soil support may be due to recent ground works; improvement in drains and other entrenching may be dig to close to existing building and or loosely back filled.

And also human activities are releasing green house gases into the atmosphere, carbondioxide is produce when fossil fuels are used to generate energy and when forest are cut down and burned methane and nitrous oxide are emitted from agricultural activit4es, change in land use and other sources. Artificial chemicals called halo carbons (cfcs, HfCs, PfCs) and other long lived gases such as sulphul hexaflouride (Sf6) are released by industrial processes.

Ozone in the lower atmosphere is generated indirectly by automobile exhaust fumes.

3.3.12 UNDERMINING OF FOUNDATION:

The removal of ground support, may due to major ground movement such as mining subsidence or swallow holes, swallow holes are in chalk and limestone, which can swallow up substantial amounts of soil.

There are two common problems; ground water movement undermines silt and peat at coast and rivers. Clays swell and shrink width moisture content affected by rainfall and drought leaking drain

CHAPTER FOUR

4.0 FINDINGS FROM CASE STUDIES.

4.1 RAINFALL GRAPH.

Fig 1 shows a rainfall pattern with its highest value (288mm) in September and it's lowest value (2mm) in January.

The value for the month of January is low but fluctuates between (5mm and 115mm) in the months of February, March, April and May. In June, it started to move up (190mm) until it got it's first peak in July (258mm). It suddenly dropped in August (250mm).

It finally got to peak in September and decline in October. The difference between the values for November and December is too great and this is shown on the graph by a drastic drop from 288mm to 4mm.

Fig. 2. Shows a rainfall pattern with its highest value 256mm in July and it's lowest value (1.5mm) in January.

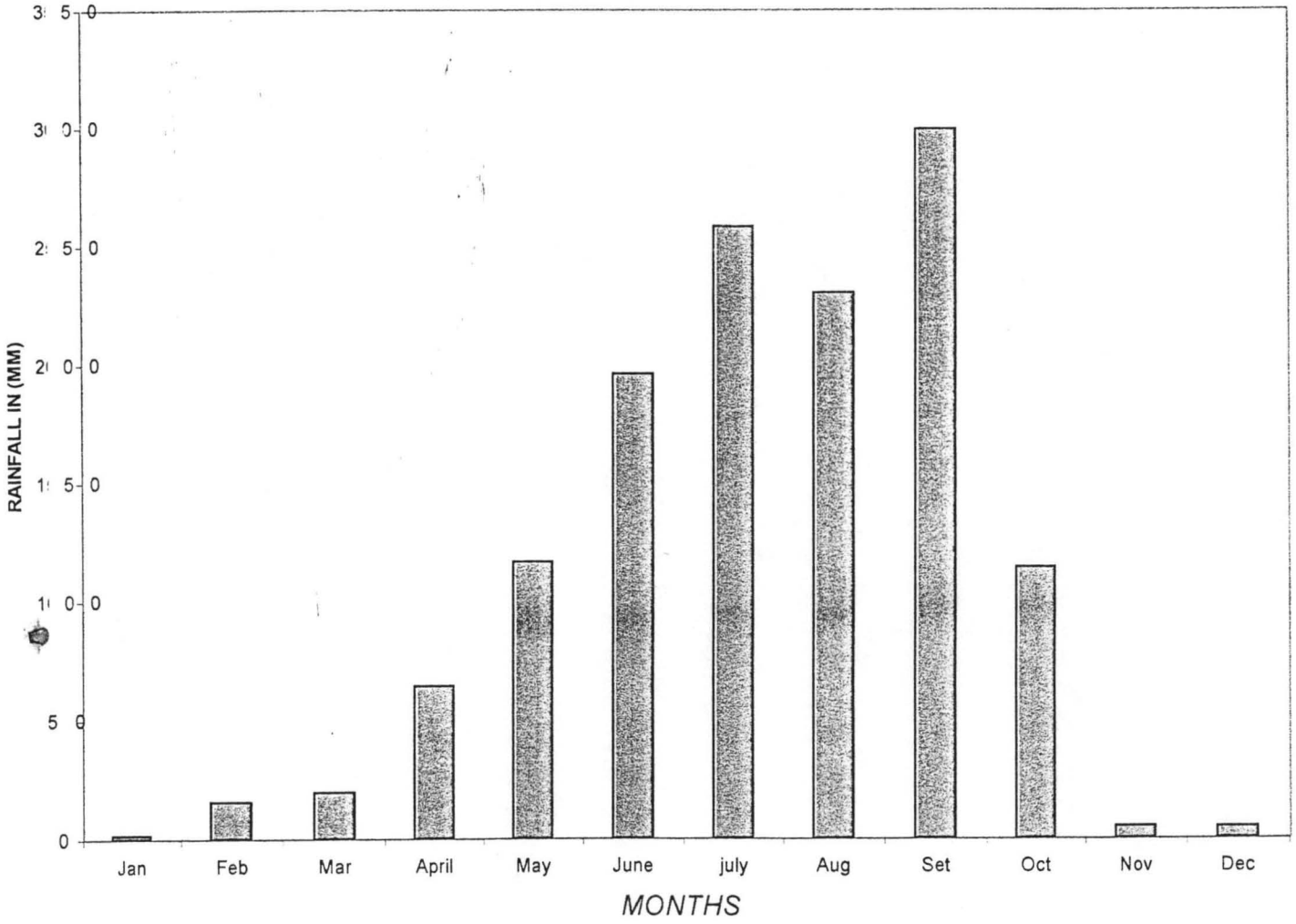
The value for the month of January is low but fluctuates between (1.5mm and 110mm) in the months of February, March, April and May in June it started to move up 190mm until it got to its first peak in July (256mm) . It suddenly constant in August and September (230) and decline in November and December.

However, Kuta experiences six months October – March of low rainfall. This could be called a period of dry spell. The remaining six month (April – September) exhibit high degree of the reverse of what is seen in the first six months that is high degree of the reverse of what is seen in the first six months that is high rainfall.

This town is prone to some environmental problems. Most prominent of this flooding which can cause building to collapse, and also excess rainfall can cause damage to roof of buildings.

Another damage that rain can cause is the structure of the building.

KUTA 2


RAINFALL IN (MM)
Jan
Feb
Mar
April
May
June
july
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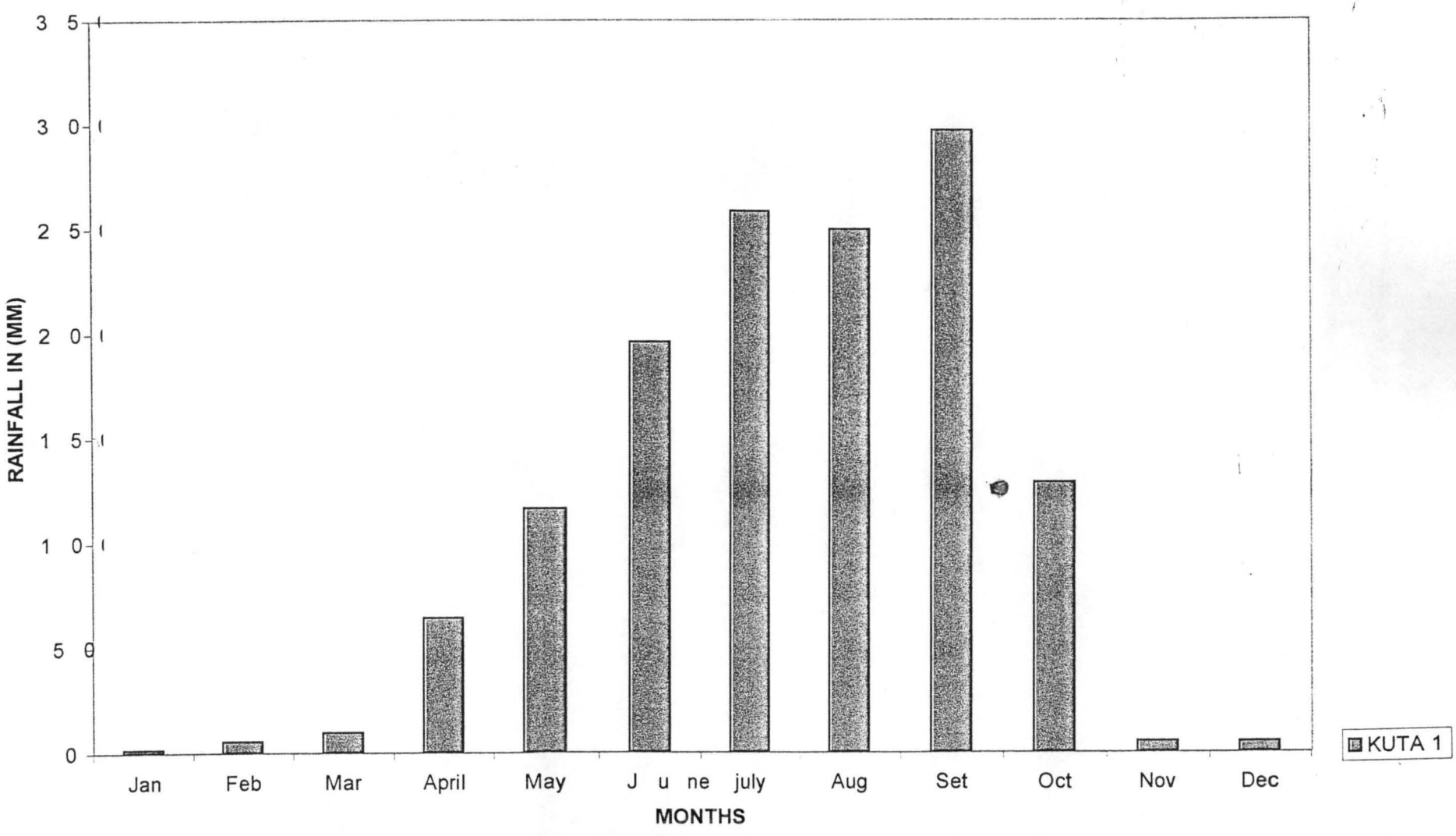
Set
Oct
Nov
Dec
MONTHS
KUTA 2

Chart1

K U TA



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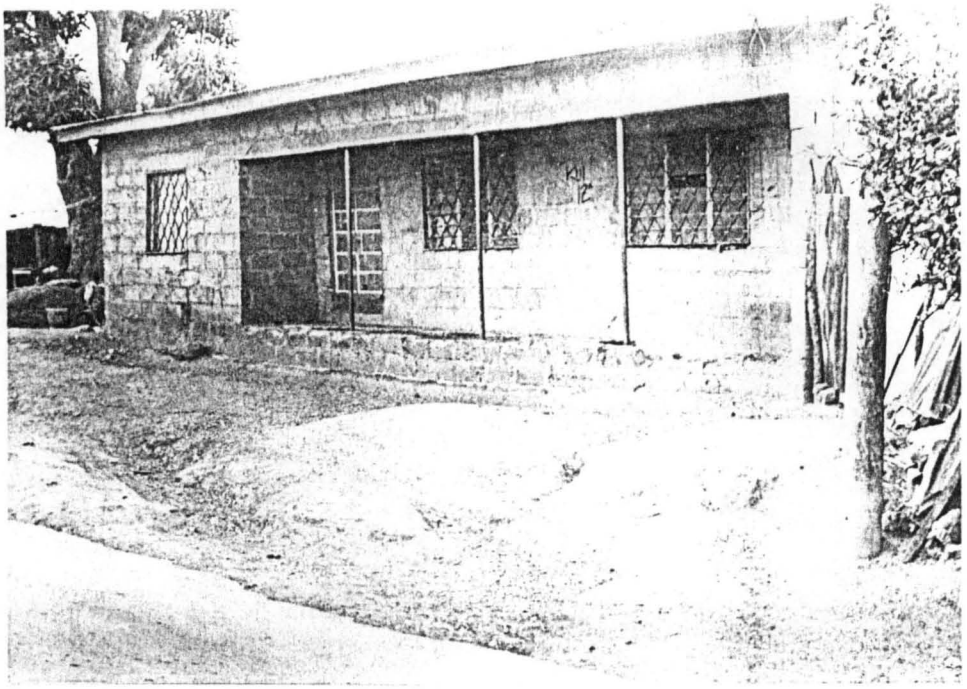
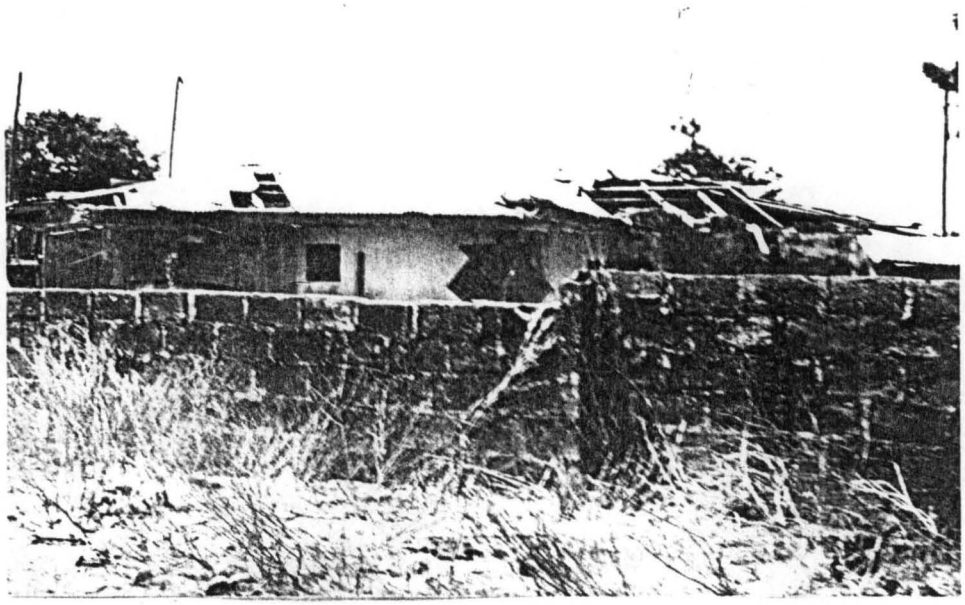


Plate 1. Showing Eroded Soil close to buildings



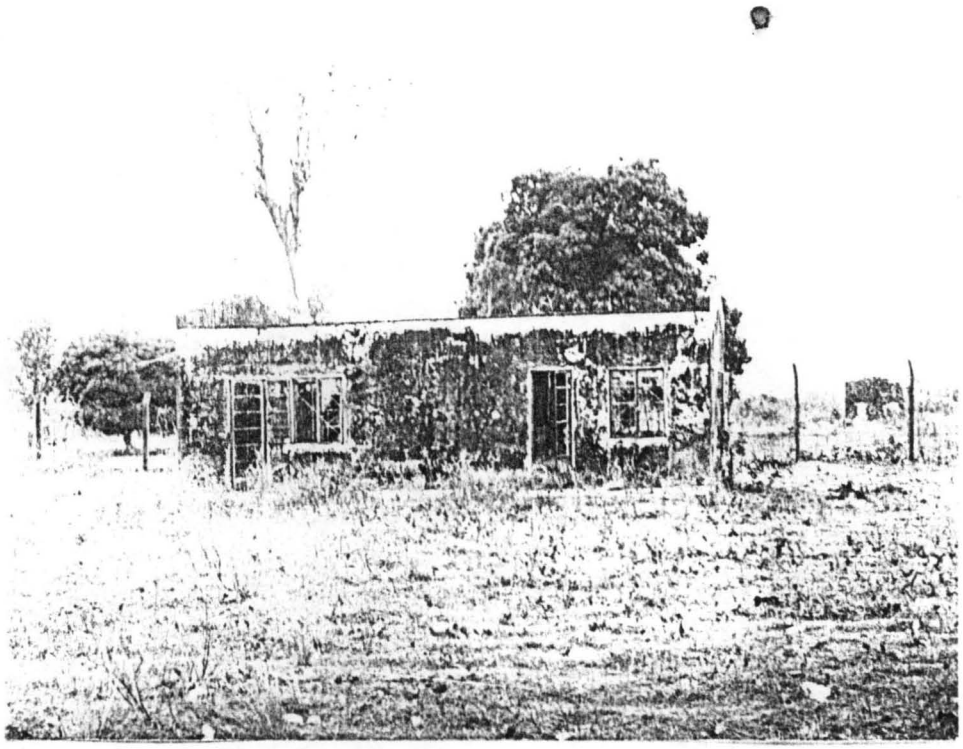


Plate 3. Defects in roof

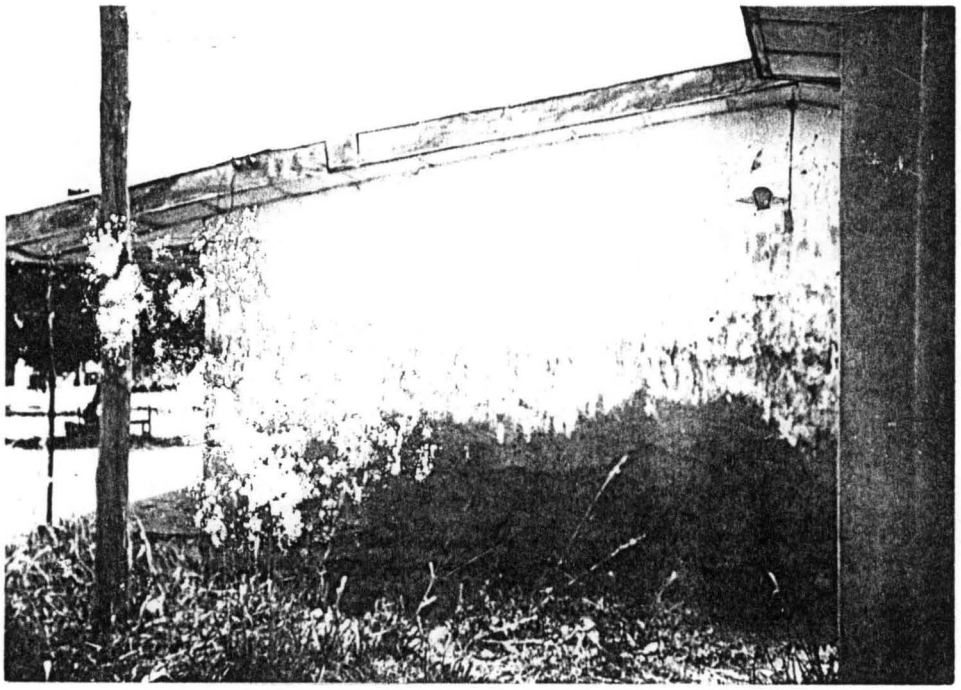


Plate 4. Chalking and lose of glossing paint

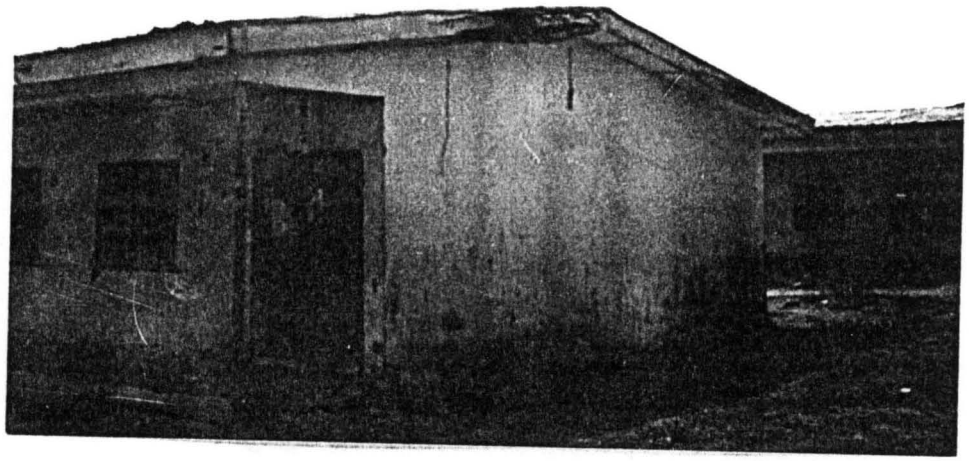


Plate 5. Decay in Fascia board

Plate 8. Weak man-hole due to excess rainfall

CHAPTER FIVE

5.0 SUMMARY

1 Kuta is a town with six month of low rainfall and another six months of high rainfall.

2. Kuta experiences internal flooding merely due to the poor drainage system.

3. Poor construction of buildings is a treat to human comfort and development in Kuta

4. Erosion shapes the topsoil so irregularly that easy movement of vehicle becomes difficult.

5.1 CONCLUSIONS

This project has focused on the effect of rainfall on buildings (Shiroro Local Government – Kuta setting Niger State). With respect to development, significant findings are as follows.

(1). Use of a sound material has lead to defect in some of the building.

(2). Poor drainage system causes flood, and there by causing collapse of some of the building.

(3). Uncoordinated development has exposed Kuta to erosion.

These findings have shown that for Kuta to develop it must be properly planned and implemented. The information from this study can be vital in forward planning in terms of evaluating the present ills in the town.

5.2 RECOMMENDATION.

In this study we have been able to show the relevance of rainfall as element of climate change in buildings.

It is therefore recommended that future of this nature should include proper waste management.

The following should be carried out in Kuta in relation to climate and development.

1. Advance information should be given to the different environment planning units before and during every season on the expected weather especially during the raining season.
2. Flood and erosion control should be done before the rainy season commences to reduce the impacts of those hazards.
3. Consideration should be to climate in the construction and planning of town (Buildings).
4. Types of materials used should be improve so that their will be no damages in the buildings.
5. The buildings should be maintained regularly in order to protect the nature of our building surface from effects of hard wear to weather deterioration. If rainfall is about 100mm per month there is possibility of high moisture content in the area, And this will and corrosion of metal, chalking and loosing of gloss on painted walls . High moisture content can also lead to decay of Timbers in the building.

   Due to problem of data acquisition, it is difficult to discuss erosion and flood but the area is prone to erosion and flood

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