DEFORESTATION AND FUELWOOD CONSUMPTION, A Case Study of Kpakungu and environs, in Minna town, Niger State.

BY

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BEING A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF POSTGRADUATE DIPLOMA IN ENVIRONMENTAL MANAGEMENT.

DECLARATION

I, Mohammed Salihu of the Department of Geography, School of Science and Scienc Education, Federal University of Technology, do hereby declare that this thes "Deforestation and Fuelwood Consumption, A case study of Kpakungu and environs Minna town, Niger State" is an authentic research work conducted by me under th supervision of Mal B M Mansur. This work has not been presented either wholly or part for any degree elsewhere. All references to previously published materials are ful acknowledged.

Mohd ..
Signature

19-4-2007
Date

CERTIFICATION

This thesis titled: 'Deforestation and Fuelwood Consumption: A Case Study of Kpakungu and its Environs in Minna town, Niger State' by Mohammed Salihu (PGD/GEO/2005/313) meets the regulations governing the award of Post – Graduate Diploma (PGD) of the Federal University of Technology, Minna and is approved for its contributions to scientific knowledge and literal presentation.

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DEDICATION

This research thesis is dedicated to the Grace and Bounty of the Almighty Allah, Who 'Sends down water from the sky according to a due measure .....which penetrates the earth and come out as springs.....gives life to the land after it has been dead.

The Holy Qur'an.

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ABSTRACT

The research work examined the rate and extent of deforestation, Vis-à-vis fuelwood consumption in the study area. Vital and reliable data were collected using different sources ranging from questionnaire, personal interview to secondary sources of data collection.

The data collected were analyzed using frequency-percentage technique as a veritable tool for analyzing and interpreting the data. Adequate and effective charts, graphs and pictures were used to illustrate the extent of deforestation in the study area.

Fuelwood consumption was identified as the most fundamental cause of deforestation in the study area. The poverty level of the household in the area to some extent is responsible for the dependency on firewood as a source of energy at home. Saw-mill business was established as one obvious cause of deforestation, saw-mill is also ranked as one of the greatest cause of deforestation. Other causes of deforestation from the research work were bush burning, construction of buildings and agricultural activities. It was observed that the rate of deforestation is on the increase and if nothing is done to halt this trend; it will have serious negative consequences.

Practically the recommendations were advanced in order to reduce or check the observed trend of eforestation in the study area, some of the recommendations are as follows: enacting of laws that ill restrict wanton felling of trees, creation of forest reserves, a forestation and re-forestation.

It is also pertinent that government develops and encourages the people to use alternative sources f energy, especially biogas and solar energy. The development and utilization of solar energy at the ousehold level within this area will help to reduce and possibly reverse the trend of increasing esertification, reduce deforestation and fuelwood consumption.

CHAPTER ONE

1.0 INTRODUCTION

Human society cannot survive without a continuous supply of energy, adequate fuel for cooking and lightning are as essential basic needs as adequate food, clothing, and shelter. Fuel wood has been the main source of cooking energy for centuries. Today, the industrialized and oil-rich countries have shifted away from firewood and charcoal to modern forms of energy. This trend has not been an easy process in the developing world. Most rural and urban people in Africa, Asia and Latin America still rely on trees and woody vegetation to meet their basic energy needs. In some of these countries, fuelwood also plays a dominant role in non-household sectors.

In sub-Saharan Africa, this bio-energy accounts for an estimated 60-95 percent of the total energy use, with the highest proportion in the poorest countries and the household sector Leach and Meams, (1988). The demand for wood resources in many developing countries is increasingly outstripping the supply, causing fuelwood shortages in some areas. This imbalance has caused many socio-economic and ecological repercussions. Deforestation in these countries is a common threat due to soil erosion, land degradation, desertification, and environmental concern.

Rural fuelwood consumption rarely causes deforestation. Urban fuelwood demand, however, can be one major factor causing deforestation, because it reinforces other local demands that can greatly accelerate the depletion process Foley and Bamard (1984), Leach (1987). Another common factor responsible for deforestation is shifting cultivation. A country's demand for energy is closely linked to socio-economic and geographic factors of the country, such as the size of population,

the degree of urbanization, level of technology, dietary patterns, and the climatic conditions. Economic conditions influence the supplies and accessibility of different sources of energy, and therefore dictate the effective demand by different countries and by different income groups.

In developing countries with limited resources, forest depletion may lead to soaring prices of wood in the urban areas, a growing drain on the household incomes of the urban poor, wasteful burning of crop residues and animal manure to cook food rather than help to produce it, soil erosion, land degradation, reduced agricultural output, reduced number of cooking meals and hence malnutrition.

Therefore, as fuel wood becomes scarce, the cost of obtaining it (in terms of cash or time for gathering) increases. This change will impose severe and increasing strains on the already strained survival and production strategies of poor households. Nigeria, being a developing country has most of its population dwelling in rural areas, engaging mainly in primary production activities. This implies that the rural populace depends so much on the natural environment for their livelihood. Agriculture is one of the most vital and predominant activity that the rural populace depends on. The guest to promote and increase agricultural production has led to the expansion of more land to be subjected to deforestation. The act of clearing forest for agricultural activities promotes deforestation and this leads to land degradation. The increasing pressure on land resources is creating a scenario where by the land is fast deteriorating and facilitating diverse environmental problems. The continuous rise in human population and limited natural resources calls for concern among well-meaningful people such that the deterioration of the environment can be reduced. This is only possible if the populace is made aware of the implications of its actions or in-actions.

The importance of fuel wood in Nigeria as a contributing factor to the rate of deforestation is very clear. Biomass in the form of firewood, charcoal and crop or animal residue, is the largest source of energy in every Nigerian home. In some it provides over 90 percent of all energy supply and use. Nigeria as a whole,fuel wood make up nearly 80 percent of final energy consumption. For most rural people and the urban poor fuel woods are indispensable basic need for sustaining life: for cooking food, for warmth and sizeable minority, light.

The symptoms of the fuel wood problem are also well known. In many places fuel wood are scarce or becoming scarcer. The costs of obtaining them, whether in cash or labour, are imposing severe strains on people's welfare and the sustainability of household production, especially for the poor and for women who generally bear the brunt of fuel provision and use. Those impacts are not felt everywhere. They are presently confined to some places and some people. But the trend is towards more places and more people. Equally serious, where fuel woods are not yet felt to be scarce, this is often because natural capital resources are being mined cheaply and without payment of their environmental and other social cost. Rapid deforestation is alarming feature of all communities and is helping to undermine the basic environmental systems which sustain life and natural economies. What is not so obvious is how the fuel wood problem can best be tackled.

Fuel wood consumption is associated with rural and urban poverty, inequalities in land holding and security of tenure, low agricultural productivity, incentives and support, especially for small and marginal farmers. The collapse of traditional resource-sharing practices and controls over resource use, rapid urbanization, sharp divisions in the socio-economic roles of women and men, in some communities, external pressures resulting in economic crises and war.

Renewable resources are being used at the rates that exceed the speed at which they can be regenerated no where is this more apparent than the destruction of vegetation. A facture of forest can be destroyed within an hour, but may take several decades for the forest to regenerate.

The chief use of the world's wood is not as building materials or paper, but as fuel. It is a pattern both ancient and modern, and one that is not likely to change in the next several decades. Today hundreds of millions of people remain completely reliant upon wood for energy and cannot anticipate any rapid transition to other energy sources. In fact, wood fuels are the world's most important form of non-fossil energy.

Of the 4.4 billion cubit meter (m^3) of wood harvested in 1996, close to half – some 1.9 billion m^3 - are burned for cooking or to provide heat, or are use to make charcoal for later-burning F.A.O (1999). Other wood products also end up being burned for fuel. The process of urbanization in the third world involves very large numbers of people, many of who retain rural habit in relation to energy use. This leads to the rural-urban energy crisis where large quantities of fire wood are supplied from the rural areas. The energy alternatives for many of the urban population are restricted due to cost and inadequate infrastructure. Wood fuel is the main energy source in the urban area of Minna Niger state.

The importance of wood fuels in Africa is clear. Biomass in the form of firewood, charcoal and crop or animal residues is the largest source of energy in the country. In some it provides over 90 percent of all energy supply and use. In Nigeria as a whole, wood fuels make up nearly 80 percent of final energy consumption SADCC (1985). Equally serious, where woodfuels are not yet felt to be scarce, this is often because natural capital resources are being mined cheaply and without payment of their

environmental and other social costs. Rapid deforestation is an alarming feature, and is helping to undermine the basic environmental system which sustains life and national economies. What is not so obvious is how the woodfuel problem can best be tackled; or indeed, whether it is a woodfuel problem at all. By and large, while there have been some successes, these direct methods have failed to turn the tide of woodfuel.

1.1 AIM AND OBJECTIVES

The primary aim of the study is to examine and evaluate the extent of deforestation in the study area viz -a- viz fuel wood consumption, and to ascertain the basic cause of the observed trend in the study area. The study will also attempt to proffer effective measures of checking or minimizing deforestation in the study area. Sequel to this, the specific objectives are outlined below.

1.2 SPECIFIC OBJECTIVES

1. To examine and ascertain the extent and rate of deforestation in the study area.
2. To identify the primary and major causes of deforestation in the study area.
3. To examine the extent of fuel wood consumption in the study area.
4. To identify and advance plausible recommendation towards minimizing the extent of deforestation, particularly fuel wood consumption in the study area.

1.3 STATEMENT OF RESEARCH PROBLEMS

It is a known fact that natural vegetation are Being threatened by deforestation, this is due to reckless exploitation of its timber, shrubs, trees and other forest products and also the increasing demand for large scale agriculture to feed the teaming population, urbanization, road building, fuel wood consumption.

There is an urgent need to obtain current information on the rate and extent of deforestation in the study area in order to facilitate using environmental techniques in

addressing the problems. The lukewarm and non-challant attitudes of the authorities and individuals concerned towards this problem are largely to lack of monitoring that will give the needed information.

Most households in the study area are in the habit of using fuel wood as source of energy. The observed trend in the ever-increasing rate of deforestation in Kpakungu and environs calls for a great concern, for its large scale use of natural resources like trees, shrubs, timber etc. There is great need to carry out a comprehensive research in the study area to proffer lasting solution to this grave environmental problem.

1.4 JUSTIFICATION

Fuel wood consumption is on the increase and has serious negative consequences on the natural resources and even on human life. The country's natural resources are generally facing problems in terms of the accelerating degradation and depletion of its resources. In view of its importance for both the present and future generations, there is therefore need to carry out adequate assessment of this dwindling natural resources to save the forest and the environment.

The study area is under serious threat of deforestation and the most evident cause at this is fuel wood consumption and agricultural activities. Deforestation has serious negative impact on the environment some of these are loss of biodiversity, loss of fertility, soil erosion, increase in local temperature etc.

This research work will provide a veritable frame work for monitoring deforestation in the study area. The project will highlight the present and future effects of natural resources depletion. The research work is highly essential.

1.5 SCOPE / LIMIT OF THE STUDY

The study will cover Kpakungu and environs, deforestation and consumption of fuelwood will be the central focus of the study. The researches will actively emphasis the need to involve the use of remote sensing techniques for monitoring the extent of deforestation. The time constraint will limit the study to some selected villages around Kpakungu.

1.6 GEOGRAPHY OF THE STUDY AREA

1.6.1 HISTORICAL BACKGROUND OF THE STUDY AREA

The history of Kpakungu could be traced back to the era of Mallam Ibrahim Gwariman in 1946, who is the first settler and the founder of Kpakungu. He was later joined by Mallam Usman Baba Wachiko who is Nupe by tribe. Mallam Ibrahim being the first settler and the Mai-unguwa (ward head) of kpakungu however the name Kpakungu was derived during the time when Niger State was created. Alhaji Abdullahi who was among the first Islamic Scholars happens to be given the responsibility of chief Imam.

1.6.2 Population

The worlds traditional farmer are conservatives and their lifestyle is difficult to change, the Kosamojona in Uganda, Masai of Kenyan and Tanzania, and Nigeria's Gwari and Nupe share a context for farming and other stationary occupation (IUCN 1988). However, for the over 11,000 residents (census NPC -1991), of Kpakungu are made up of Gwari, Nupe, Yoruba, Igbo, Fulani, Igala etc. Kpakungu is 5,000 square metres.

1.6.3 **Location of the Study Area**

The study area lies within latitude 9^0 32 -41'N and longitude 6^0 30-6^0 E, it covers an area of about 195km^2, accessible through minor and major roads. Minna metropolis covers so many wards, that is Bosso, Tungan Danboyi, Chanchaga, Maitumbi, Maikunkele, Kpakungu, Saiko, Sauka kahuta, Kongila, Ketern-Gwari, Dutsen kura etc. Minna metropolis is a growing capital of Niger state, with an estimated population of 3,950,249 (N. P. C. Census 2006) See appendice 1.

1.6.4 **Climate**

Minna lies within the middle belt of Nigeria with sub-humid type of climate classified as the tropical wet and dry (AW) by Koppen (1971), share two season which are very dependent on the two prevailing air masses over the country at different time of the year, (the dry tropical continental air mass originated from the Sahara. And the wet tropical maritime that originated from the Atlantic ocean) The two air masses nearly opposite indirection met a zone of discontinuity stretching East-West across West Africa known as the Inter-tropical discontinuity (ITD). It migrate northwards and southwards following the earth revolution, it reaches the southern limit at latitude 5^0 N in January, and its northern limit in a variety of latitude 18^0 – 20 N in August. The Inter Tropical discontinuity as explained earlier reaches the study area at latitude 9^0 35'N between March and April, it then recedes in October. This marks the beginning of the long dry season

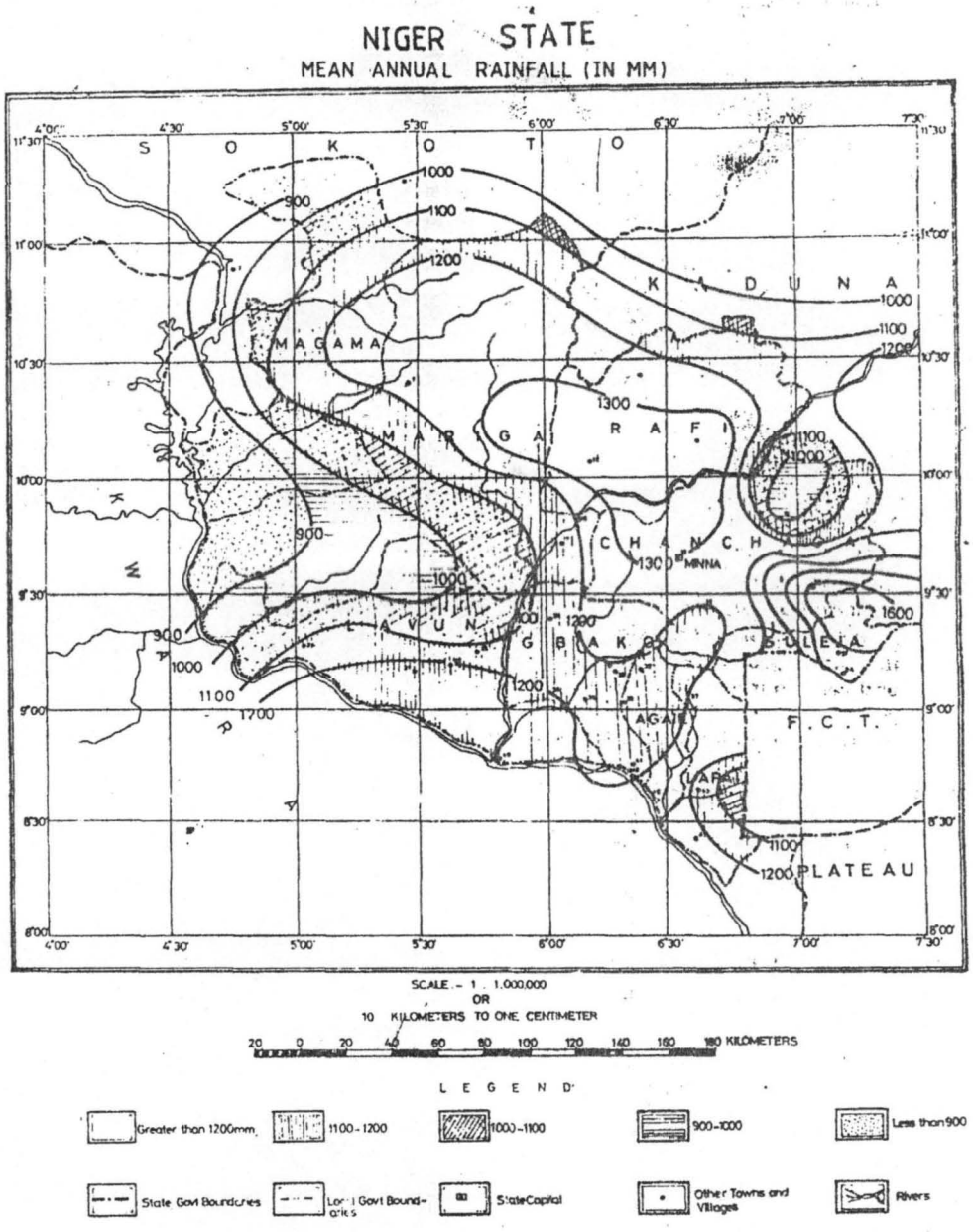
1.6.5 **Temperature**

The highest temperature is usually recorded in March at 31^{0}C and the lowest in August at 25.1^{0}C. Temperatures varies with months and years the highest peak in March 31.5^{0}C clearly shows the period of highest air pollution through evaporation

from the un-disposed dump sites and distraction of the adjoining soil and microbes in the environs. Minna, Master plan, (1980).

1.6.6 **Rainfall**

Generally, rain begins in April and the highest amount occurs from June to September with August as the peak, the winter or dry season commences as from November to early March, with trace amount of rainfall received over the period under the study area. (See appendice 1, for Mean annual rainfall).



Appendice 1. Niger state Mean annual Rainfall

1.6.7 **Land Use of the Study Area**

Relatively flat to flat terrains are cultivated for farming and major farm produce are maize, Guinea corn, yam, and Rice. The central part of the settlement cosmopolitan with a lot of people engaged in petty – trade and subsistent farming. The area is also more densely populated, the inhabitant in the surrounding villages are mostly Gwari and Nupe farmers.

1.6.8 **Soils**

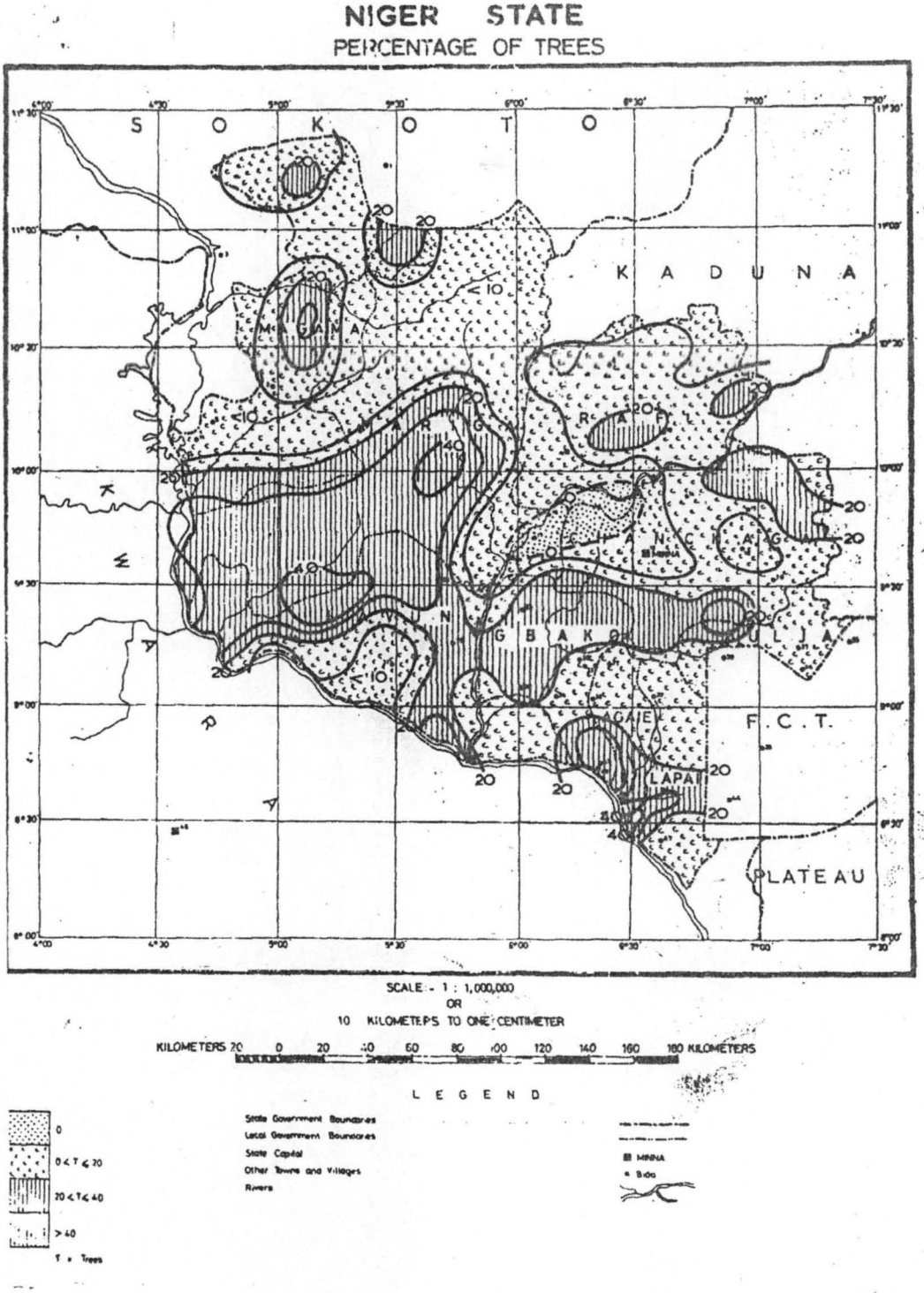
The parent materials as well as the topographical position are the main factors that influence the characteristics of soil in Minna and environs. The soil being underlain by sandstones and basement complex have loamy and sandy loam texture and is of moderate fertility. These soils are well drained and have high water infiltration rate.

The basement is of granite and gneisis and has a surface texture of loamy sand to sandy loam, drainage may be poor in areas with high clay or where soil is shallow; the soils are moderately deep and well drained.

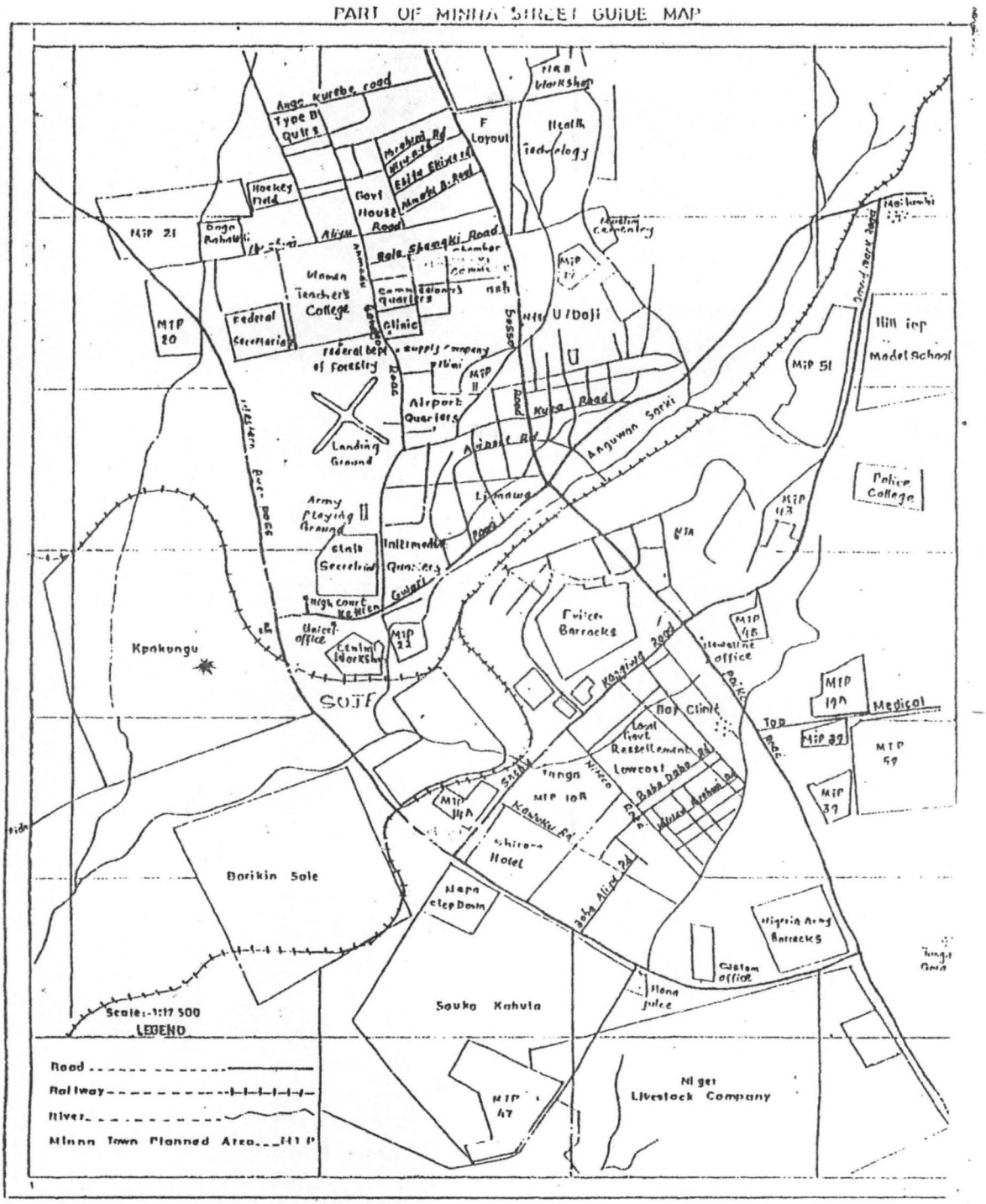
1.6.9 **Landform and vegetation**

The area covered by this study is of low topography relief without high land or hills. The highest point are the western point of Chanchaga with hills about 25m above sea level about 60-70m above the country rocks, it has typical guinea – savanna vegetation composed of shrubs. The common tree species that are found within the state are as follows; *Mangifera Indica* (mango), *Azadirachta Indica* (Neem), *Parkia biglobosa* (Dorowa), *Tamarandus Indica*_(tsamiya), *Anogeisus leiocarpus, Daneillia oliveri, Adasonia Digitata*,(kuka) *Vitellaria paradoxa (kadanya)* etc. with grasses between the height of 1.5 – 3.5m.

The trees have an average height of about 16m-20m. Farming and cattle rearing is the major occupation of the people within the state. (See appendices 2 and 3 for percentage of trees and minna street guide map. See also Appendices 4,5,6,7 and 8. For Niger state mean onset date, mean cessation, percentage of farm land and percentage of bareground)



Appendice 2 Niger state percentage of trees



Appendice 3 Minna Street guide map showing kpakungu in the context

CHAPTER TWO

2.0 LITERATURE REVIEW

Deforestation is defined as the over-exploitation of the plant component of the ecosystem without concurrent efforts towards it replacement Awodola and Oboho, (1991). At the early stages of development, it was essential to destroy the vegetation, so as to give way to arable farming and human settlements, forest being then seen as obstacles to development or at best as "mines" to be exploited. Deforestation is not simply tree removal *per se;* the process of deforestation necessitates a greater rate of tree removal than that of tree re-growth or deforestation. The simple felling of forest cover is not *a priori* deforestation unless there is a long term and permanent reduction in the forest cover.

In the recent past, there has been an unusually high rate of global deforestation of which the situation in the tropics gives great cause for concern among policymakers, forest resources managers, conservationists and even religious leaders. The Food and Agricultural Organizations of the United Nations took the lead in studying tropical deforestation FAO, (1985). The deforestation problems in the tropics have also been a subject of rigorous study by governments, private organizations and individuals Myers, (1979). A review of available literature on deforestation by Enabor, (1986), led to the conclusion that man is the most important agent of deforestation. In a similar manner, Awodola and Oboho (1991), in their study of the semi arid zone of Nigeria reported that deforestation in zone is a reality. Various ecological and socio-economic indices confirm this environmental degradation. The now more frequent drought years, the fewer, shorter and more xeropytic tree species per unit area and the prevalence of exotic tree monocultures in the landscape are ecological indices of deforestation. Also, the longer hours spent

and distance covered to get firewood, shorter duration fallow period and the encouragement of agro forestry practices are socio-economic pointers of deforestation.

In Brazil, the area estimated to be deforested each year has increased from 2.3 million to 8 million hectares in recent years thereby making it to have the greatest area deforested each year in Latin America. However, Brazil's 2.2% annual rate of deforestation is far lower than those of many major deforesting countries especially in tropical Africa. Nigeria was named as one of the three African major deforesting countries. The two others are Cote d'Ivoire, deforesting at the rate of 11.4% per year and Zaire experiencing a similar condition. In these countries over 250,000 hectares of land are converted to non forest land use each year wood, (1990).

In Nigeria, as in many other tropical countries, the rate of deforestation has been estimated to be about 265,000 hectares of forest being exploited annually Oseni, (1978). At this rate of deforestation, 50% of the country's forested land would be eliminated by the year 2000 AD. The concern is even greater for the Sahelian region of the country which is characterize by "fragile" ecosystem and climatic peculiarities inimical to fast tree growth. Deforestation is seen as a complex problem that has largely resulted from poverty, unequal land distribution and the pressure from the ever growing population. As productive land becomes scarce, the peasant farmer seeks new and fertile soil either in fragile upland forest or in original lowlands already over burdened by large numbers of like minded subsistence farmers. He then argues that rather than seeing deforestation as a symptom of underdevelopment, it is more useful to view the problem as part of a particular development dynamic.

Chidunmayo (1987) arrives at a similar conclusion in examining the relationship between the shifting cultivation practices, population pressure and deforestation in

Zambia. The World Bank (1990) recently came out with a research paper on the nexus between population, agriculture and environment. The paper posits that rapid population growth rates, lack of agricultural development and degradation of natural resources are mutually reinforcing. In their study of deforestation in the Sudan, Hassan and Hertzler (1988), note that one of the most important causes of deforestation in arid and semi arid countries is the over cutting of undervalued trees for fuel wood. Further, people's culture, habits and other sociological factors affect deforestation in Sub Saharan Africa (SSA). This assertion was made by Talbot (1986), in his analysis of how demographic pressures affect rangeland areas using the Massai of East African rangelands. The obvious results of cutting trees for fuel wood are most easily seen near virtually all African cities where treeless ground spread outwards. Ebui (1989), in an analysis of the effect of deforestation on agricultural productivity in Cote D'Ivoire examines two facets of the problem, namely, current period deforestation and cumulative deforestation. It was confirmed that current period deforestation can have a positive impact on agricultural productivity through improved soil fertility due to the effect of nutrient content of ash left after burning the forest. Cumulative deforestation on the other hand, has a negative effect on agricultural productivity due to increased erosion, leaching of nutrients and the use of marginal farmlands. French (1986), in a similar study in Malawi argues on the irreversibility of the problem of deforestation resulting from fuel wood production and consumption and Anderson (1988), and suggests the adoption of afforestation programs through agro-forestry practices.

Wood and other combustible and renewable resources were mankind's first energy sources. Wood energy gains supremacy over other fuel resources mainly because it costs less and in some circumstances got free. Nigeria is within the land

area facing crisis in fuelwood extraction. Ojo (1975) confirms the widespread use of fueldwood as the only source of energy in the rural areas. FAO (1985) identified fuelwood as the staple energy source for about three-quarters, (3/4) of the population in the developing countries. Morgans and Moss (1981), Akintola (1978), Areola (1978) and Mortimore (1967), all confirmed that fuelwood is the primary source of energy in developing countries and especially in the tropical lands. FAO (1981) reveals that poor people depend more on fuelwood because they cannot afford the alternative fuel.

Various studies have been carried out in different parts of the world on the impacts of fuelwood on the environment with emphasis on the urban dimension of fuelwood crisis. Kalapula, (1989), found positive relationship between urbanization and deforestation and the implications for alternative sources of energy in Zambia. The rapid rate of urbanization between 1963 and 1980 (20.15% to 43%) has resulted in an unprecedented rate of forest clearance. This high deforestation rate is directly linked with the demand for fuelwood which is largely due to urban populations, income effects, and the rapidly rising prices of kerosene.

Parisot (1986) notes that in India firewood is the poor man's fuel in the rural and urban areas and that there is voracious appetite for this source of energy which has continuously exerted immense pressure on the environment. Among the consequences of the pressure is deforestation on the other, which is depriving the soil of precious fertilizer. In particular, Parisot's study found out that 90% of Indian's households depend solely on firewood as their major source of fuel. In addition, households make about 172 trips a year, traveling 4.8 kilometers everyday and 2.6 hours per day in search of fuelwood.

In related study caries out in India by Macaulay *et al* (1989), it was asserted that in India fuelwood accounted for about 33% of total energy consumption in the country and that fuelwood consumption is negatively related to level of income while the regression equation has a positive coefficient on LPG use. However, with the removal of subsidy on Liquified Petroleum Gas (LPG), higher income earners are returning to the use of traditional fuels.

Munslow *et al* (1988), report that fuelwood account for 79% of the total energy consumption in the nine southern African countries which jointly formed the SADCC. There is evidence that the figure may increase in the future going by the current demographic growth pattern and the slow transition to other household fuels in both rural and urban areas in the region.

Virtually the whole population of SSA now depends on wood for its basic energy needs. In the countries such as Tanzania, Burkina Faso, Rwanda and Chad, wood provides over 90% of total national energy consumption. Even in our oil rich Nigeria, wood supplies about 80% of all energy consumption Timberlake, (1991).

In Nigeria, records of fuelwood consumption are relatively scanty and the available ones not reliable. Enabor (1981), Onuaha (1981, Ay (1979), and Edu (1981), among others have confirmed this inaccurate measures of fuelwood consumption. Most of them, at best, give estimates. Mendie and Sani (1991), report that fuelwood is the most dominant and widespread source of energy used for domestic purposes in the Jos tin mining region of Plateau State, Nigeria. And that dependence on fuelwood is showing an upward trend, and is rapidly increasing since the introduction of SAP, which brought about high prices of other competing fuel sources such as gas, kerosene and electric stoves far beyond the reach of an average income earner.

Available records show that in Northern Nigeria, the fuel consumption rate was given as 23.3 million cubic meters per year Anderson and Fishwick, (1988). Although Nigeria has crude oil and gas resources, the levels of gas and kerosene cookers and cooking stoves adoption are far below the levels that could make impact. Available information in Tables 1.1 and 1.2 shows that at the national level about 90% and 40% of heat and cooking energies are derived from fuelwood utilization in the rural and urban areas respectively. Ogbonna (1991), emphasizing the importance of fuelwood as the main source of domestic energy in the Sahel and semi arid zone sector. The situation is worsened by the ever increasing prices of the alternative energy sources following the gradual withdrawal of subsidy on petroleum products accompanied by the depreciation value of the Naira which makes the equipment used for the alternative sources more expensive.

On the issue of alternative sources to reduce the negative impacts of firewood consumption on the environment, Onyebuchi (1989), discovers that despite the fact that the alternative energy sources are cheap, renewable and versatile, they have proven unacceptable to several households in Nigeria because the traditional fuels (especially firewood) are safe, convenient and more reliable in terms of supply. With the removal of subsidy on petroleum products it is envisaged that the pressure on fuel wood will be more since most rural inhabitants in developing countries enjoy open access, the rural people will tend to harvest the resources until its rent is dissipated to the point where harvests costs equal revenue gained.

Elkan (1988), writing on "alternatives to firewood in African towns" came out with, some what, similar observations. He asserts that reforestation efforts have failed because commercial production of fuelwood cannot compete with "free" wood from common lands. However, he maintains that prices of fuelwood will inevitably rise

as free fuelwood is exhausted and that only increase in incomes especially of the lower income groups will protect them from increase in the cost of cooking. In addition, literature on the economies of deforestation tend to suggest that economic growth which raises the income level of the population will induce a switch from fuelwood to kerosene or other higher forms of energy and thus reduce deforestation associated with fuelwood demand. Interestingly, today the cost of kerosene and some other alternative sources of energy both in the west and central Africa are not very different from the cost of fuelwood in the cities. Using data from Ghana and a simple linear model, Abakah (1990), investigates the link between real incomes, inflation and fuelwood consumption. His regression analysis indicates that the quality of fuelwood consumed is negatively corrected to real incomes and positively related to inflation levels.

The disturbing aspect of fuelwood extraction is that it can hardly be replaced. Farmers, research institutes and afforestation and reforestation programs concentrate mainly on substitution of indigenous plants with exotic and economic trees, herbages, legumes and other shrub plants. Therefore, it is unusually to allow the re-growth or establishments of indigenous and naturally occurring plants. Thus, the usefulness of surveys in this area of research (i.e. deforestation) where there is currently a dearth of data in SSA cannot be overemphasized.

Table 2.1: Percentage Distribution of Households by Type of Commonest Fuel used in the Rural Areas

State	Electricity	Gas	Kerosene	Wood	Coal	Total
Anambra	-	-	0.1	99.0	-	100.0
Bauchi	-	-	2.5	97.5	-	100.0
Bendel	-	-	6.3	93.7	-	100.0
Benue	-	-	3.8	96.2	-	100.0
Borno	-	-	4.5	95.5	-	100.0
Cross River	-	-	18.0	82.0	-	100.0
Gongola	-	-	-	100.0	-	100.0
Imo	-	-	7.7	92.3	-	100.0
Kaduna	-	5.8	33.3	60.9	-	100.0
Kano	-	-	0.6	99.4	-	100.0
Kwara	0.8	-	12.5	86.7	-	100.0
Lagos	10.8	-	41.7	48.3	-	100.0
Niger	-	-	11.5	88.5	-	100.0
Ogun	-	-	55.5	44.5	-	100.0
Ondo	-	-	1.3	98.7	-	100.0
Oyo	-	-	14.9	85.1	-	100.0
Plateau	-	-	14.4	85.6	-	100.0
Rivers	-	0.1	13.0	86.0	-	100.0
Sokoto	-	-	-	100.0	-	100.0
All Nigeria	0.1	0.5	10.1	89.3	-	100.0

Sources: Federal Office of Statistics (FOS), Lagos, 1982.

Table 2.2: Percentage Distribution of Households by Type of Commonest Fuel used in the Urban Areas

State	Electricity	Gas	Kerosene	Wood	Coal	Total
Anambra	-	8.3	62.0	29.7	-	100.0
Bauchi	0.4	-	21.5	78.1	-	100.0
Bendel	0.3	5.0	70.3	24.4	-	100.0
Benue	-	0.2	28.3	14.2	-	100.0
Borno	-	-	9.7	90.3	-	100.0
Cross River	1.2	6.2	70.0	22.0	-	100.0
Gongola	-	0.4	35.4	63.8	0.4	100.0
Imo	-	4.6	83.3	12.1	-	100.0
Kaduna	-	-	21.3	78.8	-	100.0
Kano	-	-	2.3	97.7	-	100.0
Kwara	1.2	-	33.3	65.0	-	100.0
Lagos	-	0.8	99.2	0.0	-	100.0
Niger	0.4	6.8	14.8	78.0	-	100.0
Ogun	-	0.4	79.8	19.9	-	100.0
Ondo	-	0.8	47.3	49.8	-	100.0
Oyo	-	0.7	68.2	30.4	-	100.0
Plateau	0.3	1.7	34.0	64.0	-	100.0
Rivers	-	0.1	13.0	86.0	-	100.0
Sokoto	1.4	1.4	39.3	67.9	-	100.0
All Nigeria	1.5	2.7	56.0	39.7	-	100.0

Sources: Federal Office of Statistics (FOS), Lagos, 1982.

According to the orthodox view Morgan, (1978); Moss and Morgan, (1981), wood fuel is bulky and therefore transport costs form a large part of the total costs of production and marketing, limiting the distance from which it is brought to major urban markets to what its price will bear. Recalling Von Thunen's classic theory of land use, Moss and Morgan propose a model of concentric zones to describe wood fuel hinterlands. Where such conditions are approached, as perhaps at the town of Bara in the Sudan, (Hammer, 1977, 1979), a model of concentric land use zones, in which firewood cutting moves outward through time, leaving a treeless track behind, approximates reality. Such experience have been elevated to the status of general law: 'There is the urban energy crisis. Treeless zones expand around cities that

depend primarily on woodfuel, and fuel gets increasingly expensive, Energy Research Group, (1986), But its general applicability is questionable under modern conditions of transport and tenure. Wood fuel compared to other energy sources is still relatively inexpensive, although it incurs heavy transport costs in relation to its value. Urban growth may therefore be expected to intensify pressure on wood fuel resources in the peri-urban zone. Low-income nations depend most heavily on wood for fuel (See, Table 2.3), Global Woodfuel Production 1998. Five countries – Brazil, China, India, Indonesia, and Nigeria – account for about half the firewood and charcoal produced and consumed each year.

Table 2.3: Global Wood fuel Production (Asia and Africa use 75% of Global Wood fuels)

Countries	Percentage of Global Wood fuels
Asia	50
Africa	27
Central America and Caribbean	3
Eastern Europe	1
Former USSR	3
North America	4
Western Europe	2
South America	10

Source: FAOSTAT
Note: Wood fuel production in 1998 totaled 1.8billion cubic meters

Unfortunately, analyses of wood fuel consumption are complicated by a dearth of current, comprehensive data. The FAO wood fuel data, for example, are based largely on estimates derived from scattered 1960s household consumption surveys, which are updated annually in line with population and income growth. These estimates substitute for information on actual woodfuel consumption in most developing countries. Although the picture we get from such data is hazy, it is clear enough to confirm the importance of wood in the national energy picture of developing nations. Wood is the most important of several biomass fuels that also

include crop residues and animal dung. Biomass provides roughly 30percent of the total energy supply in developing countries, and wood accounts for more than half of this – about 15 percent of the energy supply in the developing world IEA, (1996). However, in many individual nations, dependence on wood is much higher. In some countries, like Nepal in Asia, and Uganda, Rwanda, and Tanzania in Sub-Sahara Africa, woodfuels provide 80 percent or more of total energy requirements.

In most industrial countries, wood energy contributes only about 3 percent of total energy supply. There are exceptions: wood energy accounts for more than 16 percent of total energy supply in Sweden and Finland, and 12 to 18 percent in some Central and East European countries FAO, (1997). The FAO estimates that woodfuel consumption rose by nearly 80 percent between 1961 and 1998, slightly trailing world population growth of 92 percent over the period. The largest increases in woodfuel consumption were reported in Asia and Africa. Demand for fuelwood and charcoal is driven primarily by growing numbers of rural poor, who depend on wood for their cooking and heating needs. Charcoal, often consumed in the form of briquettes, is also an industrial energy source in some Latin American countries. The steel industry in Brazil, for example, depends heavily on charcoal. In recent decades, economic growth in the developing world has indeed caused fossil fuel use to increase, and the relative share of energy consumption accounted for by biomass has declined. But the actual quantity of biomass consumed has continued to grow. Recent research shows that biomass consumption in Indonesia, Malaysia, Philippines, Thailand, and Vietnam grew by nearly 2 percent annually between 1985 and 1994, when these countries' economies were growing strongly RWEDP, (1997). In many developing countries, fossil fuels mix, not substituted for woodfuels.

It is difficult to project future demand for woodfuels at the global level and projections vary widely. Some projections are simple ex-trapolations of FAO production trend data, in spite of the data's known shortcomings. Others are based on estimates of how much woodfuel will actually be available for consumption or how much woodfuel people *would* consume if all their needs were fully met. As a result, projections of global wood-fuel consumption in 2010 range from 1.5 billion $m^{3,}$ (a decrease of 16 percent from 1998 levels) to 4.25 billion $m^{3,}$ (an increase of 136 percent) cited in Brooks et al, (1996). It is clear, however, that local and regional shortages of woodfuel – and the hardship this creates – exist in many parts of Africa, Asia, and Latin America. Numerous studies document instances of villagers traversing ever-longer distances to gather daily wood supplies.

Woodfuel shortages are especially likely to occur near cities. Poor, urban populations gather fuelwood and rely heavily on charcoal, which burns more efficiently than wood, but is inefficient in terms of the conversion process from wood. Rising demand for fuelwood and charcoal is causing a halo of deforestation around many cities, towns, and road. Anecdotal evidence exists of closed forests being affected, notably in India, Sri Lanka, and Thailand. At the global level, forecasts of scarcity have probably been exaggerated. "Doom scenarios" under which wood-dependent countries would lose all their forests to firewood collection have not transpired. For example, a 1979 Nepalese forecast predicted that all accessible forest in the country would disappear by 1990. Actual forest loss has been about one half the predicted amounts, and there is no suggestion that it results from firewood collection. The error was cause by the mistaken assumption that forests were the sole source of firewood RWEDP, (1997). Actually, regional studies indicate that as much as two thirds of woodfuel worldwide probably comes from non-forest sources.

Woodlands, roadside verges, and backyards are alternative source for collecting fuelwood; residues from logging, wood industries, and tree plantations; wood recovered from construction waste; and waste packaging supplement other non-forest source RWEDP, (1997).

Closed canopy forests appear not to be a prime source of woodfuels and, at the global level, wood collection for fuel is not regarded by the FAO as an important cause of deforestation. Numerous studies have documented the evolution of past human-environment relationship Perlin, (1993); Mather, (1990), and Richards and Tucker, (1988). In return, the relative socio-economic prosperity resulting from these activities supported population increases. Economic and demographic growth triggered the demand for additional land and forest products Perlin (1993), Williams (1989). To stop the deforestation cycle and to alleviate the pressure on the shrinking forested areas, many developed countries approved and enforced environmental laws protecting and expanding the remaining forest resources. In addition to these laws, the pressure on the forest environment also decreased because of the decline of the population growth rate, the use of alternative energy sources, the introduction of new farming techniques and other technological innovations. By mid twentieth century the total forested areas in developed countries had more or less stabilized, and reforestation programs led to a relative increase in the extent of forested lands FAO (1993); Perlin (1993); Mather (1990); Richards and Tucker (1988).

Deforestation cycles experienced by developed countries are now emerging in developing countries. Several studies have investigated the scale, rate, and cause of tropical forest losses Grainger (1993); Amelung and Diehl (1992); Myers, 1991; Sader et al. (1990); Postel (1988); Allen and Barnes (1985); Lanly and Rao (1982); Myers (1980). Although rates and extents of deforestation varied from region to

region, their findings suggested a relationship with the population density and socio-economic conditions. In less densely populated forested regions, the deforestation has been very minimal, and in areas of high population densities the rate and the extent of forest clearing have been high Butler, (2006), Skole and Tucker (1993). As urban population continues to grow, more housing spaces are required, and more fuel woods are needed. However, developing countries did not go through the slowdown cycle of the deforestation rate as were developed countries because their failing economies could not offer sufficient opportunities to people wishing to look for alternative sources of energy Plouvier (1998); Mather (1990); Anderson (1987). In many developing countries laws protecting forests are not being enforced.

In Sub-Saharan Africa, spatial and temporal patterns of forest clearing are similar to the situation many developing countries have been experiencing. For instance, rates and scales of deforestation vary from countries to countries, and within each country regional variations also exist Butler (2006); Downtown (1995); Barnes (1990); Myers, (1989). Some countries are subjected to deforestation rates exceeding the global annual average of 0.8 percent. Forest cover declined annually at a rate higher than the global average from 2000 to 2005, in Benin, Burundi, Cameroon, Ghana, Liberia, Malawi, Nigeria, Rwanda, Togo, Uganda, and Zimbabwe (Butler 2000)

CHAPTER THREE

3.0 METHODOLOGY

3.1 Data collection procedure:

Collection of data for the research work will involve a good number of cogent data collection techniques. Some of those techniques are highlighted below.

1. ***Structured Questionnaire*** - structured questionnaire containing vital and relevant questions will be distributed to farmers and especially commercial fuel wood gatherers within the study area. This will provide useful information for the research work. Questionnaires are good source of data from the respondents.
2. **Ground- Truthing** – Practical and physical visit to the project site will be done to provide first hand information this kind of visit avails the research the opportunity of seeing the real and actual problem on ground.
3. **Topographic maps and rural photographs** – Maps are veritable tools for research work especially topographic and aerial photographs. The maps will provide the bases for functional comparison between two different periods.
4. **Personal Interview** – In order to solicit/elicit for more first hand information/data, personal interview will be done, respondents: Elders, village heads. This will provide elaborate explanation of issues raised in the questionnaire.

5 Data Analysis

In data analysis only frequency percentage technique will be used in analyzing the structured questionnaires to be used, because of the time constraint.

Frequency-percentage technique is simple, concise and very effective in analyzing questionnaires.

Random sampling technique will be employed in the selection of individuals and other stake holders.

$$\text{Frequency-percentage} = \frac{\text{Number of observed}}{\text{Total Number}} \times \frac{100}{1}$$

CHAPTER FOUR

4.0 Discussion of Results

4.1 Data analysis and Discussion

Frequency – percentage method of data analysis was adopted. The frequency percentage method was adopted due to its adequacy, simplicity and relative ease of interpretation and presentation. Data analysis, interpretation and presentation were effectively done using frequency percentage method. One hundred questionnaires were distributed but only eighty were returned, so the analysis centres around eighty questionnaires.

4.2 Type(s) of fuel used at home for cooking

The question tends to find out the type(s) of fuel the respondents use at home. The responses will give an in-sight into the level of consumption of the different fuel used at home. It will invariably provide a framework for other analysis and simulation based on the fact or data derived from the responses.

Table 4.1: Types of fuel used for cooking at home in Minna

Types	Frequency	Percentage
Firewood	38	47.50
Charcoal	23	28.75
Electricity	03	3.75
Crop residues	04	5.00
Kerosene	12	15.00
Others	-	-
Total	**80**	**100**

Source: Survey data, 2007

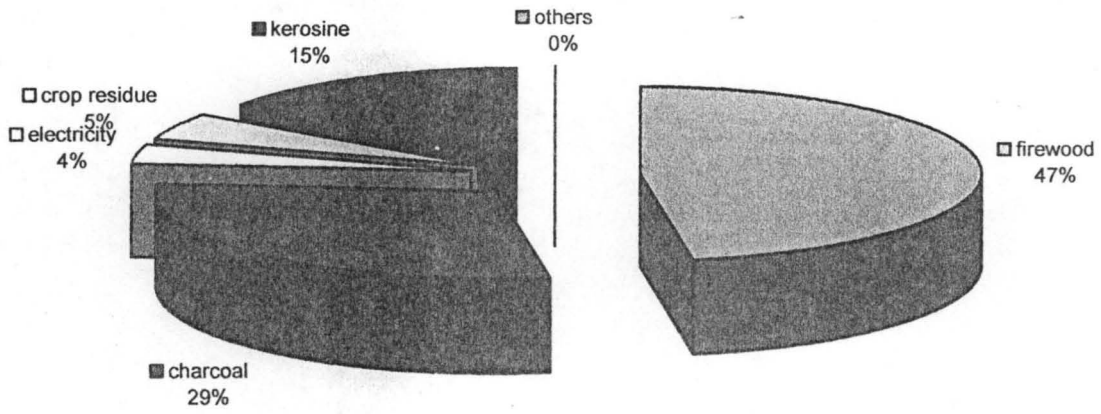
From table 4.1, 47.50% of the respondents rely on fuelwood as their source of energy at home. 28.75% make use of charcoal while 3.75% employ the use of electricity. 15% of the respondents make use of kerosene. The implication of this data is that a high percentage of the respondents rely on fuelwood at home, it also suggest that there is ever increasing pressure on the vegetation for trees,

shrubs and other economic trees for fuel. In a nutshell, deforestation is on the increase since majority of the low income earners still make use of trees etc.

Plate: 1. a young boy trying to push a barrow full of firewood he bought from commercial firewood seller.

One of the major causes of deforestation is fuelwood consumption as attested to by the data collected and shown graphically in Figure 1 below. (See plate 1).

Figure 1: Types of fuel used for cooking at home in Minna.



4.3 Awareness about problems caused by deforestation

It is asserted that most of the people that make use of fuelwood as source of energy are not aware of the negative consequences of deforestation. The question will provide good assessment of this assumption and further throw more light on the awareness level of the respondents.

Table 4.2: Awareness on the issue of deforestation

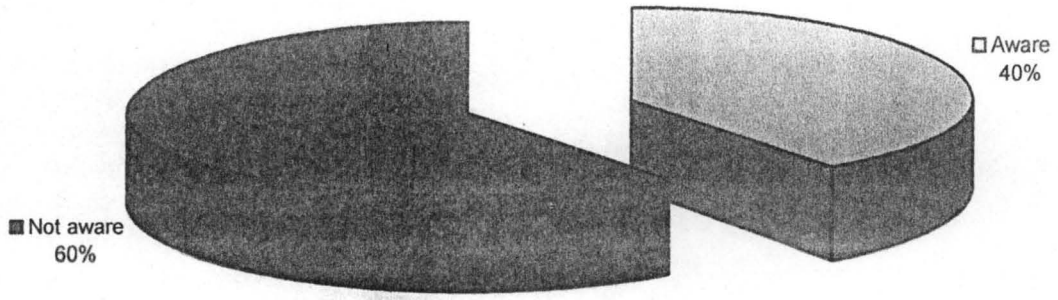
Awareness	Frequency	Percentage
Aware	32	40
Not Aware	48	60
Total	**80**	**100**

Source: Survey data, 2007

Table 4.2 indicates that as high as 60% of respondents are not aware of the negative consequences of deforestation while 40% claimed to be aware of the effects. The fact that 60% of the respondents are not aware of the negative implications of deforestations shows that there is low awareness and this may be responsible for the increasing pressure of vegetation for fuelwood and is graphically shown in Figure 2 below as attested to by the data collected.

Plate: 2. a deforested land used for farming in Minna.

Figure 2: Awareness on the issue of deforestation in Minna.



4.4 Sale of Fuelwood

Sale of fuelwood has been identified as one of the major cause of deforestation, an idea of the number of people who sale it may provide a veritable tool for analysis the observed trend.

Table 4.3: Proportion of respondents involved in the Sale of fuelwood

	Frequency	Percentage
Sellers	15	15
Non Sellers	68	85
Total	**80**	**100**

Source: Survey data, 2007

From table 4.3, 15% of the respondents are engaged in sell of fuelwood. The respondents also gave valid reasons why their activities may have serious negative effects on the vegetation. Some of them sell as high as 3 – 5 pick – up loads of firewood monthly. This activity is carried out in the forest zone. Most of the trees fell have economic values as attested by the data collected and is graphically shown in Figure 3 below.

Figure 3: Proportion of respondents involved in the sale of firewood.

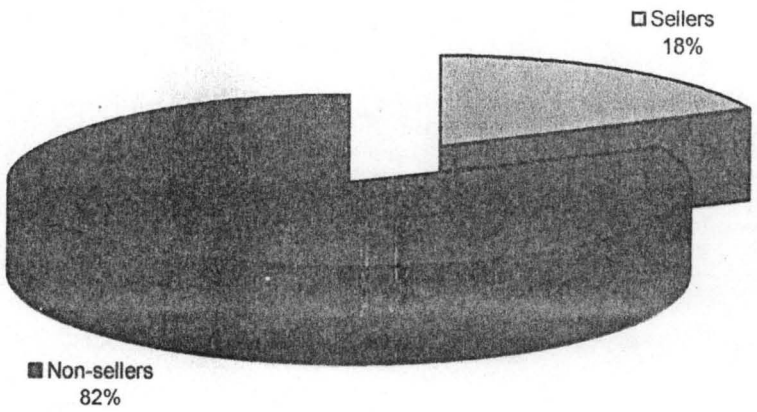


Plate: 3. an urban woman selling charcoal in commercial quantity.

4.5 Where are the fuelwood derived from

The location where the fuelwood are derived will provide the necessary and logical analysis as to where deforestation is eminent. It is necessary to identify and establish the areas that are prone to deforestation and possibility provide solutions.

Table 4.4: Sources of fuelwood

	Frequency	Percentage
Collect from rural areas	34	42.50
Buy from rural areas	20	25.00
Buy from wholesalers	04	5.00
Collect around the town	13	16.25
Supplemented by rural relatives	9	16.25
Total	**80**	**100**

Source: Survey data, 2007

From table 4.4, a good percentage (42.50) of the respondents collects fuelwood from the rural areas, 25% buy from the rural areas while 4% buy from the wholesalers. The inference to be made here is that the rural areas are the major source of fuelwood. This is an indication that deforestation is common in the rural areas either because of agricultural activities or for fuelwood, which is graphically shown below in Figure 4. As attested to by the data collected. (See plate 4).

Figure 4: Sources of firewood.

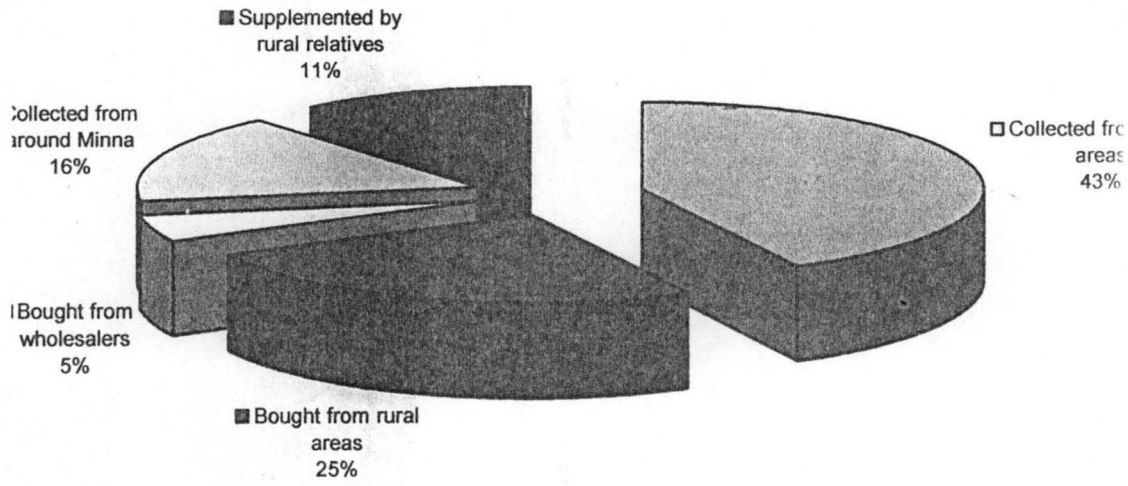


Plate: 4. buying of fuelwood from a rural woman.

4.6 Preference for fuelwood

This tends to ascertain why there is high percentage of preference for fuelwood compared to other sources. It will also provide the valid reasons why consumers of fuelwood are not ready to use alternative sources of fuel.

Table 4.5: Reasons for preferring fuelwood

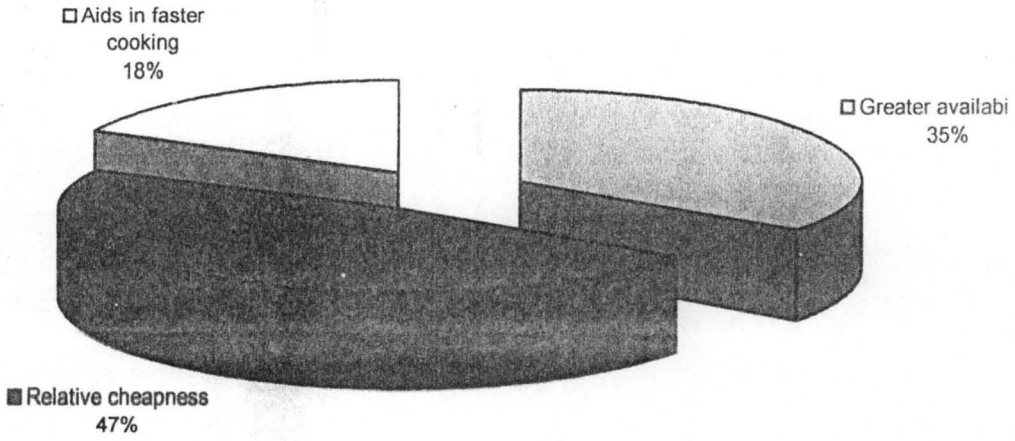
	Frequency	Percentage
Its availability	28	35.0
Its relative cheapness	38	47.5
It is faster	14	17.5
Total	**80**	**100**

Source: Survey data, 2007

Table 4.5 shows that 47.5% of the respondents make use of fuelwood because it is cheaper and on further discussing, they conformed that they do not even pay for the fuelwood in some cases. A considerate percentage (35%) makes use of fuelwood because of its availability while 17.5% make use of fuelwood because it is faster.

Fuelwood consumption is generally on the increase because of some attributes that are peculiar to it. The fact that fuelwood is cheap or even got free is the more reason why people rely on it for cooking, coupled with this is the fact that it is readily available, which is shown graphically below in Figure 5.

Figure 5: Reasons for prefering fuelwood.



4.7 Planting of trees

This question tends to find out if farmers and stakeholders plant trees in place where they fell them. It will educate us on whether they are conscious of the fact that continuous felling of trees equally demands planting of trees.

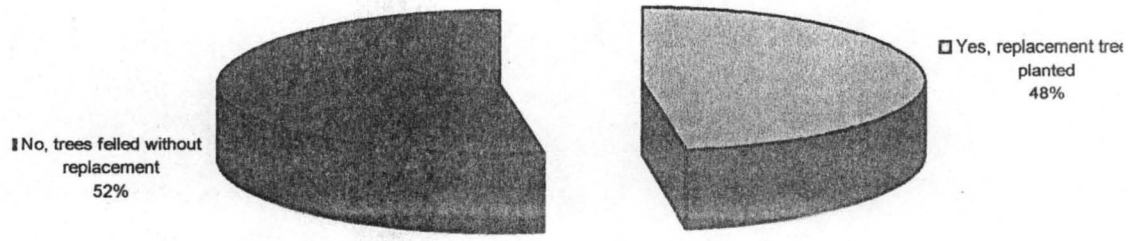
Table 4.6: Proportion of respondents practicing Afforestration

	Frequency	Percentage
Those that Plant	38	47.5
Do not plant	42	52.5
Total	**80**	**100**

Source: Survey data, 2007

From table 4.7, 47.5% of the respondents attest to the fact that they do plant trees where they fell some while 52.5% do not plant trees. It is an indication that there is no corresponding planting of trees compared to the felling of trees. At this rate or trend, deforestation will be on the increase. The fact that more trees are fell compared to planted is an indication that deforestation is on the increase and this is graphically shown in Figure 6

Figure 6: Proportion of respondents practicing afforestation.



4.8 Number of meals per day

The number of meals prepared per day for all the respondents will give a clear picture of the demand for the various source of energy. The higher the number of meals prepared, the greater the demand for fuelwood consumption. The demand for fuelwood will certainly increase. The question is relevant and will provide more information about the scope of the level of consumption.

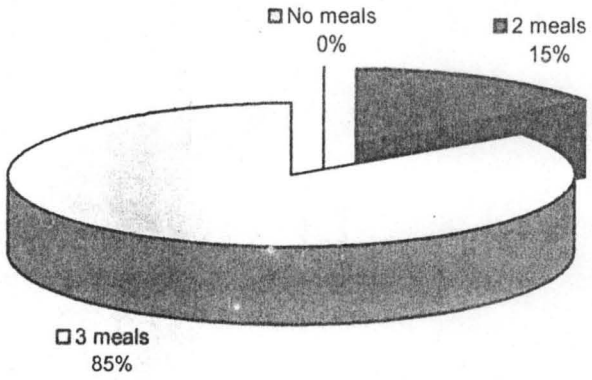
Table 4.7: Number of meals cooked per day

Option	Frequency	Percentage
2 meals	12	15
3 meals	68	85
No meals	-	-
Total	**80**	**100**

Source: Survey data, 2007

The table 4.7 above shows that 85% of the respondents cook three meals a day; this is an indication that more fuel is consumed per day. The environment is under serious pressure as a result of the high demand on it. An alternative to fuelwood will reduce the pressure on the environment, as attested to by the data collected and is shown below in Figure 7 graphically.

Figure 7: Number of meals cooked per day



4.9 Willing to accept alternative energy sources

It is very vital and necessary to know the attitude of respondents towards using other sources of energy apart from fuelwood. Some individuals will like to make use of fuelwood even if there is alternative source while some will make use of the alternative.

Table 4.8: Willing to accept alternative energy sources

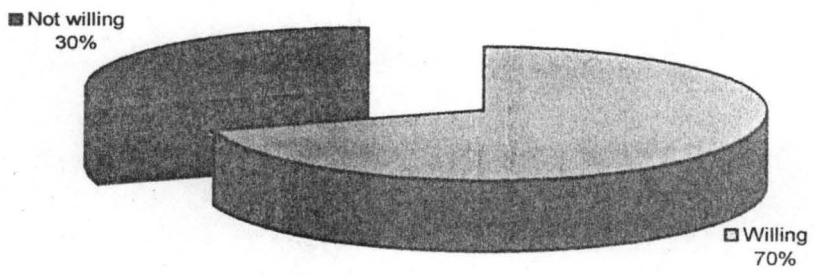
Option	Frequency	Percentage
Not Willing	24	30
Willing	56	70
Total	**80**	**100**

Source: Survey data, 2007

Table 4.8 shows that 70% of the respondents are willing to make or accept the use of other sources of energy other than fuelwood while 30% insists on the use of fuelwood inspite of the availability of other options. The observation and deduction to be made here is that some individuals are embracing the use of fuelwood not because of the absence of alternative sources of fuel. The emerging trend is that even with reliable and affordable alternative sources of fuel, some individuals will still rely on fuelwood as their energy source.

Some respondents advanced reasons why they cannot discard the use of fuelwood as its relative cheapness, foster rate of cooking and that they are used to fuelwood. The implication of this situation is that even if government provides alternative sources of energy some people will still prefer the use of fuelwood as a source of fuel, as attested to by the data collected and is graphically shown in Figure 8 below.

Figure 8: Willing to accept alternative energy sources



10 Common tree species used for Fuelwood

Virtually all types of trees in the savannah regions are used for fuelwood, except when taboos forbid their use or when the tree specie possesses unfavorably characteristics for use as fuel as in the case of baobab (*Adasonia digitata*) that stores a lot of water in its trunk. The main species of trees utilized for fuelwood in the area include: *Vitellaria paradoxa; Prospis Africana; Khaya senegalensis; Daniellia oliveri Anogeisus leicarpus; Parkia biglobosa; Butyrospermum paradoxum; Periscopis laxiflora.*

4.11 FINDINGS

It is highly imperative and pertinent to note that the causes of deforestation are a complex and intricate factors revolving round man and its activities. Lack of understanding of the natural systems and the interaction between various earth surface processes and the impact of human activities or actions, and to manage resources in sympathy with the natural environment makes deforestation a serious problem.

The research work has established the fact that deforestation is so complex that it thus largely resulted from poverty, unequal land distribution and the pressure from the ever growing population. As productive land becomes scarce, the small farmer seeks new and fertile soil either in fragile upland forest or in original low lands already overburdened by large numbers of subsistence farmers.

From the research work, it is obvious that wood energy has gained supremacy over other known energy / fuel resources mainly because it costs less and in some circumstances got free. The disappearance of forests in the study area depends on excessive dependence on fuelwood as the only source of energy. Research data has shown that fuelwood is the primary source of energy in the study area and also that poor people depend more on fuelwood because they cannot afford the alternative fuel such as; Cooking gas, Electricity and Kerosene.

The study has also revealed the fact that relatively poor people make use of fuelwood both in the rural and urban areas and that there is sharp appetite for this source of energy which has continuously exerted immense pressure on the environment. Fuelwood is the major fuel used for heating and cooking in the study area. The widespread use of fuelwood in the study area is mainly attributable to the fact that the town is still largely pre-industrial and a sizeable proportion of its

population are engaged in farming. The poor economic growth and high cost of other sources of fuel other than firewood and charcoal is responsible for the dependence on fuelwood. Most of the urban poor and rural dwellers cannot afford to buy commercial fuels such as kerosene, cooking gas and the exorbitant Electricity bill from P H C N. And this is particularly so if the size of the households is large.

Some aspects and dynamics of the firewood business found in the study area indicates the fact that there will drastic increase in the number of people involved and this has serious negative consequences on the forests. This is an indication that the rate of deforestation in the study area will certainly increase bearing in the mind the volume of trees fell by sawmill operators. There is drastic increase in the patronage of fuelwood business; this suggests a boom in the fuelwood business which is an indication in the rate of deforestation

CHAPTER FIVE

5.0 RESULT OF FINDINGS

5.1 Causes of Deforestation in the study area

1. **Increased Demand for Fuelwood**

   The high cost of kerosene and cooking gas in the country has led to a high demand for firewood from the environment by firewood sellers. A lot of trees are fell for; bread bakeries and sawmill business.

2. **Building and Construction of Infrastructural amenities**

   The ever increasing population in the area has necessitated the building of schools, medical centres; filling stations and residential housing, which are built on the environment. The forests are destroyed and exposed to agent of deforestation.

3. **Agricultural activities**

   Agricultural activities are taken place on land, agricultural activities demands large expanse of land. Land clearance is carried out and this demands removal of vegetation, uprooting of trees and physical disturbance of the soil. Vast areas of land are subjected to deforestation.

4. **Burning of vegetation**

   Indiscriminate or wanton burning of vegetation was identified as one of the major causes of deforestation. Large expanse of land were been burnt down either by farmers or hunters.

5. **Grazing**

   Animal grazing or over grazing is seen to be one of the factors compounding the issue of deforestation in the area. Animals are allowed to graze freely on the vegetation. Consistent grazing has a cumulative effect on the incidence of

deforestation. Some less obvious equally important causes of deforestation in the study area are:

(1) Lack of awareness on the part of the people living in the study area.

(2) Illiteracy of the people is fundamental.

(3) Abject poverty is one vital cause of deforestation

In conclusion, deforestation is on the increase in the study area and some drastic measures should be taken to check or reduce the trend.

5.2 Recommendation

From the analysis of the causes of deforestation in the study area, it is very essential and cardinal to recommend some drastic measures to control the rate and extent of deforestation in the study area. The following recommendations are geared towards solving the problem.

1. The practice of afforestation and re-afforestation should be embarked upon in the study area to mitigate the incidence of deforestation. This involves the planting of economic trees to fight deforestation.
2. Adequate and appropriate improvements in the systems of farming and land management technique could reduce the rate of deforestation and it will alleviate the impact of population pressure, which is sustainable Agriculture.
3. Effective and efficient legislation should be made to prohibit wanton / indiscriminate felling and burning of trees. This will check the rate of deforestation.
4. Government should develop and encourage the people to use alternative sources of energy, especially biogas and solar energy.

5. It is of utmost importance that government should address the problem of unsustainable fuelwood exploration so that our land will continue to be productive for this generation and the future generations.

6. The creation of forest reserves, Environmental conservation Education should be inculcated in all levels and Government should also reduce poverty, by giving emphasis to key sectors of the economy.

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LIST OFPLATES

Plate: 5. urban women buying a sack of charcoal from dealer

Plate: 6. Women tying charcoal in polythene for sell

Plate: 7. a pile of fuelwood ready to be splitted in smaller bits

Plate: 8. Government reserves afforestation is also being cleared for Farming and the woods used as energy source.

Plate: 9. fuelwood being used for commercial cooking in a local restaurant

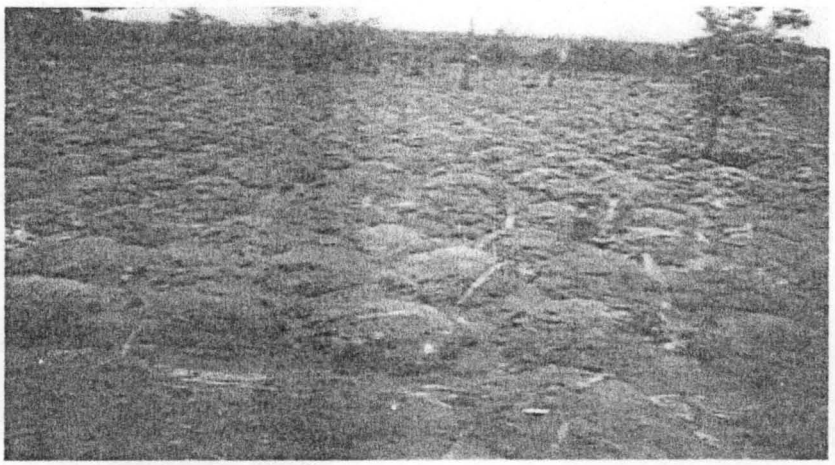
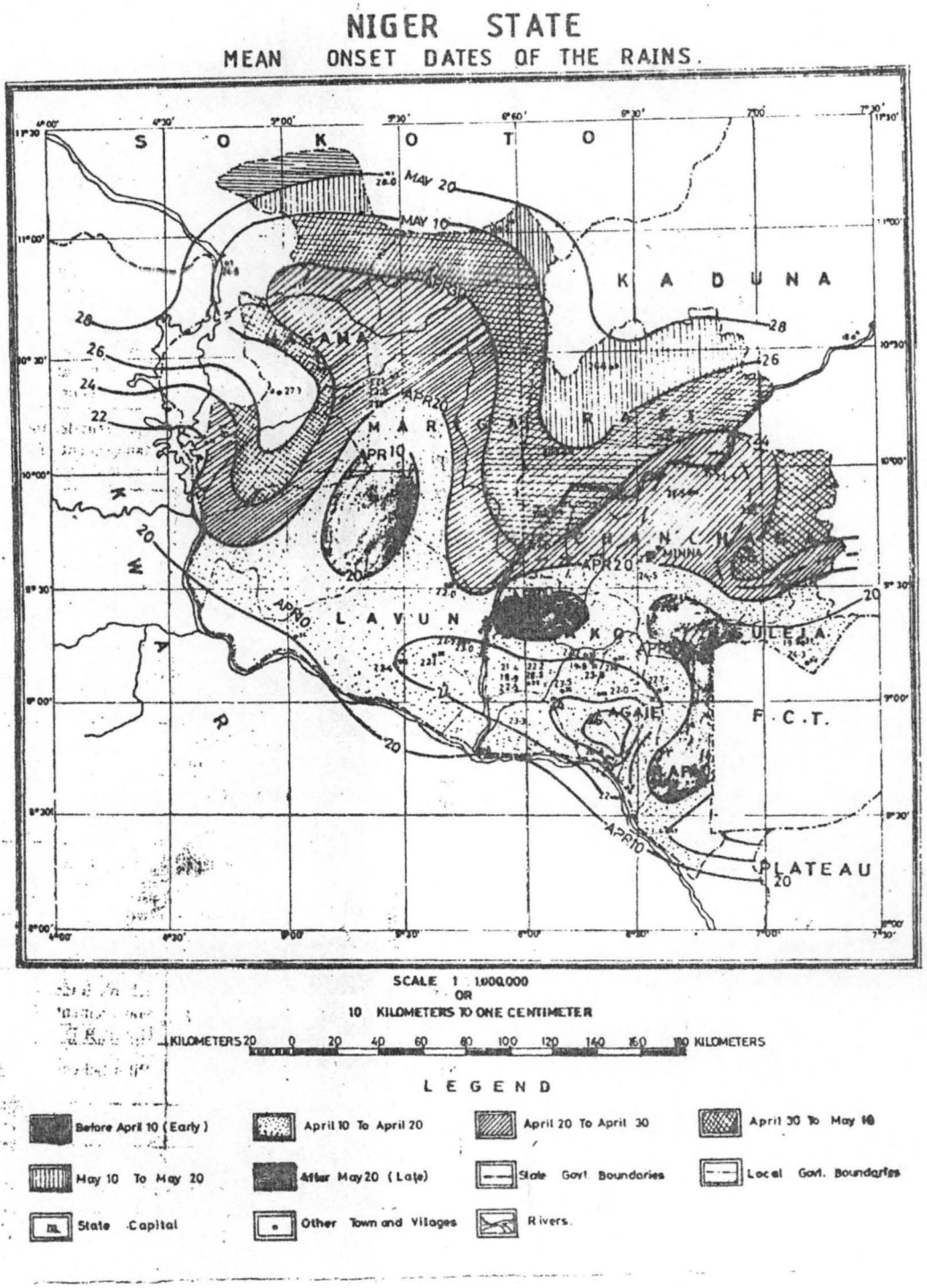


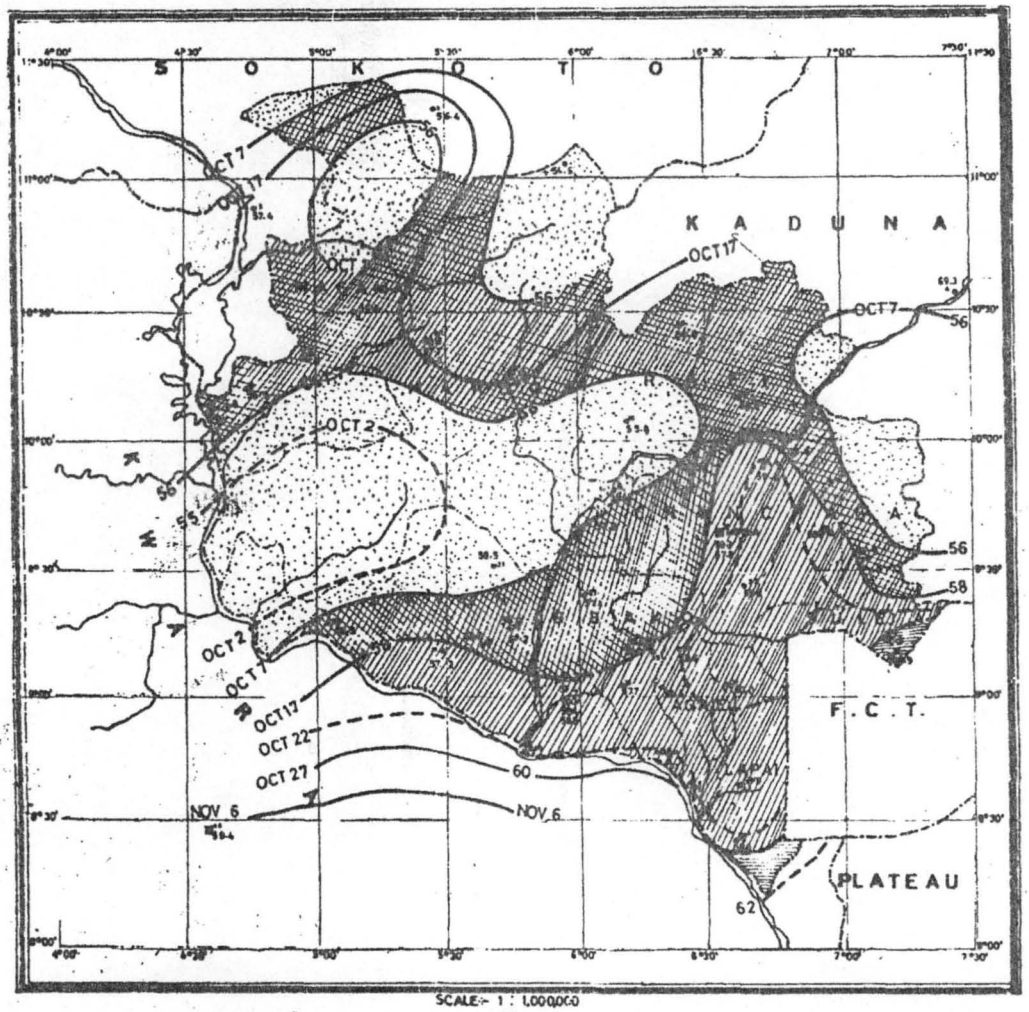
Plate: 10. A large area of land being put in to farming.

LIST OF APPENDICES



NIGER STATE

MEAN CESSATION DATES OF THE RAINS.



SCALE:- 1 : 1,000,000
OR
10 KILOMETERS TO ONE CENTIMETER

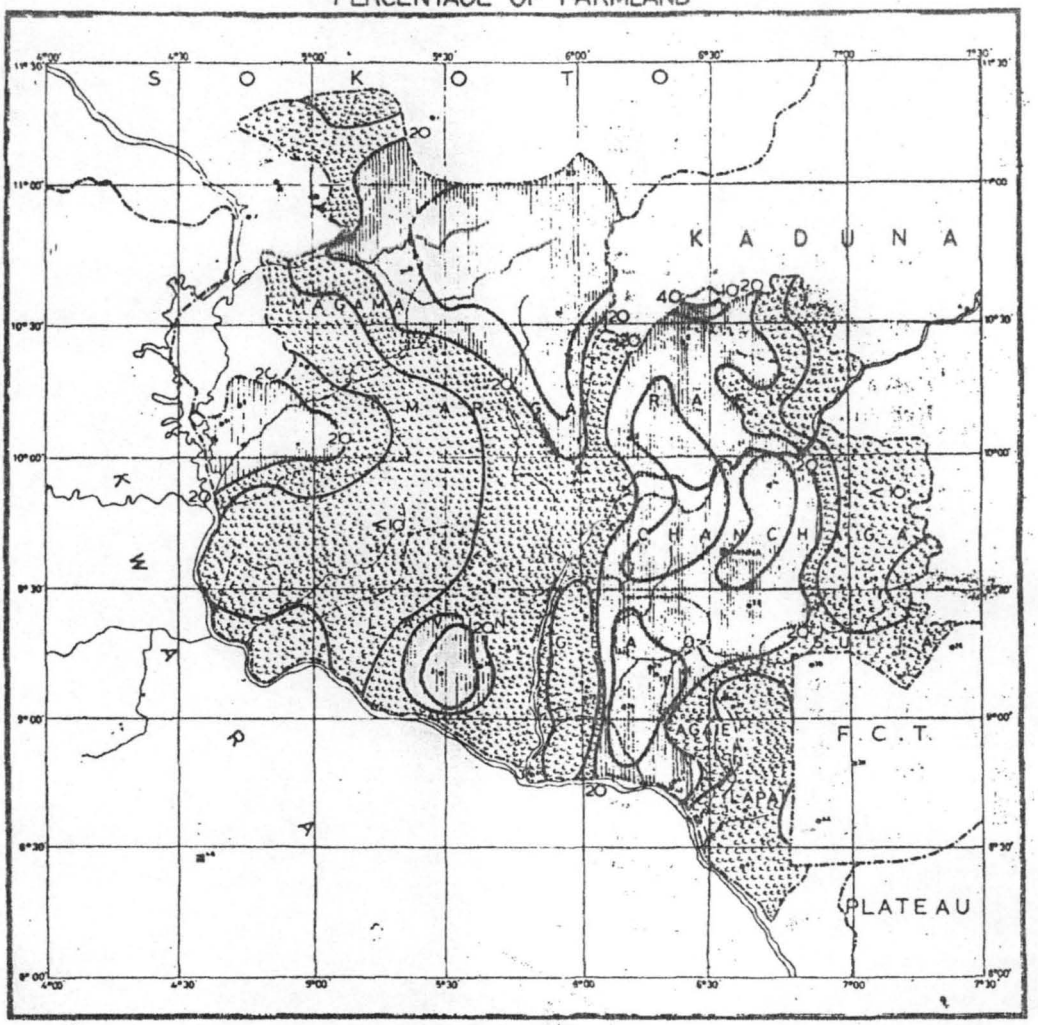
KILOMETERS 20 0 20 40 60 80 100 120 140 160 180 KILOMETERS

L E G E N D

- Before Oct.7 < 56
- 56 To 58 Oct.7 To Oct.17
- 58 To 60 Oct.17 To Oct. 27
- > 60 After Oct.27
- State Govt. Boundaries
- Local Govt. Boundaries
- State Capital
- Other Towns and Villages
- Rivers

NIGER STATE

PERCENTAGE OF FARMLAND



SCALE:- 1 : 1,000,000
OR
10 KILOMETERS TO ONE CENTIMETER

KILOMETERS 20 0 20 40 60 80 100 120 140 160 180 KILOMETERS

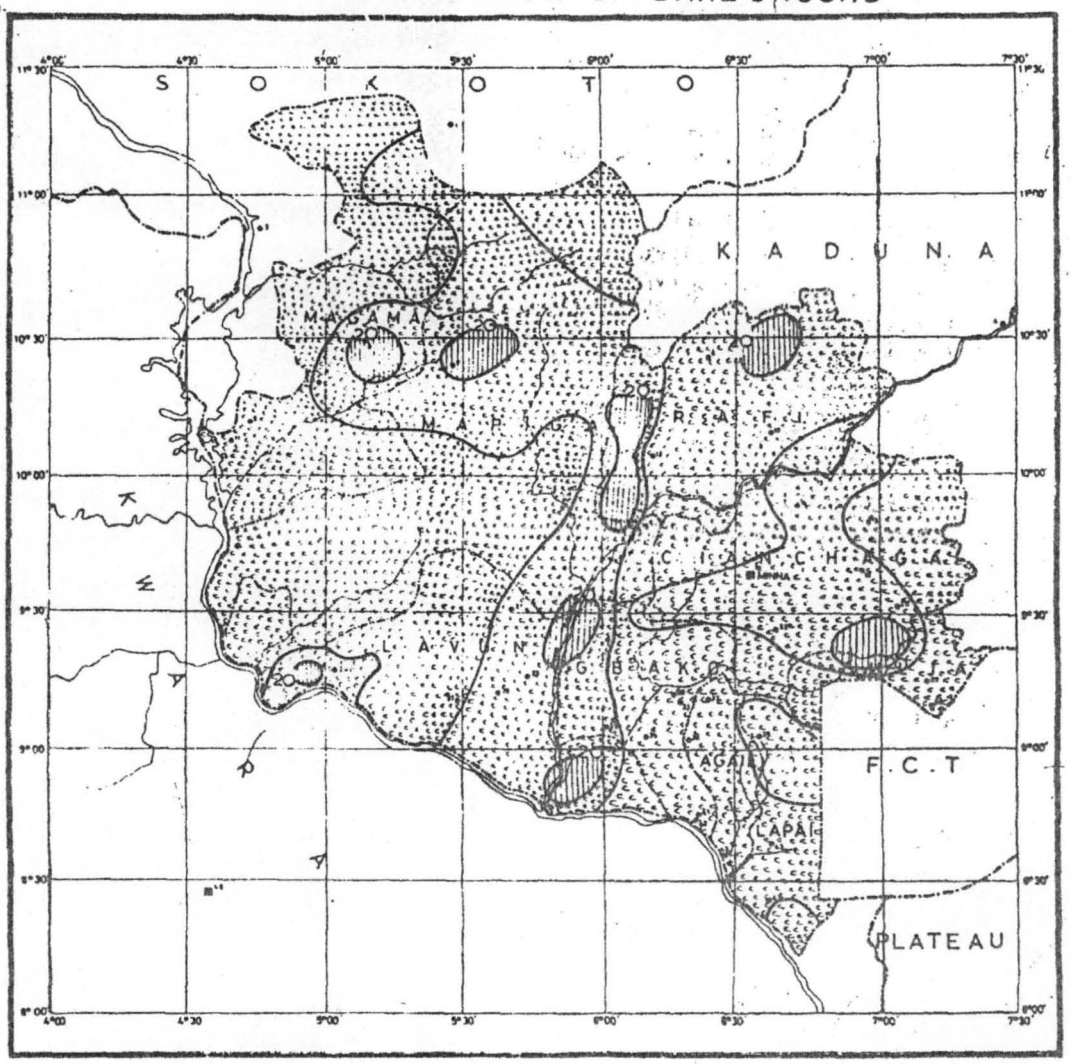
LEGEND

0
0< F≤ 20
20< F≤ 40
> 40
F = FARMLAND

State Government Boundaries
Local Government Boundaries
State Capital
Other Towns and Villages
Rivers

MINNA

NIGER STATE
PERCENTAGE OF BARE GROUND



SCALE:- 1 : 1,000,000
OR
10 KILOMETERS TO ONE-CENTIMETER

KILOMETERS 20 0 20 40 60 80 100 120 140 160 180 KILOMETERS

LEGEND

0
0 < B ≤ 20
20 < B ≤ 40
> 40
B = BAREGROUND

State Government Boundaries
Local Government Boundaries
State Capital
Other Towns and Villages
Rivers

MINNA
Bida

FEDERAL UNIVESITY OF TECHNOLOGY
SCHOOL OF SCIENCE AND SCIENCE EDUCATION,
DEPARTMENT OF GEOGRAPHY.

Instruction: - Please kindly assist in filling this questionnaire. It is purely for Academic purpose all information will be treated as confidential.

Fill as appropriate.

1. Name of respondent.....

(a) Sex.....

(b) Age.....

(c) Occupation.....

2. What type(s) of fuel do you use for cooking/heating?

   (a) Fire wood (b) Charcoal (c) Electricity (d) Crop residues

   (e) Kerosene (f) others (specify).

3. Why do you prefer to use these fuel types and not others?

   .....

4. If there are shortages of the fuels you use, how often does it happen?

   (a) Rarely (b) Seasonally (c) Frequently

5. How many meals do you cooked per day using any of these fuels?

   .....

6. If you're present income condition improves, what fuel type(s) would you use for cooking? .....

   Why.....

7. At the moment, how much fuel do you use per week or per month?

   (a) Fire wood ..... Bundles/week (b) Charcoal ..... Sacks/week

   (b) Kerosene ..... gallon or litre per month (d) Crop residues.....

   (e) I don't know.....

8. How much do you pay for .....

   (a) Electrical bill/month ..... (b) Fire wood per bundle.....

   (c) Charcoal per sack ..... (d) Kerosene per gallon .....

   (e) I don't pay in cash ..... (f) I don't know .....

9. Which fuel do you feel is the most expensive? .....

10 If you don't pay for fire wood or crop residues, who collects for or supplies you?

(a) Husband (b) Wife (c) Children (d) Rural relatives

11. How far .....km/miles and taken .....hrs/collecting trips. How many trip per week? .....

12. Do you feel fuel wood is a problem or not? (a) Yes (b) No (c) I don't know.

13. Do you sell any fire wood or crop residue? Yes / No

14. To whom do you sell it / then .....

15. If you sell, why do you prefer to be a trader in fuel wood and not other commodities?

(a) I have no job (b) To supplement my wage income (c) Easy to get and sell

(c) Profitable business (e) Other reasons

16. Where do you obtain the fuel woods?

(a) Collect from rural areas (b) Buy from rural areas (c) Buy from wholesalers in the town (d) Collect around the town (e) Supplemented by rural relatives.

17. If you buy fuel wood from rural area, what is the cost involved?

(a)Fire wood ..... (b) Charcoal..... (c) Crop residue.....

18. Who transport these fuels for you? .....

19. Is there seasonal variations of the fuels wood supply?

.....

20. Do you know the common species of tree you normally sell as fuel wood? Yes / No

21. If yes, can you mention them? .....

22. Do you have any problem in marketing and selling these fuel wood?

.....

23. Do you have any problem in obtaining adequate fuel wood for sell?

..... Yes / No

Why? .....

24. Do you know that cutting dawn of tree for fuel wood can cause problem in the environment?

Yes / No .....

25. If Government should provide another cheep source of energy for you and the community, will you accept it? Yes / No

26. Comment generally, if any

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