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TRANSPORT AND ACCESS TO RURAL HEALTH CENTRES IN ILORIN EAST LOCAL GOVERNMENT AREA, KWARA STATE, NIGERIA

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Abstract
This study examines the role of rural road transport in determining physical access to primary health centres in Ilorin East Local Government Area of Kwara State, Nigeria. Data were collected from a sample of 207 rural households using structured questionnaire. In addition to the use of descriptive statistics, principal component analysis and stepwise multiple regression technique were used to analyze the data. About 49% of the respondents were found to travel to health centre by foot while, 23% travelled by commercial motorcycle. The result further indicates that travel time to health facilities is generally low in the areas as 55.6% of the sample spends less than 40 minutes to seek medical services. By jointly explaining 75.5% of variance in access; distance, means of transport, road distance to Local Government Headquarter and level of income can be used to predict level of access to health centres in the area. It is suggested that access to rural health centres can be improved by improving rural roads, introduction of interventions to improve provision of rural transport services and introduction of mobile clinics to ensure that modern medical care is made available to the generality of the people.

Keywords: Rural Roads; Transport Services; Physical Access; Health Centre; travel time.

Introduction

Gross disparities exist in the level of mobility between developed and developing countries; while the developed world has witnessed a transport revolution in recent years, transport infrastructures remain inadequate in the developing world, with a large part of the population experiencing gross immobility. Many areas of the developing world are characterized by unreliable, expensive and labour intensive means of movement (Hilling, 1996). For instance, in Africa significant time and effort is spent on transport for essential needs by rural households (Berwell, 1996). The use of facilities in a community depends to a large extent on the level of access to such services. Better mobility helps improve people's welfare by providing better access to such socio-economic facilities. Level of physical access to any facility is known to depend on the cost, time and effort required to reach the facility. On the other hand the cost, time and effort required depend on distance and the ease of mobility (Halseth and Ryser, 2006).The role of transport in increasing access to health services include facilitating the movement of individuals to health facilities and that of health workers for outreach activities. Also, it enables the provision of timely emergency services and allows improved distribution of drugs and other services to health outposts (Linke *et al*, 2008). Distance and lack of transport have however continued to be major constraints to health services in Africa. For instance, distance and the ease and cost of transport to health facilities are important to people's willingness and ability to seek health services (Linke *et al*, 2008; World Bank, 1993; Global Action on Aging (GAA), 2008 and Poku-Boansi *et al*, 2010).

Several rural studies have shown that long distance to health facilities tend to have negative effect on frequency of visits to seek health care (Goodman *et al*, 1997; Namet and Bailey, 2000; Winters *et al*, 2006., Benjamin, 2006 and Baker and Liu, 2006). Utilization of family planning services and children vaccination is also known to reduce with distance to heath facilities. For instance, long distance to health centres has been identified as one of the factors responsible for incomplete vaccination and missed opportunities for children in Nigeria (Abdulraheem, *et al*, 2011). Thaddeus and Maine (1994) identified delay in reaching health care due to poor mobility as one of the three major barriers preventing access for pregnant women with complication to health care. The other barriers are delay in seeking health care and delay in receiving health care. Relationship has also been observed between poor transport and child and maternal mortality. For instance, Poku-Boansi *et al* (2010) noted that longer travel time to health facility was linked to greater risk of experiencing maternal mortality among pregnant women in rural Ghana. Long, slow or expensive journeys serve as constraints to health care seeking behaviour especially in rural areas (International Forum for Rural Transport and Development (IFRTD), 2005). Transport might be taken for granted in the developed countries but, in Nigeria it is a major factor inhibiting physical access to health services especially in rural areas. Poor transport inhibits vaccination distribution and ability of pregnant women to access emergency transfer and it is also a very important factor in maternal mortality in the country. For instance, maternal mortality rate in the country remains high at 540 per 100,000 live births and as high as 1,100 in some rural areas in the northern part of Nigeria (Trans aid, 2011 and Usman, 2013). Against this background, this study aims at examining the role of rural road transport in determining physical access to primary health centres in Ilorin East Local Government Area (LGA) of Kwara State.

Transport and Access To Basic Facilities

One important way, in which transport help to improve people's welfare is by providing access to socio-economic facilities (Fromm, 1965; Aderamo and Magaji, 2010). The use of facilities in a community depends on access to the facility. People undertake journeys to satisfy social and economic needs. Such trips include those undertaken to markets, schools, health centres, water sources, government offices and even those undertaken to visit family and friends. Improving personal travel is known to bring social benefits by raising quality of life, flow of information, labour mobility and marketing efficiency (Ellis, 1997). For instance, using data from Africa, Latin America and Asia, the International Fund for Agricultural Development (IFAD) (2001) found that, improvement in transport improves access to basic facilities in rural areas. Similarly, Global Action on Aging (GAA) (2008) noted that, inadequate transport in developing countries limit access to basic facilities like health and education and reduces opportunities for improving income in rural areas. Problems with transport provision can increase social exclusion in relation to access to public services. Annually, millions of people miss or even chose not to seek medical help as a result of transportation problem (House of Commons Environmental Audit Committee, 2013). Distance to health facilities and the ease and cost of transport are very important in people's willingness and ability to seek health services (World Bank, 1993). In the case of educational facilities, distance and ease of transport to school is known to have an impact on school enrolment, especially in the case of female education (Avotri *et al*; 1999).

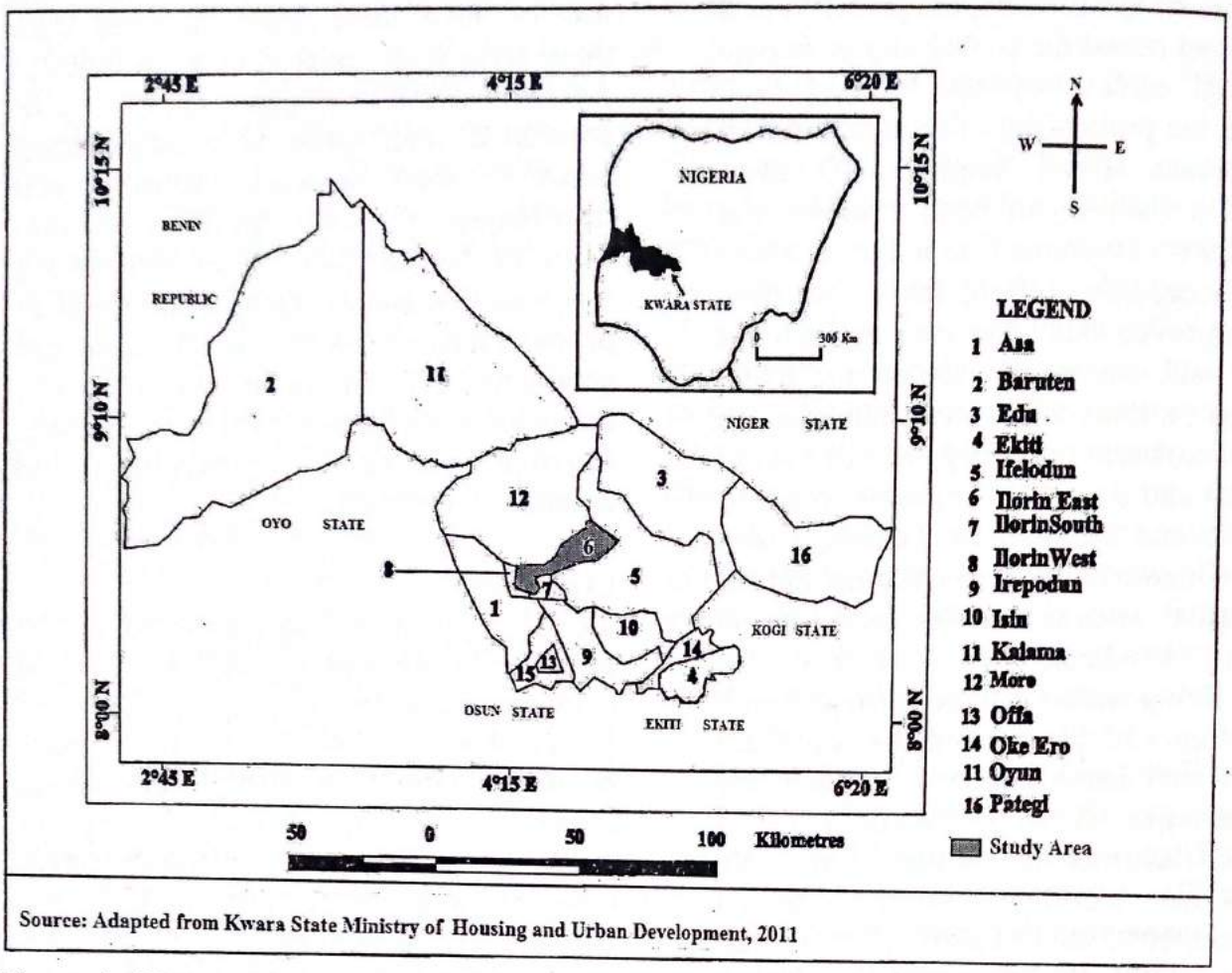
According to Khandker *et al* (1994) in a study on schooling and cognitive achievement in Morocco, the presence of a paved road raised the probability of female attending school by 40 percent and lowered the probability of dropping out by 7.0 percent. Road improvement also, reduced probability of boys dropping out of school by 36 percent. In a similar study in Morocco, Levy (1996) found that rural road improvements increased agricultural output and improved access to social facilities. Improvement was recorded in school enrolment rate, frequency of visit to hospitals and attraction of professionals to hospitals and schools. In Zambia, Howe (1983) found that distance has great impact on hospital attendance. For instance, 50 percent attendance was recorded for people living within distance of less than 5 kilometres. On the other hand, only 2.0 percent attendance rate was recorded for those residing within 33-40 kilometres of medical facilities. In Ghana, Using data from the world's Living Standard Measurement Study (LSM), Glewwe and Jacoby (1992) also observed that higher travel time has negative impact on school enrolment. While emphasizing the high rate of rural poverty in Nigeria, the World Bank (1996) observed that, roads are very vital to improving access to basic services and developing the rural economy. The report further concluded that, in communities with paved roads 80 percent of the people have access to health services. On the other hand, 70 percent of residents of communities without paved roads do not have access to modern health facilities. In a study of the Nsukka region of Nigeria, Madu (2007) identified provision of roads as a strong underlying factor of rural development in the region. Areas with high road density and communities with high magnitude of link to other communities have better access to basic facilities and recorded higher levels of socio-economic development.

Aderamo (2007) revealed that in Kwara State, those areas with high road density have more basic facilities than those areas with low road network density. Aderamo and Magaji (2010) also concluded that, there is a relationship between road network density and distribution of public facilities in Edu LGA of Kwara State. They emphasized that well maintained transportation system promote socio-economic development and concluded that, improving rural roads will bring basic facilities closer to the people, improve economic opportunities and reduce rural poverty.

Study area

The study area is Ilorin East LGA. The Local Government Area is located between Latitudes 8^0 and 15^0 N and Longitudes 4^0 and 5^0 E and shares boundary with Ilorin South, Ilorin West, Moro and Ifelodun Local Government Areas (Kwara State Government, 2013) (see Figure 1). According to the 2006 population census Ilorin East LGA has a population of 207,462 (Federal Republic of Nigeria Official Gazette, 2009). Majority of the people in the area are farmers who engage in the production of crops like melon, groundnuts, beans, pepper, cassava, yams, soya bean, maize, locust bean and Shea nuts (Raw Material Research and Development Council, 2009). There are thirty three primary health centres in the LGA. Seven of these health centres are located within Ilorin metropolis while the remaining twenty-six centres are spread across the other parts of the LGA. As is generally the case in Kwara State the rural parts of the LGA are grossly deficient in provision of infrastructural facilities. For instance, the problem of deficiency of rural road transport in the state has been noted by various scholars (Ogunsanya and Ojetola, 1993 and Aderamo 2007). Most of the available roads in the study area are in

deplorable condition resulting in difficulty of movement of people.



Source: Adapted from Kwara State Ministry of Housing and Urban Development, 2011

Figure 1: Kwara State showing Ilorin East Local Government Area

Methodology

The study depends mainly on primary data obtained at household level. Multistage sampling procedure was used to derive a sample size of 207 respondents in ten settlements spread across the LGA. The Federal Government defines rural settlements as settlements with population of below 20,000 and this definition was adopted for this study. The first stage involved the use of both stratified and systematic sampling techniques whereby all the rural settlements in the LGA were separated into those located on the main (Trunk A) road and those found along the other roads in the area (see Figure 2). The settlements were then arranged in an array of descending order based on their population and the first five settlements in each group were selected for the study. Copies of the questionnaire were applied to 5 percent of households in each of the selected settlements. The average size of rural households in Nigeria is 5 persons (National Bureau of Statistics, 2006 and National Population Commission, 2009). The questionnaire distribution of the households is shown in Table 1.

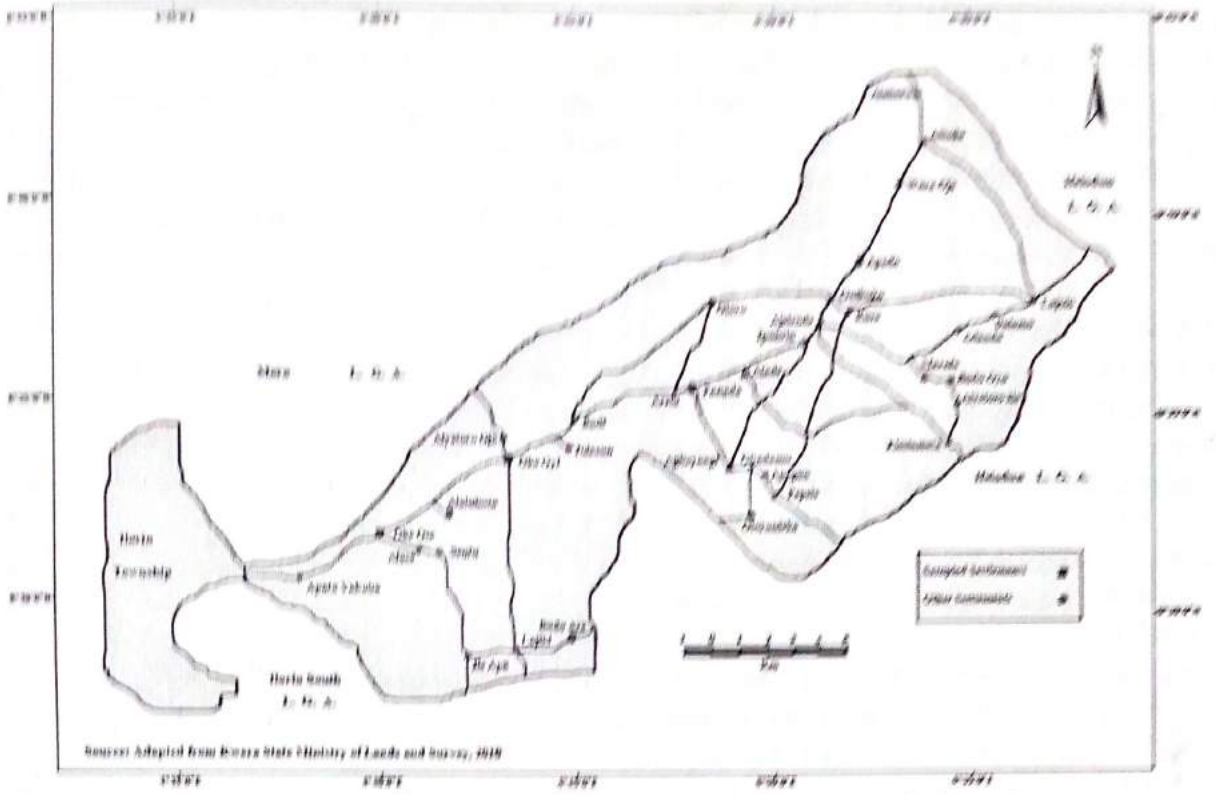


Figure 2: Ilorin East Local Government Area showing the sampled settlements

The heads of household were targeted in the survey. The households in which copies of questionnaire were applied were chosen through systematic random sampling. The use of systematic random sampling involved determining the sampling frame (N) and the sample size (n). After selecting the first household, every K^{th} household was selected for questionnaire administration. For instance for Oke Oyi with a total number 1,785 households and a sample size (n) of 89, K is given by:

$$K = N/n \quad = 1,789/89 \quad = 20$$

Table 1: Sampled settlements and number of households for questionnaire administration

SN	Settlements		Population (2006) Projection	Estimated number of Households	5 Percent of Households
1	Oke Oyi	(m)	8,927	1,785	89
2	Iponrin	(m)	2,464	493	25
3	Panada	(m)	2,162	432	22
4	Apado	(m)	1,239	248	12
5	Oke Ose	(m)	663	133	7
6	Agbeyangi	(r)	1,993	399	20
7	Budo Oyo	(r)	965	193	10
8	Marafa	(r)	793	159	8
9	Alalubasa Isale	(r)	756	152	7
10	Budo Are	(r)	668	134	7
	Total		**20,632**	**4,128**	**207**

Note: (m) Settlements on major roads, (r) Remote settlements.

Source: Population projected to 2006, from NPC's 1996 projection of the 1991 census figures using 3% annual growth rate

As observed by Sarka and Ghosh (2000) physical accessibility is a measure of the ease or difficulty of reaching a particular service. The time spent in reaching a particular facility depends on the level of mobility, the location of the facility and the route condition. This present study assumes that the time spent in reaching a particular facility is a good determinant of the level of physical access to the facility in the study area. The regression model for this specific case is of the form:

$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 \ldots\ldots\ldots b_{10}x_{10} + e$ where

Y = Time spent to reach the facility (TM) (estimated time in minutes)

$a, b_1, b_2, b_3, b_4, \ldots\ldots\ldots b_{10}$ are constants of the regression equation to be estimated.

x_1 = Category of road to settlement (RDCR) (Route Access Index 0 – 5).

x_2 = Means of transport to health centre (MTR) (by foot = 1, public transport = 2, personal vehicle =3)

x_3 = Nature (diversity) of transport service (NTSR)
(No transport service = 0, 1 vehicle type =1…….. 5 vehicle types =5)

x_4 = Distance to health centre (DS) (estimated distance in metres)

x_5 = Transport cost to facility (TC) (amount in Naira)

x_6 = Total income of household head (TICM) (amount in Naira).

x_7 = Ownership of Intermediate Means of Transport in household (IMT)
(Number of IMTs in household)

x_8 = Road distance to LGA headquarter (RDLG) (distance in kilometres)

x_9 = Education level of respondents (EDL)
(No formal education = 0, primary education = 1….. tertiary education = 3)

x_{10} = Sex of respondents (SEX) (female =1 male = 2)

e = error terms

Results and Discussion

The classification of roads in the study area into various categories is based on field observation, questionnaire administration and random interview of residents of these villages. It was therefore possible to determine the functionality of the roads throughout the year. The roads connecting seven of the sampled settlements were found to be accessible by two – wheel drive vehicles throughout the year. Roads connecting the other three settlements (Budo Oyo, Marafa and Budo Are) are passable to four-wheel drive vehicles throughout the year but often closed to two-wheel drive vehicles when wet. This implies that vehicular travel is restricted by poor road surface conditions in some of the settlements in the area. This will likely place some restrictions on mobility in the affected settlements with attendant negative effects on the economy and general wellbeing of the people. Transport services in the area are provided by a variety of vehicles consisting of buses, rural taxis, pick up vans, trucks and commercial motorcycles. Only 18 (8.7%) of the respondents were found to possess personal four wheel vehicles in their household. On the other hand, 52.3% of the sampled households have at least a motorcycle or bicycle. This is in line with the observation of World Bank, (1996) that, ownership of personal cars and other four wheeled vehicles is very low in Africa. Commercial transport services provided by four wheeled vehicles are available in eight of the sampled settlement and unavailable in Alalubosa Isale and Budo Are. Commercial transport service is restricted to that provided by commercial motorcycles in the two

affected villages. The sampled households are located at different distances to the health centres with the minimum distance being less than 50 metres. The maximum distance to a health centre among the sampled households is 12 kms, while the mean distance was found to be about 1 km. For the households that are far away distance may be a constraint to their willingness and ability to use health facilities as observed by World Bank (1993). This will be detrimental to the health and wellbeing of the affected rural dwellers. Furthermore, the difficulty of reaching basic facilities means that, time and efforts that could be used for productive activities are devoted to travelling. This will have a negative effect on the rural economy since less time and energy is available for productive activities. A total of 101 (48.8%) respondents indicated that they usually travel to the health centres to seek medical attention by foot. For 44 (21.2%) of the respondents journeys to the clinics are by personal bicycle or motorcycle, 49 (23.7%) travel by commercial motorcycle while, the remaining 13 (6.3%) respondents travel by personal four wheeled vehicles. Most of the respondents who travel by foot where found to be those located close to the health facilities in the area. Commercial motorcycles have continued to play an important role in rural areas because few commercial four wheeled vehicles are available to rural dwellers in the country. Travel time to the health facilities also vary among the sampled households. The result shows that for 85 (41%) of the respondents journey to the health facility takes less than 10 minutes. Also, 115 (55.6%) of the sample spends less than 40 minute to travel to seek medical services. When examined on settlement mean travel time to health centres is generally low in the area. For instance as seen in Figure 3, the lowest mean travel time of six minutes are recorded for Oke Oyi and Oke Ose while it is 12 minutes in Marafa and Alalubosa Isale. Figure 3 further shows that the only exception is Budo Are where the mean travel time is 45 minutes to the available rural health centre.

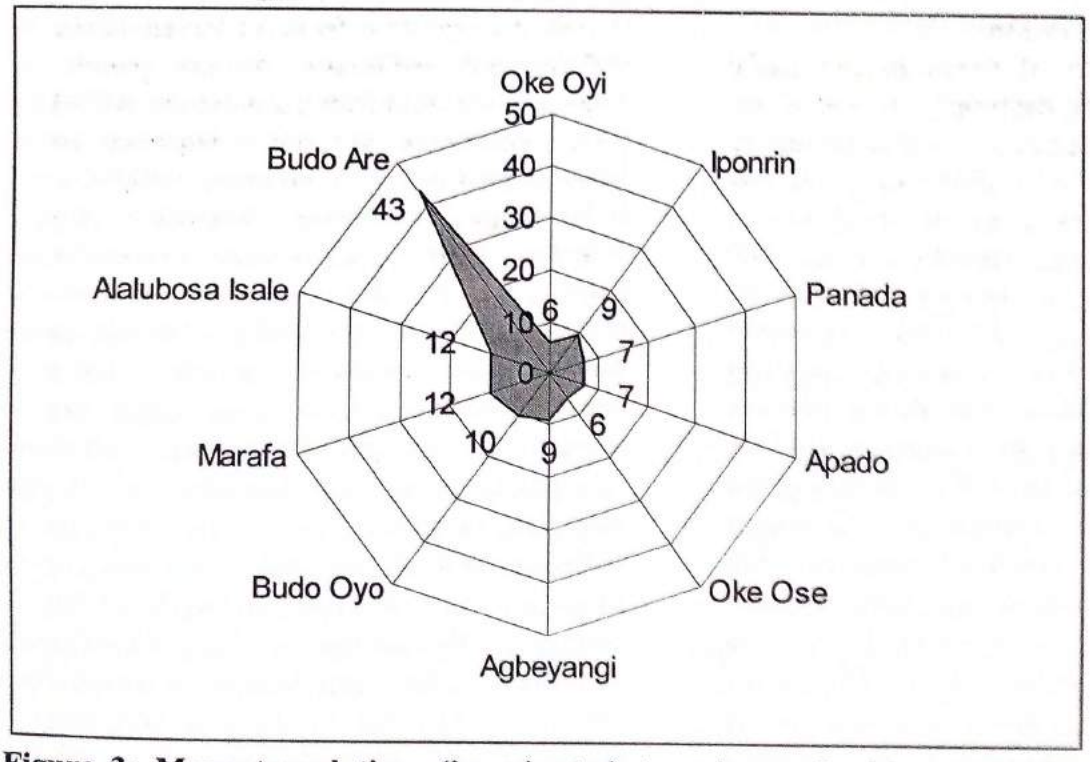


Figure 3: Mean travel time (in minutes) to primary health centres in the sampled settlements

The result of the principal component analysis after varimax rotation yielded four components that accounted for 65.5% of the variance in the selected variables (Table 2).

Table 2: Component loadings on determinants of access to rural primary health centres in Ilorin East LGA

	Components			
	1	2	3	4
Road Category	-.108	.787	-.085	-.245
Means of Transport	.145	.823	-.115	-.074
Nature of Transport Service	-.049	.756	.194	.243
Distance to Health Facility	.960	-.105	-.074	.174
Transport Cost	.911	-.073	-.016	-.025
Total Income	-.001	-.204	.750	.147
Ownership of Intermediate Means of Transport	-.044	.029	.643	.114
Road Distance to LGA Headquarter	.264	-.293	-.073	.856
Education Level	-.042	.138	.610	-.335
Sex	.206	-.149	-.227	-.355
Eigen Values	**2.581**	**2.011**	**1.468**	**1.146**
% Variance	**23.468**	**18.280**	**13.350**	**10.418**
% Cumulative Variance	**23.468**	**41.748**	**55.097**	**65.515**

Source: Computed from field data, 2011

As indicated in Table 2, the first component which accounts for 23.5 of the total variance has the strongest loading on Distance to Health Centre (DS) and Transport Cost (TC). This is understandable as transport cost often varies directly with distance travelled. So this component is labelled 'Transport Cost'. The second component labelled 'Transport Facilities' has strong positive loading on Means of Transport (MTR), Category of Road (RDCR) connecting the settlements and Nature of Transport Service (NTSR). The third component has the strongest loading on Total Income (TICM). It also has a strong loading on Ownership of Intermediate Means of Transport (IMT) and Education Level (EDL). This component is labelled 'Demography' because it embraces the demographic characteristics of the people. The fourth component has a strong positive loading on Road Distance to Local Government Headquarter (RDLG). It is named 'Remoteness' because it is a measure of level of isolation from the centre of administration or decision making. In order to establish the role of transport in determining access to basic health centres in Ilorin East LGA, the component scores in Table 2 were used as independent variables. The result of the stepwise multiple regression analysis indicates that all the four variables are important in explaining access to health centres in rural areas of the LGA. The summary of the statistics reveal that the combined influence of the four variables could explain just 75.5% of the total variation in access to rural primary health

centres in Ilorin East Local Government Area of Kwara State. Some other factors not considered in this study could be responsible for the unexplained variance (24.5%). As shown in Table 3, 'Transport Cost' (x_1) is the best predictor of access to health centres in the study area because 72.1% of its variance is associated with the variation in access to health centres. This implies that proximity to health centres is very important in terms of using health facilities in the study area. Those who live far away from health centres require more time and efforts to reach these facilities. Longer distance will also most likely translate into higher cost of transportation. Meanwhile, longer travel time to health facility was linked to greater risk of experiencing maternal mortality among pregnant women in rural Ghana (Poku-Boansi *et al*, 2010).

Table 3: Road transport variables controlling access to rural primary health centres in Ilorin East LGA

List of variables	Parameter estimate	Standard error	R	R^2	% contribution	% cumulative contribution
Intercept	10.099	0,107				
x_1	5.791	0.108	0.849	0.721	72.1	72.1
x_2	-0.938	0.108	0.860	0.740	1.9	74.0
x_4	0.699	0.108	0.866	0.750	1.0	75.0
x_3	-0.446	0.108	0.869	0.755	0.5	75.5

x_1 = Transport Cost, x_2 = Transport Facilities, x_3 = Demography, x_4 = Remoteness.
Source: Computed from field data, 2011

Next in importance is 'Transport Facilities' (x_2) which is responsible for an additional 1.9% explanation of variance in access. 'Remoteness' (x_4) also contributes an additional of 1.0% while 'Demography' (x_3) added another 0.5% to the other three variables. Those who earn higher incomes spend less time to reach the health centres because they are more likely to be able to afford higher transport charges if necessary. Ability to seek timely health services may be limited by high transport cost. For instance, households in Budo Are have to cover about 16Kms to obtain service from the nearest functional health centre at Oke Oyi. This is a journey of about 40 minutes to one hour with motorized transport and at a cost of at least ₦300 round trip. Poor access to transport is known to isolate especially low income families from health care because people are forced to spend large parts of their income on transport charges, at the expense of other basic needs (The Leadership Conference Education Fund, 2011). For instance, in a study in Ghana Heyen-Perschen (2005) noted that 70% of the rural poor sampled cited high transport charges as one of the major reasons for not using health facilities. Similarly, in a study in rural Bangladesh transportation cost was found to be the second most expensive cost after drugs when people visit hospitals (Cockcroft *et al*, 2000).

From the results of the regression analysis the relationship between access to primary health centres and road transport variables in the area can be predicted with the following equation:

$$Y = 10.099 + 5.791\ x_1 - 0.938\ x_2 + 0.699\ x_4 - 0.446\ x_3$$
$$(R^2 = 0.755, SE = 0.107)$$

The equation implies that the higher the cost of transport to the health centre the less the access to health services. Also, the better the transport facilities available the less the time required to travel and the greater the access to health services.

Furthermore, people living in remote areas have poor access since they require more time and efforts to travel to obtain health services. On the other hand higher incomes and greater personal mobility enable people have greater access to health services.

Conclusion and Recommendations

Available transport facilities, distance, mode of transportation and travel time to health facilities vary within and among the sampled settlements. Households located far away from health centres and those located in areas with poorer transport facilities were found to have less access to medical services in the area. This has clearly emphasized the important role played by transport in providing physical access to health centres in rural areas.

It is therefore recommended that adequate funds be allocated to improving roads in Kwara State. Priority should be given to construction of new roads and reactivation and improvement of existing roads especially in the rural areas. There is also the urgent need to introduce interventions that will improve the provision of rural transport services. This can be achieved through the provision of credit to rural transport service operators in the State. Such measures will help to improve vehicle supply in rural areas. Since distance has been found to be a major determinant of access to health facilities in the area, the best way of addressing this problem is by finding a way to take health services to the people. Since economic reality will not allow provision of health centres in every community, government can introduce mobile clinics in rural areas of the State. Well equipped mobile clinics would ensure that modern medical care will be available to the generality of the people, including those living in very remote areas.

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THE SCIENCE AND POLITICS OF CLIMATE CHANGE: IMPLICATIONS FOR SOCIO- ECONOMIC DEVELOPMENT IN NIGERIA.

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ABSTRACT.

This paper examined the causes and consequences of climate change worldwide and the politics surrounding the insurgence in recent times. Information were obtained through the process of literature review, and past literature indicates that there has been increase in the attention devoted towards solving the problems through adaptation and other mitigation processes. Furthermore, despite the magnitude of its likely impacts on the Third world Countries, until recently it has been viewed largely as an environmental concern, of little relevance to development policy makers. Science teaches that climate change arises as a result of anthropogenic emissions of greenhouse gases being manipulated by man activities in his environment. However, there is much of Politics in the attention, and worldwide outcries relating to its possible effects and the ways out. For those who do not believe in the anthropogenic causes of Climate Change, mitigation measures are unnecessary, rather we should concentrate on adaptation measures. Those who believe on the other hand lay emphasis on mitigation measures while others are less concerned about any serious measures in readiness for its consequences. The implications of this dreadful occurrence on the socio-economic development may include among others, a fall in agricultural output and a likely reduction of water resources in various parts of the country. A refinement of early warning system and formalization of adaptation techniques among others are strongly recommended.

Keywords: Adaptation, Climate Change, Global warming, Rural Production, Vulnerability

1.0 INTRODUCTION.

In recent times, human activities have caused, and are continuing to cause, great changes to the composition of the atmosphere. The major concern of both scientific and public communities is the enhanced greenhouse effect caused by anthropogenic activities. The findings of the Intergovernmental Panel on Climate change (IPCC) have shown that Climate change is already having strong impacts on human societies and the natural world, and is expected to do so for decades to come (IPCC,2007; Zakieldeen,2009). Much has been written and argued about global climate change since its emergence in the late 1970s. These range from total rejection to a gradual and reluctant acceptance to various debates and international conferences among others.

Various researches worldwide had indicated a lot of changes and inconsistencies on matters relating to changes in the essential elements of climate over the years. For example, the works of IPCC,(1998), Adefolalu (2007),Ayoade,(2008) and Nwajuiba (2011) among others focused on climate anomalies and changes over the years in both developed and developing nations. These observations range from climatic variability, long term weather variations, rainfall anomalies to shifts in climatic land marks and what other scholars termed

'climatic accidents'. No matter what language we use, over the years, there has been climate change or variation in the past, in the present age and probably in the nearest future. The pressure mounted by the world's advanced countries (such as the United States of America, the United Kingdom, France and Germany) on climate change has definitely raised the awareness levels in the developing countries like Nigeria. For example, countries like Niger, Mali and Algeria have involved themselves in setting up early warning systems and specific bodies to recommend for their countries comprehensive analysis of, and stakeholder consultation on, policies and institutions to integrate and co-ordinate approaches for finding solutions. These bodies are to work with vulnerable communities at the local levels to work out adaptation strategies and establish early warning centers within their environment. Many countries in the sub Saharan Africa like Nigeria, Ghana, Sierra Leone and Zimbabwe, to mention a few, have also been engaged in climate change activities and negotiations. The countries are parties to both the United Nations Framework Convention on Climate change (UNFCC) and the Kyoto Protocol. Currently, Sudan is leading the biggest negotiating group, the group of 77 and China, in the climate change negotiations to formulate new commitments in the post-2012 and to enhance the implementation of the convention (Zakieldeen,2009: 7)

Nwajuiba, (2011) indicated that the Nigerian environmental Study Action team (NEST) has been engaged for a quarter of a century with research, advocacy, and actions on the threats and opportunities with respect to the Nigerian environment. In the last five years NEST has been implementing the Canadian International Agency (CIDA) – funded Building Nigeria's Response to Climate Change (BNRCC) project. This is perhaps the most extensive and intensive project on climate change in Nigeria. However, a major component of the BNRCC has been to develop a National Adaptation Strategy and Plan of Action for Nigeria, in partnership with the Special Climate Change (SCCU) of the Federal Ministry of Environment.

Climate can be defined as the synthesis of atmospheric characteristics at a given location over a period of at least 30 years (Rosenberg (1992). Climate is more than the average weather conditions over a given area as it includes the variability over the same period. The Climate of a region depends on many factors including the amount of sunlight it receives, its altitude, topography, and how close it is to the ocean, and the climate of a region is never static, it varies around the mean or average state over a given defined period such as a month, season or year. Over a long period of time, climatic variations may be such that a shift or a change in the type of climate prevailing over an area takes place. In such a case, we say there has been a change in climate or a climate change. The common definition of Climate Change as given by IPCC,(2000) is

"A change of climate which is attributed directly and indirectly to human activities that alter the composition of the global atmosphere and which are in addition to natural climate variability observed over comparable time period"

On the other hand, Rosenberg et al, (1992) saw climate change as increasing atmospheric concentration of green house gases resulting from human activities which are capable of warming the earth. This change has led to various responses of both living and non living organisms in the environment. Climate change is ultimately a global issue, and the impact will vary from one region of the world to another and even within a given country. Scientists, historians and geographers have let us known that the climate of our known world

is gradually changing and that it represents one of the greatest environmental, social and economic threats facing the planet Earth. The measure of these changes are seen in global warming, rainfall anomalies, wind changes leading to increased hurricanes, cyclones, heat waves, dust storms, drought and flooding.

With various reports over the years, climate change is increasingly emerging as a serious threat to sustained economic growth. In the last five years for example, two major reports- the 2007 fourth assessment report (AR4) of the IPCC and stern review entered the public domain and simulated professional discussions to be reflected on development strategies and thinking. These two reports provide compelling evidences, analytical explanations of observed trends, and simulation model projectors drawing strong cause and effect linkage between human and socio-economic activities worldwide (Ojoye,2010).

The aim of this study is two folds. First, it is to examine the politics and scientific explanations surrounding the issues of climate and climate change over the years. Secondly it is to examine the components of climate change as affecting Nigeria, with a view to proffer solutions to the emerging climate related problems. The global climate change and its associated risks are serious issues for Nigeria most especially in the Northern parts of the country where precipitation is erratic and desertification is on the increase over the years. The basic questions still remain: what causes climate change? Is Nigeria prone to climate change? If yes, what are the likely effects of climate change/ and how ready are we to combat these effects?

2.0 THE CAUSES OF CLIMATE CHANGE

The problem of human induced climate change first came to the attention of the global public and international policy makers when the Intergovernmental Panel on Climate Change (IPCC) published its first assessment report in 1990. This drew attention to the significant increases in atmospheric greenhouse gas concentrations observed in the last 150 years.

Science teaches us that global warming and climate change have come to stay, and that they arise as a result of variations in the earth orbital characteristics, atmospheric carbon dioxide variations, and variation in solar output worldwide. This is a natural cause resulting from steady increase in the amount of energy emitted by the sun, solar energy intercepted by the earth, the energy absorbed by the atmosphere, volcanic eruptions and variations in solar output.

The other cause of this phenomenon is anthropogenic emissions of greenhouse gases such as Carbon Dioxide and Nitrous Oxides being manipulated by man activities in his environment. Man over the years has spewed gases into the atmosphere and the rate has been on the increase leading to major source of atmospheric pollution. These are man made change resulting from increasing Green House Gas emission [CGH] caused by development factors such as economic growth, technology, population and governance. Ayoade(2008) opined that a continual loading of the atmosphere with radio actively trace gases such as carbon dioxide, methane nitrous oxide, CFCs and other gases, could change the climatic condition of an area. These emissions arise from various developmental efforts of man such industrial and nuclear development, manufacturing, bush burning and emission of combustible products into man's environment resulting into various pollutions.

Ayoade (2008), however indicated that Carbon dioxide is only one of several greenhouse gases that human activities produce and it is estimated to account for

about 55% of anthropogenically induced global warming. It could thus be said that both variations in solar activity affecting solar output and the greenhouse effect of anthropogenically produced gases may contribute to global warming and relative climate change worldwide. Ayoade, 2008:7) further attested that the role of greenhouse gases have often been emphasized at the expense of the role of natural forces due to variations in global solar activity. In most cases, the projected impacts of global warming are mostly not beneficial; attempts are thus being made to device appropriate response strategies worldwide. These have been in form of mitigation and adaptation measures both of which have political undertones and socio-economic implications.

3.0 VULNERABILITY AND ADAPTATION TO CLIMATE CHANGE

Developing countries like Nigeria are particularly vulnerable to climate change because of the overwhelming dependence of their economies on natural resources, and their low adaptive capacity. Most land in Nigeria especially in the north is quite sensitive to changes in temperature and precipitations. Food security is mainly determined by rainfall, with more than 60% of Nigerians directly depend on climate sensitive resources for their livelihood (Olawepo, 2011).

Vulnerability according to Zakieldeen (2009:4) is the potential to be adversely affected by an event or a change and ability to cope with or recover from its impacts. The extent to which climate change may damage or harm a system depends on the system's sensitivity and ability to adapt to new conditions. Physical vulnerability refers to exposure to stress and crises resulting from physical hazards, while social vulnerability refers to the inability of individuals and communities to respond to physical impacts,. Vulnerability may also be considered at many levels, including the individual, national or regional level. Apart from the general views on vulnerability in the Nigerian context, the following vulnerable groups deserve attention. These have been identified by Ayoade (2003:45 ,2008:10), Ojoye,2010:25), and Olawepo (2011:58). They include among others,

(a) rural poor and local farmers in all locations in the country. This is because they mostly depend on nature for agricultural productivity due to poverty and in ability to access means of production that may reduce the likely effects of extremity of climate variations;

(b) the people in the Sudano-Sahelian belts of Northern Nigeria. These locations have a range of ecosystems relating farming, water and social livelihoods. Throughout the region, water resources and rainfall variability are dominant. These underlying conditions are exacerbated by various human pressures which are also relating to climatic issues;

(c) water resources as a sector. Climate change is expected to affect Nigeria's water resources through reduced groundwater recharge brought about by a projected decreased precipitation and/or increased temperatures and evaporation ,especially in the Northern States;

(d) the rain fed communities of the South are also vulnerable due to a projected increased precipitations along the coast and excessive flooding;

(e) the public health sector and human resource. More people are likely to be exposed to significantly increased tropical diseases such as malaria, waterborne diseases and heat related risks. The risk of transmission of diseases could increase substantially

in the coming years due to variability of climatic features; and

(f) human environment and environmental hazards. There is the likelihood of increased environmental hazards in various locations. The speculations include environmental hazards because their impacts, in conjunction with climate change, are likely to exacerbate people's vulnerability by weakening coping capacities and reducing options for adaptation.

Among the different options being proposed for solving climatic problems is the issue of adaptation to the impending changes. Adaptation is an automatic or planned activity that is proposed to minimize adverse effects of climate change, and which maximizes the accrued advantages. According to Zakieldeen (2009: 4), adaptation is the adjustment in natural or human systems in response to actual or expected climatic change or their effects, to reduce harm or exploit beneficial opportunities. Adaptation involve among others, changing processes, practices or structures, either automatic or planned, by individuals, households, governments and other stakeholders. The capacity to adapt depends largely on access to assets (including natural resources; and human, technological, social, physical and financial capital) and how well these are used (ibid).

The main consensus in various climate change conferences and convention is in the area of adaptation to changes. Burton et al (1998), summarized adaptation strategies into eight alternatives at various levels. These include:

(i) bear losses among the vulnerable communities; bearing losses may occur when the people affected have no capacity to respond in any way ,to the impending impacts of climate change, the only response is 'doing nothing';

(ii) share losses among a wider community, especially among traditional societies as well as high tech societies;

(iii) modify the threat; such modifications may be in form of reduction strategies on greenhouse gases as well as flood control in order to slow down the effects of climate change;

(iv) prevent effects A common form of adaptation measures involves steps by communities, corporations and NGOs to prevent the effects of climate change;

(v) change use; where the threat of climate change makes the continuation of an economic activity extremely risky or impossible, an alternative activity could be sought for. e.g substituting a less drought tolerant crop with varieties with lower moisture needs or improved seedlings;

(vi) change location; location of economic activities to a more favourable environment in order to reduce the effects and threats of climate change;

(vii) indulging in continuous research; this will advance the process odf adaptation and researches into new technologies; and,

(viii) educate, inform and encourage behavioural change; this will enlarge peoples' perception and foresight, and make more people to prepare ahead various impending threats.

In Nigeria, various adaptation strategies have been suggested and are ongoing at various levels and locations. For example,

Dabi et al (2005) have identified a number of adaptation options in Nigeria's rural communities especially among the local farmers. These include among others; the use of shallow wells to increase water supply, increased mulching on farms, development of small-scale irrigation initiatives and planting drought resistant crops. Others include, crops and animal diversification, development of alternative local fish ponds and income diversity into nonfarm activities.

4.0 EVIDENCES OF CLIMATE CHANGE

That the climate of the world is changing is not new and that this present change has come to stay. Evidences of these changes therefore cannot be over flogged in a country like Nigeria. For example, the Sahelian Zone of Nigeria is now extending southward into guinea savannah zone leading to increased desertification threat. There is now also misnormal behaviour of the ITD, floods and drought are now common especially in the north, while coastal cities are experiencing increased rates of ocean surges. The truth about climate change worldwide is that no matter what language we use over the years, there have been various changes even within our environment. Ayoade,(2003) supports the view that increases in atmospheric concentrations of Carbon Dioxide and other greenhouse gases and the resultant global warming and projected changes in climate will have impact on natural terrestrial ecosystems in diverse ways. Changes in temperature, precipitation and relative humidity will cause ecological stresses in marginal areas and will affect the dynamics and distribution of plant species, insects and animals (Jeje, 2009). Apart from this, Adefolalu (2007) has shown that there is ample evidence already that climate change is taking place at the local level in Nigeria, especially in the Sudano-Sahelian ecological zone with a substantial reduction in rainfall distribution over the years.

Global change and its associated risks are serious issues for Nigeria most especially in the Northern states where precipitation is erratic and temperature is usually on the high sides. There is a growing evidence of a shift in climatic patterns. Although governments around the world have embarked on programmes designed to cut greenhouse gas emission that fuel climate change (Ojoye, 2010). Furthermore, observational evidences in various weather stations and locations indicate that changes in the 20th century have already affected a diverse set of physical and biological system. Examples of these changes include the shrinkage of glaciers, coastal storm surges, high temperature, high precipitation and intense wind among others (McCarthy, et al 2001, Ojoye 2010:5)

The work of Nwajiuba (2011:3) showed that there are four climate issues or related issues, which BNRCC has isolated and which are emphasized in the adaptation strategies. These are temperature, rainfall, extreme weather events and rising sea level. The experience in the last decade in Nigeria, which are projected to increase in the coming decades, include rising average temperatures all over Nigeria, but most significantly in the Northeast of Nigeria.

The coastal regions have positive moderating effects of the ocean on the rising temperatures hence this is milder in the coast. In Nigeria's north, especially the Northeast, the rising average daily temperature is more critical and areas around Maiduguri already experience significant increase in the number of days with mean average (minimum and maximum) temperature above 40 degrees Celsius. This is projected to increase with adverse consequences for human livelihoods as well as crops and livestock production. Around some of Nigeria's most important food producing areas of the Savannah

including Nasarawa, Benue and Taraba, Plateau, Gombe, and Niger states, but also Borno State among others, rising temperatures could be a disincentive to labour productivity, as we know that the main source of far energy is the human labour. The low level of mechanization and huge rural out-migration will hamper domestic production and further compromise food security. Such crops as maize, yams, onion, tomatoes, potatoes, sorghum, millet, cowpea, and oranges are among the most potentially affected. (Nwajiuba,2011 :2)

. The following are few examples of various variations that are known to us in recent years, and these are clearly documented by the works of Ojoye (2010:23). They include:

(i) Shifting in the sahelian zone and increase in desertification rate down south in North Africa and most especially in the northern parts of Nigeria.

(ii) Uncontrollable famine in Sudan/Sahel region due to excessive drought in the last 20 years, examples include Somalia, Ethiopia, Sudan and north Niger.

(iii) Flooding and over flooding in oceanic countries in the last 10 years eg Tsunami experience that cut across China, Japan, and parts of India and other oceanic countries..

(iv) Rise in temperature and heat waves worldwide and late onset of rain in some places like Sudan and Somalia.

(v) Melting of ice bergs in Arctic and Antarctic circles at alarming rate in the last 2 decades.

(vi) Rainfall anomalies and storm dust over Nigeria in early2010.

(vii) Floods in both North and South Nigeria and increased erosion in the South-South (Nigeria), the worst occurring in 1999 and 2007 with loss of life, property and agricultural produce amounting to billions of Naira.

(viii) Hot dry season with record breaking temperature which exceeded 50 Centigrade in the North East Nigeria in 2005 resulting into thousands of deaths.

Apart from the above, there are recent global occurrences that deserve our attention. For example, in the first two weeks of August 2010, calamity struck in Russia, China and Pakistan. In Pakistan there were excessive rains that wiped away many villages. Over 1,584 people were killed, 1 million lost their homes to flood and 20 million people were affected, and there were outbreak of water borne diseases. At the same time they were experiencing summer heat in other parts of the country. This was alien to their country, at least not in the last forty years. The Russian case is that of excessive heat leading to fire burning hectares of land and communities. Despite technology, hundreds of people were killed while resources running to billion dollars were destroyed. This also affected the whole of Moscow for a week without proper breathing air and space (Olawepo 2011:64)

Similarly in September, 2010 in China (Gonsou province), mudslide after torrential rain claimed more than 1200 lives, the rainfall caused the land slide that swallowed whole villages while hundreds were made homeless, and 600 were missing. In Portugal in the same week, temperature rose to 110 degree Fahrenheit for the first time in twenty years leading to wild fire killing more than 13 people. In Saudi Arabia, 10 people died on January 10th 2010 due to flood where they were expecting dryness during the time of the year. Coming back home in Nigeria, there have been various effects of climate change and global warming, ranging from excessive

dryness to rainfall anomalies and flood. In August 2011 for example, there was the case of consecutive rainfalls for days in both Lagos and Ibadan with a loss of about 200 lives. Residents of Eti Osa beach in Lagos are also experiencing fast ocean surges eating into inland, destroying infrastructures and means of livelihood during the months of August and September 2011 NIMETS (2011, CNN,2011).

An impact of climate change that is becoming increasingly important is the aspect of heavy precipitation events, specifically their reference frequency and spatial distribution in a warming climate. Future increases or decreases in extreme potential to impact broad aspects of society through flooding and related natural disasters like the ones recently experienced in both Pakistan and Somalia in 2011. The Intergovernmental Panel on Climate Change (IPCC) (2001) projected that by the year 2050, the number of countries that will be faced with water stress will rise to eighteen (18) affecting about 600 million people with unprecedented impacts on the socio-economic development of many more countries in the sub Saharan Africa. This will invariably affect their food production levels, degradation of shared fresh water ecosystems and competing demands for shrinking natural resources to mention a few.

In view of these anticipated climate change related problems, further researches into climate change and improved early warning signals should be encouraged in all African countries, especially in our country Nigeria, where the perception levels of people on climate change is assumed low. Nigeria is the most populous country in Africa and one of the most vulnerable countries to climate change and climate variability. This situation is aggravated by the interaction of multiple stresses occurring at various levels such as endemic poverty, institutional weaknesses, limited access to capital, ecosystem degradation, coastal environmental pollution and other complex disasters and conflicts in various locations.

5.0 THE POLITICS OF CLIMATE CHANGE AND GLOBAL WARMING.

Despite the various evidences of either existing climate change or a projected change due to existing information worldwide, there are political undercurrents to the scientific issue of global warming and climate change especially with regards to its causes and how to deal with the problem. The climate scientists themselves do not agree on the causes of the ongoing changes, especially whether it is man induced or natural. The situation has been more confounded by press reports on the projected impacts which tend to be alarmist and ignore the various assumptions of models used by scientists to make their predictions. Evidences across the world have shown that climate change is now a political issue. However, as yet there is no substantive framework for policy which offers coherence and consistency as to how national governments should cope with the long-term political challenge of climate change (Giddens, 2008). There have been several outcomes, part of which is organized conferences and public discussions instigated by the developed world. . Public discussion of climate change tends to be partial and disparate. Loosely connected debates hinge on the evidence that climate is occurring and estimates of its potential impacts; the prospects for agreeing an international framework for an economic response to, for instance, carbon trading; futurology surrounding the potential for technological innovation that could solve the problem (Giddens, 2008:3).

There have also been various political positions worldwide and the issue of climate change is being handled differently. Firstly various government bodies and international organizations have been organizing

conferences and debates in the last ten years to publicize and tackled the issue. On the other hand, some countries are idle and careless to focus on the problems of climate change. They are probably waiting for the industrialized world to finance various programmes and project relating to climate change. Giddens (2008) indicated that very few aspects of the climate change debate are uncontroversial, and the controversies between protagonists are often intense and even bitter. By their nature, it could be argued, democratic countries tend to be driven by the immediate concerns of voters at any one time, using climate change issue propaganda to winning votes. For example in Britain and the U.S.A, there has been increased clamor for 'increased greenhouse' taxation and asking for politics of returning to planning to reduce the effects of climate change.

In the world of politics relating to climate change, four different positions can be distinguished. First, there are the climate change skeptics, who claim the case that present –day processes of global warming and climate change are produced by human activity is not proven. Fluctuations in climate, they point out, produced by natural causes, has been a constant feature of world history. The current situation they assert is not different. Other skeptics accept that climate change is happening and that it is humanly induced, but argue that the threat has been exaggerated. For them, other world problems such as poverty, Aids, or the possible spread of nuclear weapons, are both more worrying and present more pressing dangers than climate change. The skeptics have dwindled significantly in numbers in recent years as the science of climate change has progressed, but they still get a significant hearing (Giddens,2008:6).

Second, there is a mainstream view (or, more accurately, spread of views) about climate change, represented above all by the publications of the IPCC. The IPCC has had an enormous influence over world thinking on climate change-in so far as there is a consensus about its extents and dangers; it has played a large part of it. Indeed, that is its declared aim, to gather as much scientific data as possible, subject it to rigorous review, and reach over all conclusions on the state of scientific opinion. Those who are skeptical about climate change see the IPCC as the enemy of free and proper scientific thinking. For them it has become an establishment, determined to see the world through its own eyes, the guardian of orthodoxy.

The third groups are the radicals who argue that there are threshold effects in climate change, as the naturally induced climate fluctuations we know about from the past reveal. There are those that believe that the current global climate change is not new and are only temporary. This is because climate change has been occurring before man-made emissions of greenhouse effects could have any impact and that studies have shown that the earth's climate had in the past moved from periods of warmth to cold and back again without any man made causes. (e.g. the 1910-1945 warming was replaced by cooling up to the late 1970s). Some of this group however believes that it is already too late to avoid dangerous climate change. We had best concentrate most of our energies preparing to adapt to it and cope as best as we can.

The fourth group is people who believed that the current global warming was caused by the developed countries in their search for knowledge and economic development and therefore they should fund mitigation measures and adaptation strategies in the developing nations. This group also believe that it is a form of groupings on the basis of alignment i.e. it is a situation for developed countries to draw alignment for themselves among the poor countries.

For those who do not believe in the anthropogenic causes of global warming and Climate Change, mitigation measures are unnecessary, rather we should concentrate on adaptation measures. Those who believe on the other hand lay emphasis on mitigation measures and also, should be spearheaded by the industrialized countries which are the greatest emitters of greenhouse gases and consume most of the global resources. Developing countries argue that sustainable development is a good idea but it does not address the problem of intra-generational equity in terms of global resources utilization. To them the environmental effects of development are currently not fairly distributed (Ayoade, 2008:9)

The questions still remain:

(a) Are the phenomena of global warming and climate change real, myth or mere propaganda?
(b) If they are real is the cause man made or natural, or both?
(c) Is it (or not) a way by the World's strongest countries (rich) to force the (poor) Third World Countries shift their allegiance and bases or support?
(d) Can we do anything to stop global warming and climate change?
(e) What will be the impacts of global warming and climate change on the economy of the Third World Countries?
(f) How should we react to global warming and climate change in our local environment?

Correct answers to these questions require scientific researches that are totally devoid of politics. What we need is good funding, better attention and lots of preparation incase it becomes reality in our world and in our time.

6.0 THE LIKELY EFFECTS OF CLIMATE CHANGE ON RURAL PRODUCTIONS AND SOCIO-ECONOMIC DEVELOPMENT IN NIGERIA.

The Federal Ministry of Agriculture in conjunction with the Nigerian Meteorological Society (NIMET) on 17th February 2011 predicted early and heavy rainfall in Nigeria. This is true but we must be expecting excessive flooding of our water beds to be followed by extensive drought in the coming years. After now, Climate change is expected to worsen the vulnerability of the poor through its impact on their livelihoods, water supply situations, health conditions food security and economic opportunities. For example, the IPCC (2001) opined that the poor are most at risk from the effects of climate change and identified some poverty related ones. These include reduction in crop yield that may result from variation in temperature, flooding, decrease in water availability and new/changed insect pest incidence. Others are the adverse effects on food security, employment and income and exposure of people to new health risks. While Africa is vulnerable to the predicted effects of climate change, the lack of industrial activities in many countries means it contributes little to greenhouse emissions; there is variation in the levels of the impacts. Yet, many countries depend on natural resources that are sensitive to changes.

Ayoade (2008) had identified the general impacts of climate change especially on issues relating to Global Warming. According to him, Palaeoclimatological studies indicate that the pattern of the general circulation of the atmosphere and the characteristics of global and regional climates will be different in a warmer earth from what we currently have. This may herald significant changes in global and regional climates in the following ways.

(a) a shift in the boundaries of climatic zones,
(b) increase in the length of the growing seasons in the middle and high

latitudes that may allow the successful cultivation of new crops,

(c) increase in precipitation extremes giving rise to increase in the occurrences of floods and droughts,

(d) increase in global average temperature and consequent increase in heat waves especially in urban areas and the melting of polar ice and glaciers in the coming years,

(e) tendency towards less severe winters and decrease in the occurrence of cold waves,

(f) possible increase in the occurrence of storms including tropical cyclones; and,

(g) a general rise in sea level as a result of thermal expansion of ocean water and melting of polar ice and glaciers of between 0.09 to 0.88 metres within a century leading to the inundation of low lying coastal areas and some oceanic islands.

Having viewed the likely impacts of climate change and global warming globally, it is essential to expatiate on the likelihood effect of a projected climate change on Nigeria, not minding the politics surrounding the issues of climate change. That a large proportion of Nigeria is vulnerable is a reality, and thus what should concern us is the possibility of reducing the effects on our environment. Bako (2007) and Adefolalu (2007) have identified some of the likely effects of climate change in Nigeria in the nearest future based on the various weather reports within the shore of the country. They include among others:

(i) Nigeria is expected to witness an average 15-20% reduction in agricultural production in the next 3 decades due to drier conditions and crop damages. The major impacts on crop production will come from change in temperature, moisture levels, ultraviolet radiation, carbon dioxide and increase pest and diseases. Similarly, high temperature in the Northern States may have detrimental effects on the development stages of some crops especially grains, thereby reducing yields and quality overtime.

(ii) Livestock production will be affected negatively as the North becomes drier and there is possibility of desertification increase in the North as well as increased risks of fire outbreaks.

(iii) Since water resources are linked with climate, the prospect of local climate will have serious implications for water resource development and utilization in Nigeria. For instance, the lake Chad basin may dry up to a capacity that is less than ¼ of the existing water level and fishing would drastically reduce.

(iv) Rivers Niger and Benue would reduce drastically, with low fishing output and this may further affect electricity generation in Nigeria more in the nearest future.

(v) In recent years, it has become clear that climate change will have direct and indirect impacts on diseases that are endemic not only in Nigeria, but in other tropical countries of the world. Warmer climate may increase the spread of disease like malaria, skin problems other environmental health disorders and the latest fear of humanity-cancer. The IPCC report of 1988 acknowledges that climate change will have an effect on vector-borne diseases in the

African continent, Nigeria inclusive.

(vi) Loss of natural habitats and wildlife in the Savannah and rain forests are also eminent. This may result from the effect of desertification which will be on the increase due to excessive drought and dryness. Desertification will essentially , reduce potential vegetative productivity in both the savannah and the forest zones.

(vii) Excessive flooding may be on the increase in the coastal locations as well as in the rain forest regions. The recent flood in Lagos and Ibadan are examples of what we may experience in the nearest future.

Apart from the above socio-economic implications of climate change on the Nigerian economy, the various politics of climate change can also have effects on the socio-economic life of the Nigerian citizens. Nigeria, as at today has been involved in various debates in both national and international forums. This has geared up various attentions on both adaptation and mitigation measures especially within the agricultural and industrial sectors. A positive politics of climate change depends on us deciding that politics works, that is how we focus collectively on a different future, and in focusing on it, make positive things happen. A positive thinking may accelerate the pace of development especially in the area of preparation that will lead to improved productions in agriculture and consequent food security and a cleaner industrial production. The politics may also have negative effects in that we may be slow in taking action with ill prepared motives with varying disasters. It may also mean more funding on climate related projects at the expense of more productive ventures. Unless leaders of developed world, whose countries account for more than 80% of current greenhouse gas emissions, make a legally binding commitment, countries like Nigeria will continue to suffer the effects of climate change.

7.0 THE WAY OUT FOR NIGERIA.

The problems at hand need urgent attention both from the people and the Government. Rather than panic, we need to take immediate action, and make adequate preparation to reduce the risks. The following steps are essential for us to follow in order to create an enabling environment for implementing adaptation options:

(a) establishment of monitoring and early warning systems by metrological Authority and Government Agencies is urgently advocated. This could be an establishment of a climate change center. The center could be saddled with researches, monitoring and overseeing all aspects of climate change relating to the country at large.

(b) The impact of climate related disasters recently experienced in the country is very high and thus, the provision of timely warning by NEST, NIMET and NESREA could help reduce the projected impacts; the Government should therefore finance these agencies very well to enable then carry out their constituted duties efficiently;

(c) the Federal Government should make landuse laws consistent to encourage proper land use management techniques that would protect crop productions on a large scale; this would reduce the likely effects of climate change on crop productions especially among the rural farmers;

(d) introduction of climate change information into educational curricula in schools, universities and in our

religious institutions will help to educate people and expand their perception;

(e) amend and/or develop funding policies which suit the conditions of the poor. There is the need to work with vulnerable communities at the local levels and take a participatory approach to project planning. This is very important and can generate valuable lessons, not only for adaptation success but also for sharing knowledge/experiences with vulnerable communities within the country;

(f) formalize adaptation techniques among our local farmers through proper development of indigenous knowledge in agriculture with improved seedlings, storage facilities and modernization; the government could also develop funding policies which suits the conditions of the poor;

(g) emphasis on the development of alternate energy power source especially in the usage of natural gases in thermal stations, this would reduce dependency on hydro power which may face down ward trends in efficiency as a result of drought and low water levels;

(h) encourage environmental friendly productions that will reduce gaseous emissions in industries as well as on our roads, Intensive research into energy usage and alternate renewable energy at household and industrial levels;

(i) efficient storage and utilization of water resources need to be emphasized especially in the drier locations in the country;

(j) the country must address the population factor in the development process to reduce the share impacts of population on the environment; and,

(k) refinement of early warning System through proper utilization of Nigeria's satellite system.

If these recommendations are considered in planning and in a comprehensive national sustainable development strategy, then the process of integrating adaptation is more likely to be effective.

CONCLUSION

The problem of human induced global warming and climate change has dominated the world's attention in the last ten years. Despite the magnitude of its likely impacts on the Third world Countries, until recently it has been viewed largely as an environmental concern, of little relevance to development policy makers. Climate change or global warming has become a new reality, with deleterious effects: seasonal cycles are disrupted, as are ecosystems; and agriculture, water needs and supply, and food production are all adversely affected. Global warming (climate change) also leads to sea-level rise with its attendant consequences, and includes fiercer weather, increased frequency and intensity of storms, floods, hurricanes, droughts, increased frequency of fires, poverty, malnutrition and series of health and socio-economic consequences. It has a cumulative effect on natural resources and the balance of nature (BNRCC, 2008).

Recent happenings in Nigeria have shown that the impact of climate change can be vast. This means that some stable ecosystems such as the Sahel Savanna may become vulnerable because warming will reinforce existing patterns of water scarcity and increasing the risk of drought in Nigeria and indeed most countries in West Africa. As well, the country's aquatic ecosystems, wetlands and other habitats will create overwhelming problems for an already

impoverished populace. Similarly, based on the Intergovernmental Panel on Climate Change (IPCC) projections, the humid tropical zone of southern Nigeria, which is already too hot and too wet, is expected to be characterized by increase in both temperature and precipitation, especially at the peak of the rainy season in the coming years (BNRCC, 2008; 2).This and other occurrences have shown that climate change is a reality and not a myth

Even though there are lots of politics on climate change globally, the world should not wait endlessly to extend the influence of this "monster' to destroy our world. The developing countries should endeavor to lay emphasis on various adaptation measures, and if these are considered in planning and in a comprehensive national sustainable development strategy, then the process of integrating adaptation is more likely to be effective.

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EVALUATION OF THE LANDSCAPING OF THE STUDENTS HOSTELS AT THE GIDAN KWANO CAMPUS OF THE FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

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Abstract
Landscape is fundamentally the land as shaped by the climatic conditions and which results in the distribution of existing flora and fauna. It is also the environment inhabited by man and other living creatures. This study is aimed at examining the current landscape design and an evolvement of a landscape design proposal; for the beautification and control of erosion of the institution with a view of creating an environment that is more conducive for academic learning and recreation. The objectives of this study are to examine the existing landscape environment in the institution; identify areas vulnerable to both human and physical constraints in the campus as a result of inadequate landscaping of the students' hostels section of the campus; propose a landscape design for the institution and lastly prepare an implementation proposal for the landscaping of the institution. The data for the study were obtained from both primary and secondary sources. The result of the study showed that the study area is devoid of essential landscaping facilities such as organized open spaces, public seat outs, benches, organized pedestrian walk ways, organized drains and culverts for water passage, dearth of organized parking areas for vehicles. Based on the observed environmental and landscape problems in the study area, appropriate recommendations were therefore proffered to resolve the problems through a proto type lands cape design proposal.

Keywords: Landscape, Environment, Landscape planning, Landscape design and landscape development.

Introduction

Landscape is the combination of two words: land and scape. The word land consists of earth surface and its entire characteristics such as sea, lakes, rivers, mountains and valleys. Scape on the other hand means a combined view or pictorial representation of all the earth's surface features. Hancock (1980) defined landscaping as aiming at new development in its surrounding and to provide a desirable new development. Landscaping involves an accurate and appropriate provision of landscape elements such as planting of trees, grasses and ground cover water. Landscape design can, therefore, be considered as the art and science of shaping man's natural environment to suite his needs as well as restructuring man – made environment in order to bring it into closer harmony with nature (Igbozuirike,1986). Akanbi (2002), views landscape as the world around us and one tends to have a sense of loss or boredom if the immediate surrounding is devoid of landscape elements. According to Dayo (2004), landscape is fundamentally the land as shaped by the climatic conditions and which results in the distribution of existing flora and fauna. It is the expression of ecological, technological and cultural influences and it may involve design or non design as generated by the influences (Motloch, 2001) and it is the use of plants and outdoor materials to fulfill aesthetic and functional purposes (Acquaah, 2004). It is also the environment inhabited by man and other living creatures. In essence, Dayo (2004) concludes that landscape is a reflection of the dynamic natural and social systems that exist within the environment.

Landscaping can, therefore, be seen as the art or science of arranging land together with spaces and objects thereon for safe, efficient and aesthetically appealing to man. Landscape planning is concerned with the environment as a series of habitats for different species of both man and plants. According to Dayo (ibid), any changes introduced to the habitats need to be assessed with regard to the manner such alteration will affect the entire living plants and animals community. The objective of landscape planning therefore is to ensure that landscape changes will continue to provide habitat conditions that are capable to support and accommodate the various life forms. The history of landscaping can be traced to the era of notable pioneer industrialists and town and regional planners who demonstrated the ideas of creating conducive, safe, aesthetic and befitting environment in residential, public, institutional and other land uses through the provision of aesthetically pleasing and well landscaped environment. It is one of the effective tools for improving and sustaining the quality of life in both urban and rural areas of a country. The Federal University of Technology, Minna, is an internationally recognized tertiary institution in Niger State Nigeria, established in 1985. The view presented from the entrance of the students' hostels in Gidan Kwano campus, through the main road into the main campus indicates that the place is devoid of eye catching and aesthetically appealing landscape elements. A university is an internationally recognized edifice that requires an aesthetically pleasing and attractive designed landscape that befits the institute as an academic centre of excellence. A sizeable proportion of the open space around the students' hostels is left open and seemed unplanned and it is therefore vulnerable to natural disasters such as soil erosion, which can pose danger to the entire university community and the host community, Gidan Kwano in general. The students' area is devoid of defined parking spaces for vehicles, the streets are untarred and marshy during rains. The road leading to the hostel lacks road alignment and side drain for water runoff. There are also problems of dearth of landscape facilities such as sit outs, gang huts, water fountains and others that can add beauty to an organized environment. Appropriate landscape measures must, therefore, be put in place to avert the likely natural disaster posed for the area as a result of poor landscaping of the entire environment.

Aim and Objectives

The study is aimed at examining the current landscape design and evolves a landscape design proposal for the beautification and control of erosion of the institution with a view of creating an environment that is more conducive for academic learning and recreation. The objectives of this study are to

i. Examine the existing landscape environment and areas liable to both human and natural disaster due to inadequate landscaping in the students' hostels area of the institution
ii. Examine the relevance of landscaping in urban development in the study area
iii. Advance a prototype landscape design proposal for the institution to resolve landscape planning defects identified in the study area
iv. Prepare an implementation proposal for the landscape design of the institution.

Conceptual Issues and Literature Review

Conceptual Framework

There are many concepts used in landscape planning and design and common among them are the concepts of Colour; form, line, texture; Proportion, transition and unity; and lastly Rhythm and focus

Concept of Colours: The choice of the colour to be used in landscaping is never considered in isolation but forms the basis on how the colours interplay with the other basic elements of the landscape as well as

with the principles of landscaping. Colour is also used in landscaping as a guide to conform to the colours to be used in landscaping so as to match with each other. It follows, therefore, that the proper use of colours can affect the mood and perception of the landscape. In landscaping Red, Orange and Green colours are regarded as cool colours which can excite viewers, while such colours as Blue, Purple and Yellow are cool colours and are likely to relax the viewers. Therefore, for a meditation garden blue and purple colours would be the right choice to relax the mind of the users. When attention is required in a place, a focal point is created with Red, Yellow or Orange element (Brookes, 1992).

Concept of Forms, Texture and Line: Form is defined generally as the shape or visible appearance of a thing or the way in which the parts of an object are arranged. The buildings, streets, bus stops and other structural elements such as plants of a town are seen as forms. Forms chosen in landscape element may be aesthetic or functional. A wide spread tree may be chosen to provide a shading area, paths and walks leading from one area to another. Form of plant can be used to convey a vertical or horizontal appearance. Tall or thin plants give impression of height and low spreading plants have horizontal form. The element of form cannot be separated from the element of texture. Texture is about how the surface of landscape plant or element is perceived in relation to other landscape plants or elements around it. A variety of texture in landscape, therefore, adds interest and reduces monotony. The element of line refers to the fact that the viewer's eyes movement is unconsciously governed by the way the plant groupings fits and flows together, both on the horizontal and vertical planes. Lines can be used to create patterns in a landscape. Lines formed by plants or other elements can direct the viewer's attention to a focal point. Straight lines suggest uninterrupted movement while curved paths add interest and break the monotony of a landscape with too many lines.

Concept of Proportion, Transition and Unity: These concepts apply to the overall feel of landscape. Landscape plants and elements should be arranged to conform to these principles. Proportion in essence is the size of the individual component of landscaping plants or groups of component in a landscape is consistent with the landscape as a whole (Ahmad, 2010). However, good proportion is sometimes difficult to achieve in a landscape design. The landscape plants and elements that are too close together should be in proportion to each other and a ratio of 5.3 is considered adequate. The reason for proportion is akin to the basic element of scale. The difference is that while scale is a neutral term, proportion is based on the premise that something is either available in reasonable quantity or excess. Unity and Harmony can be achieved when the viewer sees that all landscape plants and elements in the landscaping complement each other. Placement of landscape plants and elements in a thoughtful manner regarding their form is one method for promoting a unified feel (David, 1978).

Concepts of Rhythm and Focus: This concept refers to the control of a viewer's eye movement. Rhythm according to (Van, 1977; Wahab, 2004)) is a pattern of repetition that reduces confusion in a landscape. Rhythm in Urban design therefore is the repetition of elements in the design of buildings and other elements in the built environment. Such elements as shape and size of plots, road alignment, columns, windows, balconies, lobbies, window canopies and others may be employed to achieve repetition in which can be interrupted to achieve rhythm.

Evolution of Landscape at Medieval Era: The complexity of landscape as a subject cannot be overemphasized. It is practical yet aesthetically demanding. The elements of landscaping include

topographical features such as hills, valleys, rivers and ponds; growing things such as trees, flowers, shrubbery, grasses and flowers; construction elements such as buildings, terraces, roads, bridges, foundations and sanctuary. Geoffrey and Susan (1995) observed that the first consciously perceived landscape by man appear in the cave painting of France and Northern Spain between 30,000 and 10,000 BC. The painting in Lascaux, France, is a section of about 6 ft. by 9 ft. of intuitive drawings made before geometry was known and probably based on sympathetic magic and considered as a whole, the cave paintings are the first and still the most pure of all the intuitive arts of landscape design. The primitive man set his mark in landscape by raising artificial hills or rearranging stones of simple heaped mound emulating a hill was the most universal record of a burial throughout the prehistoric time, made after 2500BC, with over a thousand stones. The stones are regimented, probably for ritual purposes. In the Ancient Egyptian Landscape, Falade and Leke (1998) observed where the art of landscape design from gardening in a definitely, restrictive area and harsh weather was developed. Hot and dry with frequent sand storms relied on irrigation from river Nile. The earliest Egyptian gardens were more regular enclosures that were later replaced by walls with a house or palace within the enclosure planted with shading palm trees and vine pergolas with big water tanks in the garden to water the plants. The ancient Greeks observed that natural landscape should be dominated by deities and minor spirits. In essence, mountains, woods, brooks, and caves were never with religious awe but often with fear and as a result, the landscape development for human use and enjoyment were confined largely to the courtyard dwellings to a few grooves held sacred for religious purposes. The placing of the public buildings and temples was based on topography and the demand for security.

The renaissance influence on landscape design came with evidence of enthusiasm for classic forms and details. The success of the Italian renaissance was as a result of the ordered political system of that time based on commerce and the eclipse of ravages of war that characterized the medieval Europe. The wealthy aristocrats turned their attention to the refinement of the environment. During the early 17th century, the taste of landscape was coming back to the classical forms and a modified type of symmetry in England as a result of new environmental problems for the landscape. One of this was to produce outdoor space other than for the wealthy land owners. The social reforms inspired by the American that followed within a few decades made necessary the provision of open spaces where people moving into densely populated areas could rest and relax under natural country surrounding. In China, landscape designs were influenced by the teaching of Buddha that ''man is not the universe but merely one of the ten thousand things'' and attain satisfaction and ultimate happiness only through close association with and quiet contemplation of nature in its various forms. As a result, successive Chinese landscape had a lot of mysticisms attached to it and the Chinese garden style was transferred and adopted by the Japanese.

Landscape Development in Nigeria: There are varying evidences of landscape planning in most Nigeria traditional cities. In Sokoto town, there are old massive trees planted along the main streets to provide shade and aesthetic beauty of the streets long before contact with colonial era. In traditional northern cities of Kano, Maiduguri, Katsina, Bauchi, Bida, Jos and Zaria, there are evidences of streets in the central areas with tall trees of long standing to provide shades and aesthetic scenic values in the places (Ahmad, 2010).In the Yoruba region of Nigeria, much attention is attached to the garden as art, which is attested to by the rich artistic

culture existing there. In Yoruba speaking areas, most streets are dotted with tall ever green trees, ornamental trees and shrubs of fragrance blossom for the purpose of providing shade for the public during the hot sun and as well as beautifying the city. In the foreground of most palaces are designed as seat of cultural, public and semi – public functions such as market squares, town halls, museums and parks and gardens.In Benin, Opobo and Calabar areas of Nigeria, there have also been landscapes in various forms portraying their respective environmental settings and culture. Tree planting is one unique culture that cuts across the country. The purpose of such trees ranges from shade provision and city beautification, down to setting of stage for folk tales telling at night or provide canopy for selling and buying of goods. Indeed, anywhere Nigerians pitch tent to establish a settlement, whether urban or rural, trees are usually planted (Akanbi, 2002).The principle of developing the landscape of the Government Residential Areas (GRA) was well documented by Lord Lugard in 1904 as reported by Falade (1994). In it, Lugard suggested that the GRA should be developed as '' a cool fruit and flower garden where one could sit in a shading veranda in the privacy of one's own home. Extensive public open spaces with recreation grounds and sports fields would be near both office and home and reach by shading pathways''

Importance of Landscaping On the Built Environment

There are areas of relevance of landscaping in the overall built environment as discussed below.

Provision of Food and Fruits for Man: It has been found that almost all mammals live and depend on vegetables as well as relying upon it for much of their food, either directly or indirectly.

Prevention of the Depletion of Ozone Layer: The human environment enhances comfort and facilitates the maximum enjoyment of life and in Nigeria, as in all tropical climatic zones, the major threat to climatic comfort is heat. Excessive heat coupled with high humidity sap human strength and may affect our thinking. With constant warning from both scientists and ecologists that the ozone layer is being eroded, consequent increase in temperature of our planet, we must appreciate that there is the need to devise solutions to protect ourselves through sustainable landscaping of our environment.

Act as Soil Cover, Erosion Prevention: The importance of landscaping can be found also in the use of trees, shrubs, grasses to protect the soil from overheating, erosion and moisture control to the shelter space from wind, noise, sunshine and dust. Apart from enclosing and dividing areas in a design, it also gives security, privacy and visual barrier.

Provide Healthy Living Environment for Living: It has been observed that the current design of our communities has created new health problems and medicine cannot adequately eliminate such from our society. There is the need therefore to pay more attention to how we design our living environments. The healthy living environment in this regard includes not only a clean and heated kitchen, bath or bedroom but also the landscape around us.

Improvement of the Environment via Native Plants and Flowers: The use of native plants and flowers help in protecting the environment around us. Native plants are hardening because of their adaptation of local climatic conditions. They do not need pesticides, fertilizers or watering and therefore save time and fund for maintenance. The native plants increase our relationships with nature, help educate our neighbours and provide a beautiful and peaceful place for relaxation.

Control of Harsh Climatic Conditions: Plants use for landscaping control the temperature, air flow and humidity of air. The effects of flowering plants during summer periods in the central areas of the city are quite striking. The overheated air

rises, creating a zone of low air pressure or depression. This depression acts as a vortex to attract air flowing from the edges of a town.

Others (Provision of Job Opportunities, Incomes and others): The role of landscape design activity in the provision of readily jobs for young men in the areas of horticulture, landscape designs, flower gardening, landscape contracting, consultancy and landscape maintenance cannot be over emphasized in our modern times. Much has been realized in these regards in terms of the provision of jobs and incomes which invariably increase the living standards of the concerned individuals.

Study area

Location: The study area is the Gidan Kwano Campus of the Federal University Minna. The university is located precisely at Kilometre 14, on the way to Bida, a major urban settlement after the state capital of Minna. The University lies between Latitude 09°26' N and 09° 41'N of the Equator and Longitude 06° 22' E and 06°30' E of the Greenwich Meridian. The campus is about 72 kilometres from Bida town, the Headquarters of the Nupes. It is about 70 kilometres from Zungeru, about 260 kilometres from Kaduna and about 160 kilometres from Abuja, the Federal capital of Nigeria.

The precise site for the study is at the western end of the campus: the area that houses the boys and girls hostels, the commercial complex and the student mosque as indicated in figure 1.To the northern part of the site is virgin bush, and the university staff quarters to the south and to the eastern and western parts of the site are the university sports area and students' affairs complex and virgin bush respectively.

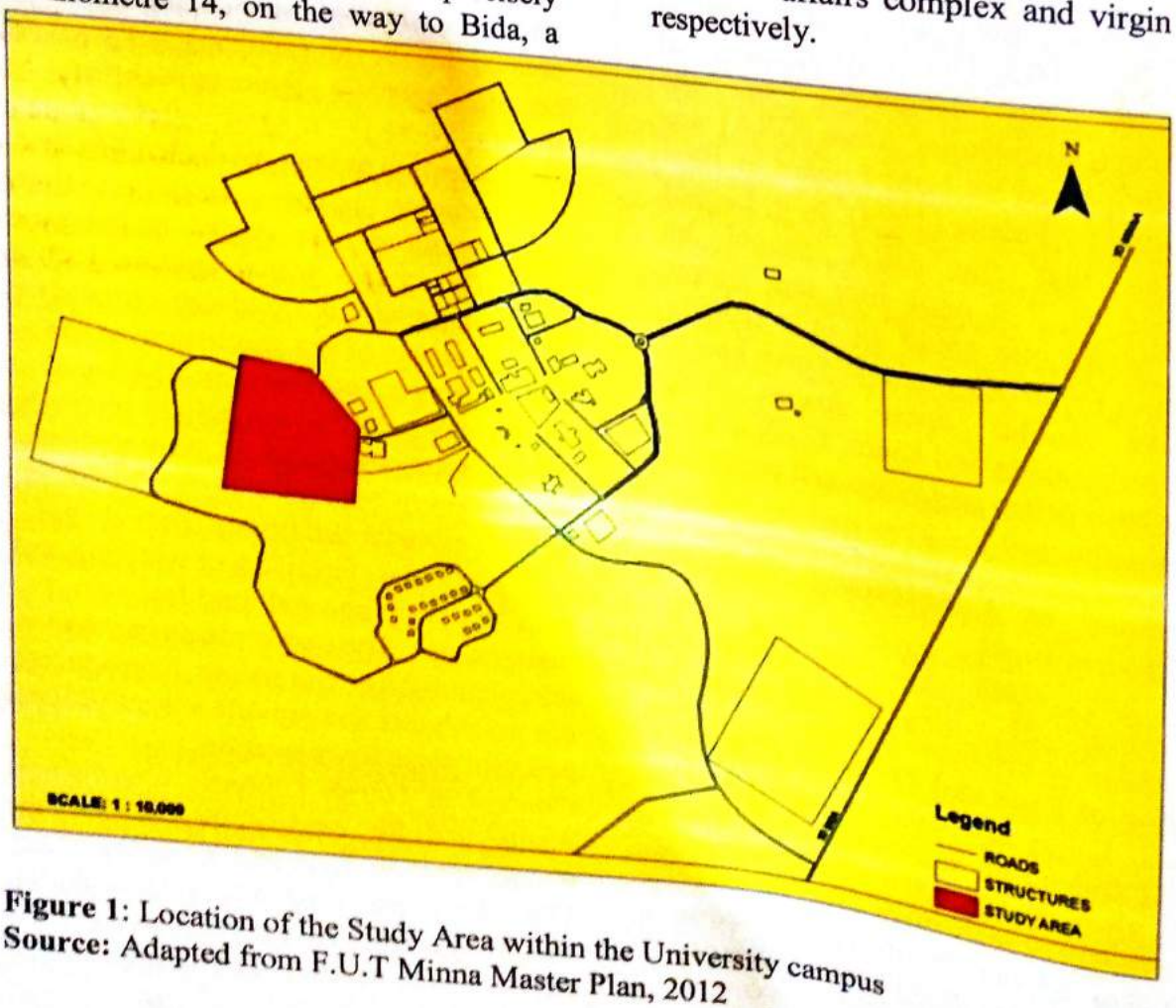

Figure 1: Location of the Study Area within the University campus
Source: Adapted from F.U.T Minna Master Plan, 2012

Historical Evolution of the University: The Federal University of Technology, Minna, Nigeria came into existence on the 1st of February, 1983, backed by Decree No. 13 in 1986. The university is a specialized institution of technology with a view to give effect to the country's drive for the much needed self reliance in sciences, Engineering and Technology (F.U.T, Master Plan Review, 2012).

The university has two campuses, the Bosso Campus, in Bosso town and the GidanKwano Campus, along Minna – Bida road, GidanKwano Minna. At inception, the university had four (4) schools: School of Agriculture and Agricultural Technology (SAAT), School of Engineering and Engineering Technology (SEET), School of Environmental Technology (SET) and the School of Science and Science Education (SSSE). At the end of the 2009 academic session, two additional schools were added to the existing schools to become six (6) academic schools in the university. The new schools are School of Entrepreneurship and Management Technology (SEMT) and the School of Information and Communication Technology (SICT). The establishment of the extra schools means more space and facilities demand for the new and existing schools in the university.

Apart from the above academic schools there are also many academic centres in the university. These are centres for Remedial and Extra Mural Studies (CPES), Centre for Human Settlements and Urban Development (CHSUD), Global Institute for Bio – Exploration (GIBEX), Centre for Disaster Risks Management (CDRM), Mariam Babangida Centre for Rural Development (MBCRD) and the Centre for Vaccines Research and Development (CVRD). There are two other centres for the administration of the university: Advancement and Development Office (ADO) and the Directorate for Collaborations, Affiliations and Linkages (D - CAL).

Population

Three types of population groups exist in the university. These are the Academic staff, Non Academic Staff and the Students population. The staff strength of the university is 1866, made up of 1497 males and 369 females respectively. The university has a total of 13483 students, made up of 13077 undergraduates and 406 post graduates students respectively during the 2009/2010 academic session as shown in table 1 (F.U.T, Minna Reviewed Master Plan, 2012 – 2022).

Table 1: Population of the Study Area 2009/2010

Population	Frequency	Percentage
Members of staff	1866	12.2
Students	13283	87.8
Total	**15349**	**100.0**

Source: F.U.T Minna Master Plan, 2012

Physical Characteristics of the Study Area

Topography and Drainage: The topography of the university slopes from the North West through the centre to the South west. It has a rise in relief of about 300 meters above the sea level in the North West and slopes to a height of about 150 meters in the South west. The university is located on a moderately elevated plain of mean height of 230 meters above sea level. The drainage of the university campus takes after the pattern of the relief. The area has a finger – like drainage net work pattern which rises from the North West highland and flows towards the south to

the lower areas of the university. The drainage system consists of seasonal rivers, which flow well during the peak of the rainy season. The main river that drains the area is River Dagga, which is fed by two tributaries River Waminafia and River Gwokodina.

Climate: The University, as in other parts of Niger state, experiences two (2) distinct climatic seasons, each having its own climatic characteristics of rainy and dry seasons. The dry season begins in November and ends in March. The rainy season is experienced between April and October. Minna has an average temperature of 27.3° C (81°F) with a range of average monthly temperatures of 5.5° C.

Table 2: Average Weather Condition in Minna

Months	Temp(oC)	Precipitation/ Rainfall(mm)	Wet Days (>0.1mm)	Sunlight (Hours/day)	Humidity (%)
January	27.5	2	<1	8.4	24
February	29	7	1	8.6	21
March	31	14	1	8.3	30
April	30	62	5	7.6	44
May	28	120	9	7.7	58
June	27	175	13	7.1	66
July	26	228	17	4.6	72
August	25	269	21	3.6	73
September	25	296	21	5.5	70
October	27	129	12	8.3	62
November	27	7	1	9.2	39
December	27	3	<1	9.0	28

Source: F.U.T, Minna Reviewed Master Plan, 2012 – 2022

The warmest average Maximum/highest temperature is 19°C (66°F) in December. Minna receives on the average 1312mm (51.7 inches) of precipitation yearly, with January and September being the driest and the wettest months respectively. The mean Relative humidity on the average year is 48.9 %; and ranges from 21 %in February to 73% in August on monthly basis. On the average, sunshine ranges between 3.6 to 9.2 hours per day in August and November respectively as indicated in Table 2.

Vegetation: The vegetation of the study area is dominated by stunted shrubs intercepted with trees of average height, mainly of eucalyptus extraction. As a result of the continuous human activities the general vegetation has been greatly altered and now being pushed to the Sahel savannah grass/ shrub land. There are now scattered short trees and shrubs and grasses, with an obvious possibility of the extinction of the common trees such as dogoyaro from the area. There are numerous Mango trees in the area, which can be utilized as wind breakers.

Soil and Geology: The different types of soils identified in the study area are:

i). Mapping Unit A (Minna Association): This category of soils is generally deep and brownish in colour and the surface soils are greyish brown and of medium or fine textured. The reaction soil in this group ranges from slightly acidic to slight alkaline. ii). Mapping Unit B (Minna Association): This soil type is similar to Unit A soils but gets more water because of its location to receive runoff water from higher areas. The surface texture of this soil type ranges from sandy loam to clay, and the sub surface is mostly sandy loam. The soils are deep and the surface soils are olive in colour and the sub surface is olive

yellow (2.5Y hue), with highchromate.iii). Mapping Unit C (Malaji Association): This type of soil occurs on slightly dissected plains with moderately low interfluves. The soil textures are generally clay loam with yellowish red mottles.iv).Mapping Unit D: The soil types in this category are mainly isolated rock outcrops that are lithotic to paralithic.

Materials and Methods

The primary and secondary data were used for this study. The primary data collection methods include direct personal observation, oral interview and questionnaire interview. The secondary data for the study comprises of data extracted from publications, meant to supplement information from primary sources. Data in this regard include information from the library, internet, the University Reviewed Master Plan 2012, information from Landscape design journals and relevant textbooks on the study.

Population and Sample Size: A 5% sample size of the total of 15,349 of the university community population was utilized for the study. Thus an approximate sample size of 800 was used for the study, which comprises of 703 university students and 97 members of staff, randomly selected from the university community population.

Results and Discussion

Existing Situation

Site Area: The total area of the site is 19.3 hectares; representing 12.3% of the total built up area of the University of 156.6 hectares (F.U.T, Master Plan Review, 2012), as shown in Table 3.

Table 3: Total Area (m2) of the Study Area

Sections	Designation	Area (hec)	Percent
	Students Hostels		
Hostel A	Girls hostel	1.50	7.8
Hostel B	Girls Hostel	0.36	1.8
Hostel C	Boys Hostel	0.30	1.6
Hostel D	Boys hostel	0.30	1.6
	Activities Area		
Commercial Complex			
Complex A		0.05	0.3
Complex B		0.02	0.1
Complex C		0.04	0.2
	Public Area		
Mosque area		0.06	0.3
Open Space		16.65	86.3
Total		**19.30**	**100.0**

Source: Field Survey, 2013.

The physical structures of noticeable relevance in the area are the boys and girls hostels, the commercial complex and the student mosque.

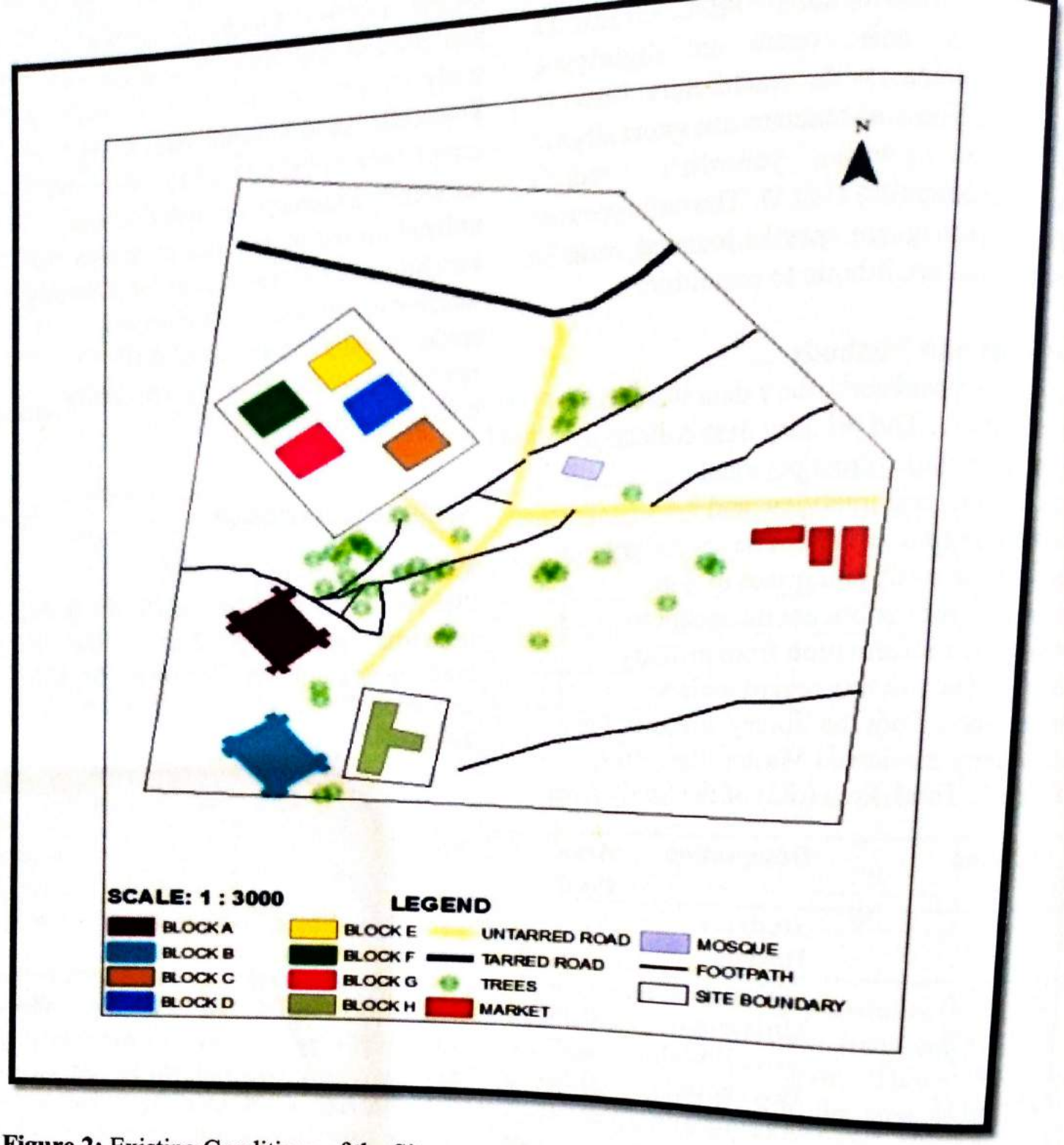

Figure 2: Existing Conditions of the Site
Source: Field Survey, 2013

Organized Open Space: There is no organized open space around the hostel area. The entire environment is dotted with bushy mango and dogoyaro trees.

Football Field and Sporting Facilities: There are no sporting facilities provided for students in the hostel. There are no football, long tennis, table tennis and other sporting facilities provided for the students in the hostels. Though there is a football field provided in between the School of Engineering Complex and the University clinic but is far away from the hostels for students' convenience.

Table 4: Existing Situation of Landscaping Facilities in the Study Area

Landscape Elements	Available	Not available	Remarks
Open Space	✓		The open space is unorganized
Football field and sporting facilities		✓	The football field available is far away from the hostel area, and it is for the staff members of the university community.
Botanical Garden		✓	There is no such facility around the hostel area
Sit outs and benches	✓		There few sit facilities under the mango trees close to the hostels
Access roads	✓		There are access roads leading to the hostel but are not tarred
Side walks		✓	There no sidewalks for the pedestrians
Road side drains		✓	Roads side drains are conspicuously absent
Planted Trees/ Flowers		✓	Organized planted ornamental trees and flowers are absent
Recreation Park		✓	It does not exist. Students usually relax outside in the front of hostels
Street lights	✓		There are provision of street light
Fountain		✓	No fountain is provided in the area

Source: Field Survey, 2013

Botanical Garden, Seat Outs and Benches: There is no botanical garden facility in the hostel area of the campus. Moreover, there are no sits and benches for students use during relaxation (see plate I and II)-

Plate I and Plate II: Flowering Plants without Sit outs/Benches for relaxation
Source: Field Survey, 2013

Access Roads and Road Side Walks: The study area has two hierarchies of road network: a distributor road that conveys traffic from the main gate via the school farm into the university, of about 12 metres of right of way and untarred access road that branches off from the distributor road into the hostel area of the university. The four (4) hostel complexes are linked up with unorganized untarred foot paths. The access roads are not provided with road side walks (see plate III and IV).

Plate III and Plate IV: Unorganized pedestrian walk ways to the students' hostels
Source: Field Survey, 2013

Road Side Drains: This is an essential road facility in landscape project as it helps in draining excess runoff water away from the road and thereby prevents the easy washing away of the soil surface. There is obvious dearth of this facility in the study area.

Plate V: Lack of road side drainage network
Source: Field Survey, 2013

Plate VI: Menace of soil erosion due to lack of drainage facility **Source:** Field Survey, 2013

Planted Trees, Flowers and Recreational Park: There are few mango and dogoyaro trees around the hostels, with hedges around the foot paths. 'All work without play, it is said makes Jack a dull boy'. There is the need for a recreation park to be provided in the students' unit of the study area for use by the students and the university community. There is no such facility on campus at the moment. After much academic exercise, there is the crucial need to have a place for relaxation by all.

Design Proposals and Analysis

As regards the observed problems associated with the landscaping of the entire environment in the university, a landscape design proposal is presented to correct the problems as indicated in figure 7.

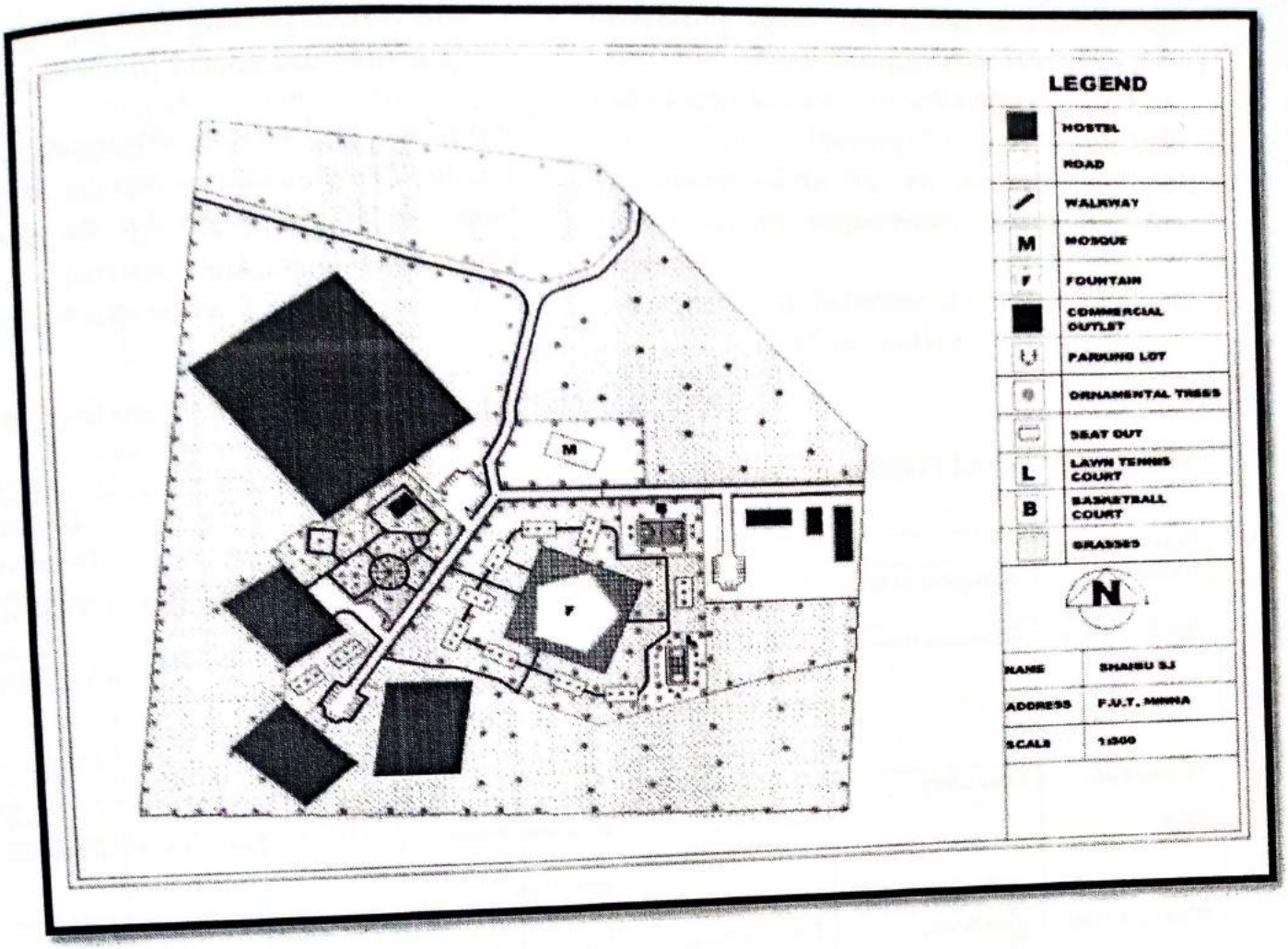

Figure 3: Landscape Design Proposal of the Students' Hostels
Source: Authors' Analysis, 2013

In the process of putting forward a befitting design proposal for the students' hostels of the university, consideration was given to the climatic and topographic conditions prevalent in the study area. This is one of the conditions considered for the selection of landscape plants and elements to be provided. The grasses, shrubs and plants recommended are typical of the tropical climate. The direction of the prevailing wind and sun are also considered in bringing together the landscape materials. For purposes of resolving the landscape problems associated with the study area, as identified above, the following proposals are put forward.

a. There should be routine planting of trees along the main access roads to the students' hostels to act as wind and noise breakers and provide privacy required around the hostels.
b. The organized open spaces and green areas to be adequately maintained to act as air purification function for the continuous air pollution from carbon dioxide from moving vehicles.
c. A recreation area with functional facilities such as table tennis, basketball court, sit outs with beautified shrubs and ornamental trees should be provided around the hostels for students use and the general public.
d. It is also proposed that side drains be provided in all the access roads to the hostels so as to resolve problems of stagnant water that is seen on the roads after rains. Pedestrian walk ways should also be provided for side by side with the vehicular access roads.

e. All access roads are to be provided with streets lights for illumination during night time and to add beauty to the environment generally.
f. All access roads are to be provided with hedges and trees of different species.
g. It is also recommended for adequate car parking facilities to be provided at the central parking area and such other places so designated for the purpose.

Proposed Planting Materials: With regards to soft landscaping the following materials are proposed for the students' hostel

Table 5: Proposed Planting Materials

Trees/Palms						
Names	**Botanical name**	**Purpose**	**Area of use (Design)**	**Height (m)**	**Spacing**	**Tree Type**
Satellite Trees	Cameroonianficus	Provide shade, reduce effects of sun's heat	Parking areas, relaxation places. 2m away from pedestrian walkways	15+	4m	Deciduous
Masquerade trees	Osaka tree	To show direction, give panoramic view	Parking areas, relaxation places. 2m away from pedestrian walkways	18m+	4m	Evergreen coniferous
Blue gum trees	Eucalyptus	For screening, reduces the intensity of wind, wind breaker	Use close to building structures, along the fence	15m +	6m	Evergreen deciduous
Neem trees	Dongoyaro	Provides shade, screening agent, wind breaker	Parking areas, relaxation places. 2m away from pedestrian walkways	20m+	6m	Evergreen deciduous
Royal Palm		Provides beauty to the environment	Along road side	5m+	4m	Evergreen
Hedges						
Ixorastricta		For beauty of the environment, act as barrier and stop unapproved crossing	Along the road side and walkways	2 – 5m	0.3m	Evergreen and Strives well in dry season
Yellow bush	DurataRupins	For demarcation, to hide unsightly areas	Along the verge between property line and walkways	2+	0.3m	Shield leaves in dry season
Grasses						
Baharma grasses	Cynodondactylon	To absorb direct radiation, to reduce glare, great virtual perception	In the open field, open spaces		Spreading	
Carpet grasses		To control erosion, soil cover	Ditto		Spreading	

Source: Authors' Analysis, 2013

Proposed Structural Landscaping: The structural landscape proposal is to provide an order in the development of landscaping components and the spatial organization of

the site for the achievement of a pleasant and harmonious environment. The components include street planting, structural planting, street lightening, access roads, pavement of walkways, provision of lither bins at strategic points, seat outs/ benches, parking spaces, drainages, fountain and sign posts.

Proposed Land use Plan: A detailed study of the study area shows the following percentages of land use of the area. Open Space has the highest percentage of 49.7% and commercial land uses has 4.2% respectively as indicated in table 6.

Table 6: Land use Budget of the Landscape Students Hostel

Land use	Area (hect)	%
Residential	2.5	13.2
Commercial	.8	4.2
Circulation	2.1	12.3
Public	1.4	5.2
Organized Open Space	2.9	15.4
Open Space	9.6	49.7
Total	**19.3**	**100.0**

Source: Author's Analysis, 2013

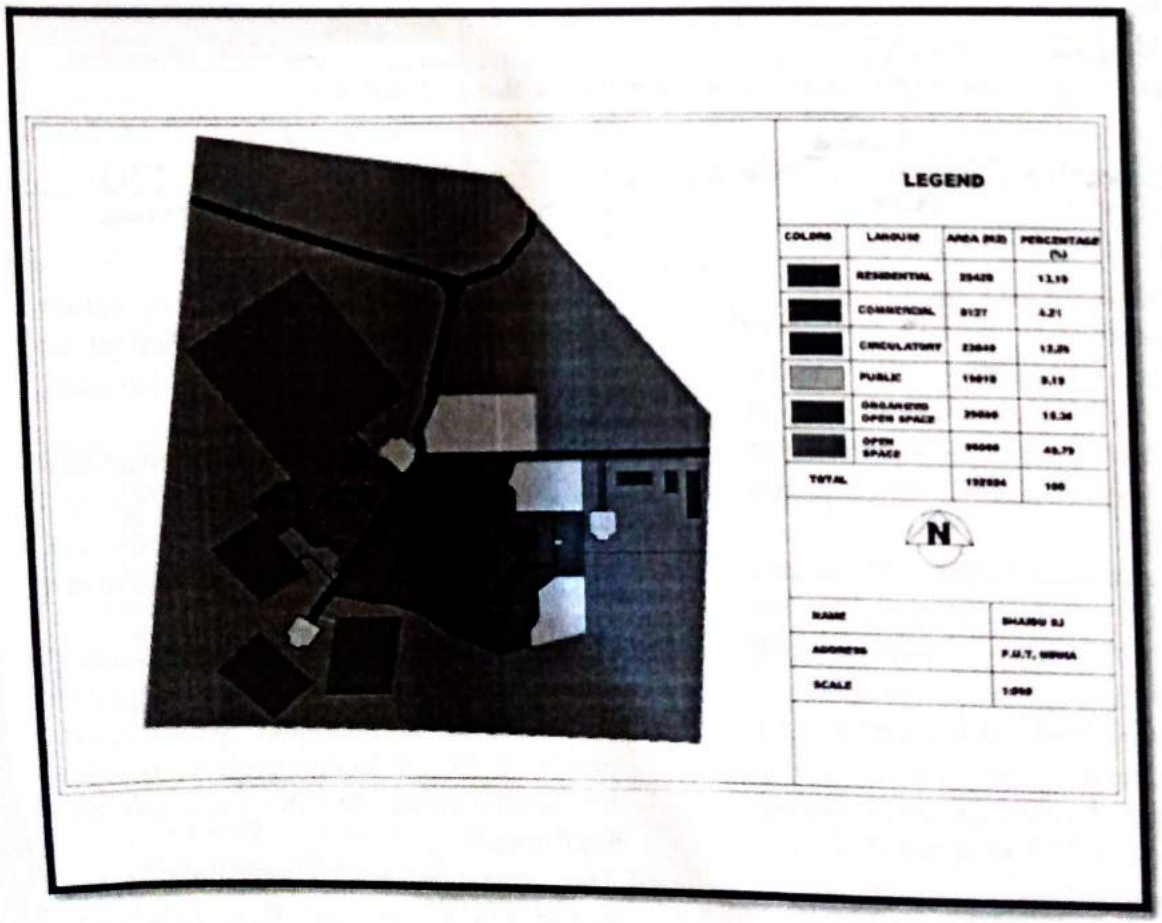

Figure 4: Land use Plan of the Landscape Design
Source: Authors' Analysis, 2013

Design Implementation:

For effective implementation of the landscape design, considerations are given to its fiscal and administrative requirements. The suggested sources of fund for the execution of the project are

i). Government budgetary allocation to the institution

ii). Loans and assistance from Agricultural Development Bank

iii). Inputs from the United Nations Aids

iv).Education Trust Funds

Moreover, the responsibilities of the implementation agencies should be clearly stated. The University Landscape Implementation Committee should be charged with the responsibility of implementing the recommendations in the study. Efforts should be made to use the best available materials that are easy to maintain.

Phasing of Implementation

In physical development, it is difficult to effectively achieve the execution of any project without adequate project phasing. As a result, the implementation of this landscape design proposal is scheduled to be in three phases, covering a period of three years, from 2013 to 2016 as outlined in Table 7.

Table 7: Implementation Phases of the Landscape Design Proposals

Phase I (2013 – 2014)	Phase II (2014 – 2015)	Phase III (2015 -2016)
Construction of roads and walkways	Planting of trees, shrubs and grasses	Construction of recreation facilities
Installation of street lights	General beautification of the site	Monitoring

Source: Authors' Analysis, 2013

Recommendations and Conclusion

Recommendations:

i. Enabling legislation should be enacted for public institutions in the country to landscape their surroundings in order to bring about good quality and aesthetic environment.

ii. Adequate awareness should be created for the public and institutions on the relevance of an aesthetically pleasing environment through landscaping.

iii. Routine awareness campaign to the students on the need for an aesthetically pleasing and functional environment devoid of wastes and littered refuse should by carried by the management through the students affairs department in conjunction with the students union government of the university.

iv. In that regard efforts should be made by the university management to provide waste paper baskets in hostels, refuse drum and carts at designated spots around the campus for waste disposal vans to final disposal sites.

v. Landscape Maintenance Students Vanguards should be launched for the effective monitoring of landscape vandals in the hostels and elsewhere on the campus.

vi. The introduction of good management strategies that involve adequate financing and maintenance, security and monitory for landscape projects should be incorporated in the curricula of institutions.

vii. The management of the institution should make adequate fund available for the regular maintenance of her landscaped facilities in the hostels of the institution, through the setting up of a committee of men of proven integrity

and sound educational background in the built environment disciplines.

Conclusion

A well landscaped environment, in no doubt, has many benefits derivable from it. It is observed, however, that there are many constraints associated with the landscaping of the students' hostels of the university campus and as such the environment is left unkempt and therefore not aesthetically attractive to the eyes and individuals around. A careful observation and implementations of the recommendations in this study will go a long way in resolving the observed problems associated with the landscaping around the students' hostels on the campus of the university.

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