DEFORESTATION AND CONSEQUENCIES

A CASE STUDY OF MOKWA LOCAL GOVERNMENT AREA NIGER STATE OF NIGERIA

BY

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DEDICATION

This project is dedicated to the entire family of Lile Mamman of Ja'agi, his children and great grand children.

Most notable among them include

(1) Alhaji Ahmed Jaagi

(2) Alhaji Salihu Ja'agi

(3) Hajiya Adama Ja'agi

(4) Mama Amala Ja'agi

(5) Nnanda Sule

My dedication equally goes to my wives and friends. Mrs Hawawu Idris Ja'agi, Ramatu Idris Ja'agi and Late daughter Hawawu Mama.

DECLARATION

I hereby declared that this project Deforestation in Mokwa Local Government was conducted by me as a requirement for the Award of Post-Graduate Diploma Certificate.

This project work has never been presented at any University known to me. The project supervisor Professor D. O. Adefolalu contributed in no small measure to its success. All the information, data, photographs have been acknowledged accordingly in the field and references.

ADAmed
8/4/2002

ABSTRACT

The forest or woodland ecosystem when left undisturbed, maintains a stable land with good porosity and a tight nutrient cycle. The population pressure has subjected the land to relatively permanent impairment or destruction from a variety of causes amongst which is "deforestation the subject of this study through large farming for arable land, timber for different types of infrastructures, fuel wood for energy drive in houses e.g cooking, smoking of meat and fish, provision of charcoal for making matchets, hoes and other farming implements and wide industrial diversification has resulted in ecological imbalance that affected solid stability, nutrient cycling, hydrological cycle, microclimatic and biotic environments including soil floral and faunal activity in Nigerian savannas and in the Local Government Area.

Data used include information from forest offices, sawmills; oral interviews directly form the stakeholders. Method of collection is practical fieldwork and through photographs.

Data collected were analyzed through past records and experience of major happenings similar to the topic of study. Through the deforestation processes on-going in the Local Government, land degradation is much at hand and also drying up of streams and rivers are witnessed in many rivers e.g Zhibi, Tekpa, Nyanko, Ikko. Flood is also witnessed every year as a result of removal of trees and farming along water shaded areas of these rivers as a result of siltation.

Deforestation in the Local Government Area should as a matter of urgency, be checked through legislation, environmental education, tree planting campaign to ameliorate the hazards of land degradation such as soil, water and wind erosion, River silatation, flooding etc.

ACKNOWLEDGEMENT

I would like to express my appreciation to DR. M.T. USMAN of Department of Geography for his invaluable encouragement to undergo this study.

I am sincerely grateful to and appreciate the immense contribution and organization towards the success of this project. He is sincerely a supervisor worth emulating. He is Professor D. O. Adefolalu a concerned citizen of Nigerian environment and world at large. The entire staffs of Geography Department are no exception for they have contributed in no small measure to the success of the course.

Also thanks to the saw millers, Big timer Agricultural Managers, Zonal forest officer Mokwa for giving me their time and materials without which their will be no success.

May Allah's blessing be bestowed on all of us.

CERTIFICATION

This is to certify that I, Alhaji Idris Ahmed Jaagi carried out this project as well as its presentation, for the Department of Geography, School of Science and Science Education (S.S.S.E) Post Graduate School, Federal University of Technology, Minna, Niger State.

PROFESSOR D. O. ADEFOLALU
PROJECT SUPERVISOR 23/03/02
SIGN/DATE

DR. M.T. USMAN
HEAD OF DEPARTMENT 23/03/02
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EXTERNAL EXAMINER .....
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SIGN/DATE

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CHAPTER ONE

1. INTRODUCTION

Adage says Tree there and free here makes a forest and this can be compared to the song by Alhaji Mamman Shata who says "Yawan Mutane shine Kasuwa" meaning "many people gathered in the market makes it a market. This could be liked to many tress in a stand makes a forest. Thus deforestation may be defined as any act leading to removal or destruction of forest vegetation unaccompanied by deliberate effort at its replacement. The term, thus, includes not only felling of trees but also removal of shrubs, lianes and other plants from the forest; deforestation is as old as man himself. At the early stages of civilization it was essential to destroy and remove some of the abundant forest in order to pave the way for activities such as arable farming and human settlements which advanced man's development.

Forest, then were viewed as obstacles to development. In the United States of America and Australia and New Zealand, the extensive and extended destruction of natural forests was a necessary part of conquests and settlement of the continents in 17th centuries. This therefore compared favourably with the conquest of other tribes in the North by the Hausa Fulanis who invaded the North in the name of Islamisation according to (Mallam Muhammadu Village Head Jaagi). He asserted that Fulanis could not penetrate some towns because of the thick forest and Isetse flies hence resisted conquest.

In the past three decades there has been high rate of global deforestation but the situation in the tropics gave the most cause for concern among policy

makers, forest resource managers and conservationists. In 1978 the US Department of State and US Agency for International Development Sponsored a strategy conference on Tropical Deforestation, to study the problem and make recommendations for action (USDS & USAID, 1978).

The Food and Agriculture Organization of the United Nations has taken a lead in studying tropical deforestation and proposing solutions (FAO, 1985/4: 1986/2). In recognition of the deforestation problem and the need to conserve tropical forest resources FAO declared 1985 International Year of the Forest. The deforestation problem in the tropics has also been appraised in numerous studies by governments, private organizations and individuals Scientists in recent years (notably Norman Myers 1979, and World Resources Institute, 1985).

Available reports suggest that while the forest area in developed countries has stabilized and probably increased in recent years, the forests in tropical developing countries are being destroyed at an alarming high rate. It is estimated that the area of tropical forests (including closed forests and savannah wooland) cleared and/or destroyed annually is between 8 million and 20 million ha. The FAO (1986/2) estimated that 11.3 million ha. Of tropical forests are destroyed annually made up, on average of 7.5 million hac. of closed forests and 3.8 million ha. of open tree formation. The area of plantations in the tropics in 1980 amounted to 12 million ha, or only 10% of the area deforested annually.

In Nigeria, as in other tropical countries, the rate of deforestation has accelerated in recent years. Although reliable estimates are not available, it has been put at approximately 285,00ha. annually (Oseni, 1978, Aruofor, 1986). At this rate of deforestation 50% of the country's, relatively small forest land area of

just 10% of total land area would be eliminated by the year 200. In Niger State deforestation became so alarming that in 1980 the civilian government of Alhaji Awwal Ibrahim enacted a law banning the use of power saw in spilling, followed by the introduction of early burning in November of each year, all aimed at reducing the rate of destruction to the vegetation and conservation of flora and fauna.

The alarming rate of deforestation in the tropics in general and in Nigeria in particular must be checked in order to avoid potentially disastrous consequences for society. Although deforestation can be ultimately harmful to man, he is also the most important agent of forest disturbance and destruction (UNESCO, 1978).

Deforestation is primarily a result of socio-economic factors. It is important to understand these factors and their operative forces in society as a basis for sound policies to reverse the trend. Socio-economic factors contributing to deforestation such as overgrazing timber utilization, farming, fuel wood for rural energy, urbanization will focus my attention in this project.

It is desirable to note the above global review and relate it to what

1.1 STATEMENT OF PROBLEM

Deforestation in Mokwa Local Government Area of Niger State has been on the increase since about 1978 (Jaagi, 2001). If the trend is not checked, it will lead to ecological disaster including soil degradation, gully erosion and desertification.

The Local Government Area has six sawmills and twenty timber contractors, illegal exploiters are also rampant.

Before 1983 exploitation was minimum because the forestry Department were allocated to social sector but after to economic sector. Where the department was asked to generate revenue, this lead to over exploitation. Hence deforestation become a problem which the state Government closed its eyes to while reaforestation was not a priority. This led to establishment of more sawmills and a myriad of Timber contractors.

Mokwa Local Government is host to about five (5) major agricultural projects which is one of the factors of deforestation, these projects include (1) National grains (maize, Soya beans, Rice and cowpeas), (2) Sunflag Rice (3) Guineas farm (Maize Soya beans, Rice and Cowpeas (4) Cattle Ranch (Maize, Soya beams, Rice, Maize.

A third component factor of deforestation is "Tungya farming" in the forest reserves. The practice was in formed by lack of fertile land and to allow farmers to plant in the fertile forest for two years where the Government plant up the area. In recent years Government has no fund to plant up the reserve, hence degradation of the land became eminent.

Rural energy need and shifting cultivation. Its an every day affair that man must eat hence wood use in every house hold become eminent. The Area also witness shifting cultivation where the farm is cleared, slashed and burnt for farming. These and other factors could be disastrous if not checked.

1.2 AIMS

The aims of choosing the topic of this study is to identify the level and extent of damage deforestation is causing the Local Government after which solution will be proffered to reduce the act.

1.3 OBJECTIVES

The main objective of the study of this project is to:

(i) Appraise the problem of deforestation in Mokwa Local Government Area in terms of possible climate change, soil degradation, changes in water shade areas, underground water, extinction of ecosystem ie.thora and fauna, siltation and flood of our Rivers and streams.

(ii) Assess or quantify the percentage of deforestation since 1980s. These are to be measured by the big time farmers and small scale farmers, rural energy drive, logging and timber exploitation and socio cultural.

(iii) Adduce (or document) major factors of deforestation in the study area that is Mokwa Local Government.

(iv) Attempt solution strategies i.e legislation, re-afforestation improvement of farming system enlightenment campaign and education and improvement of water shade all aimed at ameliorating land degradation and improvement of carbondioxide emission.

1.4 JUSTIFICATION

Mokwa Local Government Area was formarlly a dense derived savannah with thick friging forest along the Rivers Niger. Kaduna and streams fo Ikko, Zhibi, Yanko and Dumi to mention a few.

However, factors leading to deforestation of the area became eminent, among these factors include Big Agricultural projects like Guineas, BCC's farm,

Sunflag, Niger State Agricultural Development Projects, National grains and Cattle Ranch were sited up. Also importantly population of small scale farmers increased two fold. Their practice of farming of slash and burning adds to the impoverishment of the land. Rural energy drive of using wood for domestic use such as cooking, use of charcoal for hoes, matchetes, langa langas etc contributes immensely to deforestation.

1.5 SCOPE OF STUDY

This study will be limited to Mokwa Local Government Area with special reference to major Agricultural projects i.e Guineas farm, causes of deforestation and it consequences in the farm, Timber exploitation, method of farming in the area socio cultural and bush burning are causes of deforestation, will be looked into. The study will not be complete without looking into wood as a source of Rural Energy drive. This will be studies and possible solution proffered.

The solution to some of these factors that lead to deforestation, results and impacts will be suggested and possible ways of ameliorating their occurrence.

The study provided for this project is short hence time and logistics is a limits factor, however effort will be geared to factors derived from experience.

1.6 METHODOLOGY

The project will be carried out through pictorial view, Data Collection, Oral Interviews, Filed work and References to research papers.

ORAL INTERVIEW - Interviews will be conducted in the farms to ascertain the system of farming being adopted either stash and burning fallowing

etc and why the system interview will also be conducted in the Sawmills to ascertain how many trees entered the sawmill a day.

DATE COLLECTION - Collection of data will be done from offices, that has direct bearing to factors leading to deforestation.

FIELD WORK_- Efforts will be geared to filed work, sketchy maps will be provided and measurement carried out showing the extent of deforestation and damages.

PHOTOGRAPHS - Photographs will be conducted where necessary during field work.

CHAPTER TWO

2.0 STUDY AREA PYSIOGRAPHIC FEATURES

2.1 LOCATION – LAND FORM

The land bordering on the River Niger is flat and marshy, and it marked by a series of lakes and flood chancels, especially towards the west. Around Bida to the West, there are flat, topped hills (mesas) capped by thick layers of ironstone (Adeleye 1976). An important features of the landscape is the existence of large areas of fadama where the rivers flows off the basement complex and on to the Nupe sandstone.

The Kaduna and Niger River flood plains are many kilometers wide at the down stream of the Nupe basement boundary; two major streams Yanko Ikko, Dumi, Ebigi. All these empty their waters into Niger River.

Mokwa Local Government is situated at latitude $8^0\ 30^1 - 9^0\ 28^1$ N and longitude $4^0\ 40^1 - 6^0\ 25^1$ East, Datum of Mokwa is 150ft above sea level.

2.2 CLIMATE

Meteorological research confirm that the climate of Niger State is well suited for tree growth.

The temperature rarely falls blow 20^0. The wet season temperature averages about 28^0 C.

The peaks are 38^0C in February to March, and 35^0C in November to December Mokwa Local Government rainfall is between 1,000 – 1250mm per annum. Relative humidity are satisfactory between 33 – 83 percent. Very high temperature with low humidity and drying winds can be disastrous for young

plants and are likely to cause severe stress at all ages rise to deforestation, erosion desertification.

2.3 VEGETATION

The dominant vegetation type in Niger State is referred to in the new vegetation map of Nigeria (Charter 1970) as the mixed leguminous wooded savannah. This embraces the two types that were in the recent past labeled as Northern Guinea and Southern Guinea Savannah (Keay 1953). The specific composition varies considerably and is governed by the soil and topography and the history of cultivation. Mostly found trees include.

Butyrospermum parkii

Lophira alata

Deterium Senegalensis

Isoberlina doka

Burkea africana

Terminalia Gaucosceaces

Afzelia africa'na

Pterocarpus erinaceous

Secufidaca longipenduculata

However along fringing forest in the Local Government, species like Khaya Senegadlensis, chlorophora ecelsa, Irvengia gabonnesi mansonia africana can be found.

SOIL - Most of the Mokwa soil lies on cretaceous sedimentary sandstones in which a series of fine grained substance and siltstones overlies a series of

coarse – grained sandstones. The drainage ranges from good to excessive. The soil are developed from the Nupe sandstone which is mostly dark red or reddish brown. Well drained and very deep. Tall termite mounds are conspicuous on very well drained soils. The soils were classified as:-

Very Deep Well-drained loamy sand. SKOUP & CO LTD on Forest Resources survey and management proposals for Niger State June 1979.

2.4 SOCIAL CULTURAL ASPECTS

2.4.0 Mokwa Local Government Area was created in 1991 out of former Lavun Local Government Area. It has its Headquarters at Mokwa.

2.4.1 The Local Government Area forms boundary with Kwara State, New Bussa, Lavun, Gbako, Katcha, Mashegu Local Government Areas.

2.4.2 **OCCUPATION** - The people of the Area are mainly peasant farmers, hunters and fishermen and few traders.

2.4.3 **LAND USE** - Before 1978 land use Act by the Federal Department, the land being controlled by individuals and family. Each village area forms a boundary with another village where a demarcation is made in form of a hole filled up with perm kernel nuts and a high ridge built on the hole. No trespass is allowed as it can be violent without permission. None natives are tolerated for farmlands but must pay a token fees due in form of a farm produce.

2.4.4 **FESTIVALS** - May festivals are celebrated by the people of the area e.g yam festival of muwo, hunting festivals in Jaagi, Tuntinktiko, Labozhi Fishing festivals at Ketso which brings heavy rain that will enable fishermen to have more catches.

2.4.5 **CULTURAL** - Before the advent of Islam, Trees like Chlorophora excelsa, Adansonia digitata, Kyaya senegalensis Ceiba pentandra are seriously protected and are not to be felled as their felling will drive merciful cujanus and God of rain and water from villages. Also iron like head pan matchetes, arrows, bucket are not to be taken to streams as doing this will drive away the aquatic animals away from the river and taking iron to the stream, snakes will erupt and drive you away.

CHAPTER THREE

LITERATURE REVIEW

Deforestation at its widest measuring does not only stop at tree felling but include the removal of the top soil and general degradation.

Accordingly to population Reports (Series M, Number 15) (Special Topics) The world's forest cover is shrinking. Over the past 50 years nearly half of the world's original forest cover has been lost – some 3 billion hectares. Each year another 16 million hectares of virgin forest are cut, bulldozed, or bumed (25,76).

Indiscriminate land clearing and burning and the higher energy load of rains in the Nigeria Savannas aggravate the hydrolical problems in these areas (Kowal, 1973). The rainfall intensity usually features prominently in equations used to predict rate of erosion. A large preparation of the sediment produced in some rivers reflect the impact of deforestation and so called medium – high intensity 2 year 30-minute rainfall (Chow, 1964).

Results obtained from hydrological investigation in tropical Asia have emphasized the importance of forest cover in proper management of soil and water resources (Kenworth, 1969). The protective effect of forest cover on water yield and erosion was demonstrated by an accidental fire in the snow mountains of New South Wales in Australia (Brown, 1972). The flow pattern changed abruptly after the fire. The water yield and sediment load increased significantly in the first four years after fire.

As a result of deforestation, the open nature of the vegetation renders the soil vulnerable to direct impact of rain drop. These easily dislodge the naturally

loose soil particles, and start a wash off as the rainfall is heavy. Ezenwa and Momodu (1980) observed that the erodibility of the soils of forest reserves in Nigeria Savannah was not attributable only to the nature of the soils, slope and parent material but also to the nature of the vegetation cover.

There are several agents of deforestation in Nigeria. Clearly the most important is man. In Nigeria the clearing of land for farming accounts for over 80% of the total forest area deforested annually. The vast majority of the country's more than 20 million farmers practice shifting cultivation or rotational agricultural (Enabor 1982) whereby each farmer cultivates a plot of land for two to three years after the soil fertility is depleted and he moves to another plot to allow the previous plot to fallow and recuperate.

Population growth is another important factor of deforestation in Nigeria. The estimated annual population growth rate in Nigeria is 3%. This is a relatively high rate of growth and could put the country's population at over 100 million in 1983 (FOS, 1984). In the number of farmers requiring farmlands puts corresponding increased pressure on forest lands. The concept of the landless peasant is alien to Nigerian community is entitled to a piece of land from his community to meet his production needs (Oluwasami, 1966).

It is very well known by now, the important role of which vegetation plays in maintenance of purity and constant composition of the air in the atmosphere. All green plants absorb Co^2 during the day and give our oxygen (O^2) which is essential for human existence. Okali (1978) draw attention to the possible level of increase in atmospheric carbon dioxide (Co_2) if all tropical forests in the World is replaced by grass of equivalent.

The value of shade provided by tress to both human and livestock, especially in the hot, arid climate of northern Nigeria was stressed by Adeyoju (1974).

A global food fund publication described deforestation (the total clearing of natural tree stands) as the biggest problem forest systems have to cope with. A large part of this activity goes on in the tropics and sub-tropics mainly. The forest area of many developed countries has stabilized and in some cases has increased during this century. The situation in the developing countries indicates that forest areas have continued to decline. Over 11 million hectarages of tropical forest are cleared yearly and it is estimated that at present rate of use at least 225 million hectages of tropical forests will be cleared by year 2000(World Institute, 1985). In Africa alone, over 2.3 million hectares of closed forests are cleared in three main regions of the continent (Table1).

CLEARING OF CLOSED FOREST BY MAJOR FORESTED REGION 1985

(WORLD WATCH, 1985)

REGION	AREA OF CLOSED FOREST	ANNUAL CLEARING	CHANGE
Coastal West Africa	(Thousand hectares) 13,752	703	5.1
Zaire Basin	171,540	351	0.2
East Africa	12,957	105	0.8
TOTAL	198,249	1,159	0.6

The World Wild life fund estimated that in Nigeria, over 300,00ha / annum of its forest is cleared yearly. Compared with its land area put at about 92.4 million hectares (924,000 sq.km) the rate of change is about 0.35% but statistics of

actual existing high forest, Savannah woodland and mangrove show that the rate of change in Nigeria is about 9.9% (WWF, 1982). This is alarming and therefore calls for urgent solutions.

Deforestation comes as a direct consequence of the following shifting cultivation, logging, grazing, fuel wood use, fire and urbanization. Of these factors shifting cultivation is by far the most important cause and it accounts for about 70% of the total deforestation in the African region (Global Forest Fund, 1982).

The effects of deforestation on atmospheric condition on a global scale is still a matter of speculation. Richards (1977) discusses the possible increase of atmospheric Co^2 content by up to 10% and a consequent increase in global temperatures through the green-house effect as a likely result of removal of all tropical rain forest.

In Nigeria, the adverse effect of deforestation is already measurable in the form of increase in light intensity, soil and air temperatures decrease in soil moisture and atmospheric relative humidity (Ujah 1982). Destruction of habitants of many animals and plants has become wide spread thereby endangering the existence of such species.

Deforestation again increase during the oil boom years of the 1970 and as a result of various large-scale agricultural schemes such as operation feed the National (1977 – 1979). The Green Revolution (1980 – 1983); DFFRI (1986 – 1993), and NALDA (1989 to date. Roby (1991) calculated the rates of deforestation for reserved and unreserved forests in different vegetation zones, between 1976 and 1970 (Table 2.10) and arrived at a total deforestation rate of

400,000 ha. per annum for the country as a whole. Again FAO (1992) using logistic function linking deforestation to land area, forest area and population density, and estimated population densities for 1980, 1985 and 1990 forecast deforestation rates for the periods 1981 – 1985 and 1986 – 1990 as 3.48 and 3.57 percent respectively, FAO (1992) concluded that if these rates are maintained, the remaining forest area of Nigeria would disappear within the next three decades, i.e by the year 2020.

CHAPTER FOUR

4.0 RESULTS AND ANALYSIS

" Paul R. EHRLICH copy right 1970, 72,77 advanced that Loss of plant cover and top soil reduces the capacity of an area to retain water, diminishes the supply of fresh water, causes silting behind dams, and has other serious consequences for human beings. The flooding along many of the worlds rivers, from the Gauges in India to the Eel in California has been greatly aggravated by heavy deforestation in their water sheds"

From the results obtained and taking into cognizance of the above findings the above rivers have being silted as a results of deforestation resulting from many factors.

4.1 FARMING ALONG RIVERS

Most of the people leaving along the Rivers Niger and Kaduna Banks are fishermen from the time immemorial, but with the construction of the hydro-electric dams in Kainji and Jebba the level of water has greatly reduced hence fishing as a means of lively hood reduces drastically. This gave rise to people living in the area in resorting to an alternative way of lively hood. However the only alternative way is farming.

Indeed to be a successful farmer, the forest must be cleared to give way to food crops. The people therefore resort to clearing of the forest and consequently tillage of the farm, thereby removing the ecosystem, reduction in soil nutrients and moisture, direct heat from the sun on the ground, increase evapo-transpiration, increase in run-off and deposition of the sediments along the

rivers. These are noticed at Lugwa near Muregi, Tama near Nku. There the depth and width of the two rivers has reduced greatly.

At Ketso along River Niger the course of the river has been directed by the erosion to an extent that the government is considering resettling them.

Flood along the two rivers has now become an every year affair contrary to every five years given by the authority of the two dams. In fact the ZHITSU of POTO (1994) said he was born in 1902 and has never witnessed the flood like that of 1994. He asserted that the flood has never reached the stump of Ceiba at the outskirt of his village but with the felling of the tree, they have seen the flood at the village. This however confirms again with the believe attached to the felling of the tree: (Ceiba Petandra).

4.1.1 LOGGING ALONG RIVERS AND STREAMS

Since the volume of the two Rivers have greatly reduced, this makes it possible for the logging of the wood from the valley. This again lead to reduction of the organic materials and leaving the soil bare, increase in runoff which leads to more deposition of sediments in the rivers.

PLATE 1 - Zhibi River being silted at Labozhi as a result of logging, farming and grazing

4.1.2 GBELE – YANKO, ZHIBI AND EKKO PATA STREAMS

From the results obtained most of the streams in the local government area are perennials that exist all the year round. Today some of them have become seasonal e.g. Kpakiko and Gbete Rivers.

Factors leading to their drying include farming and logging.

Before 1970, rice, as a crop is farmed along the two major Rivers Kaduna and Niger but now in all the streams you can find in Mokwa local government area. His gave rise to the clearing of the forest for rice farming and dry season farming by both indigenes and non-indigenes. The saw millers are even invited to come and fell some trees that are believed to be good of rain.

As can be seen in the photograph Zhibi stream at Labozhi was formerly a big stream but with the farming and logging exercise along it, is being silted up. This also applies to Eko and Yanko streams. Dumi River in Mokwa town used to be a very big River and consists of big animals such as Crocodiles but with the clearing of the forest along its bank in an attempt to construct a dam in 1992, part of it dries up and the Crocodiles disappeared (Ndace Legbo) declared.

4.1.3 SHIFTING CULTIVATION

From the Data obtained majority of people of Mokwa Local Government Area are farmers and all used to the traditional farming method of shifting cultivation.

The method involves the total clearing of the bush including trees and grasses except Butyrospermum, paradoxum, and Parkia Clappertomana because of their economic nature.

When the land involved in cultivation is completely degraded, and sign of soil nutrients are gone, erosion began to show, the land is abandoned and consequently the farmer moved to another place.

The practice reduces soil moisture, increases rainfall run-off, rendered land vulnerable to wildfire. You can see the photograph of the shifting cultivation farm and fallow land attached.

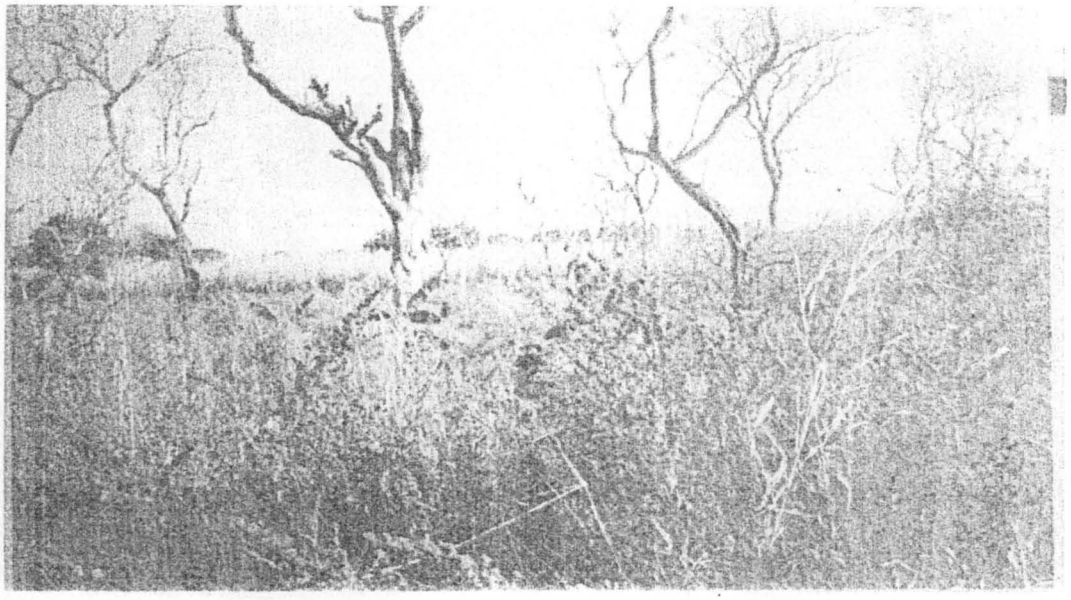

PLATE 2 - A typical deforestation act example of shifting cultivation

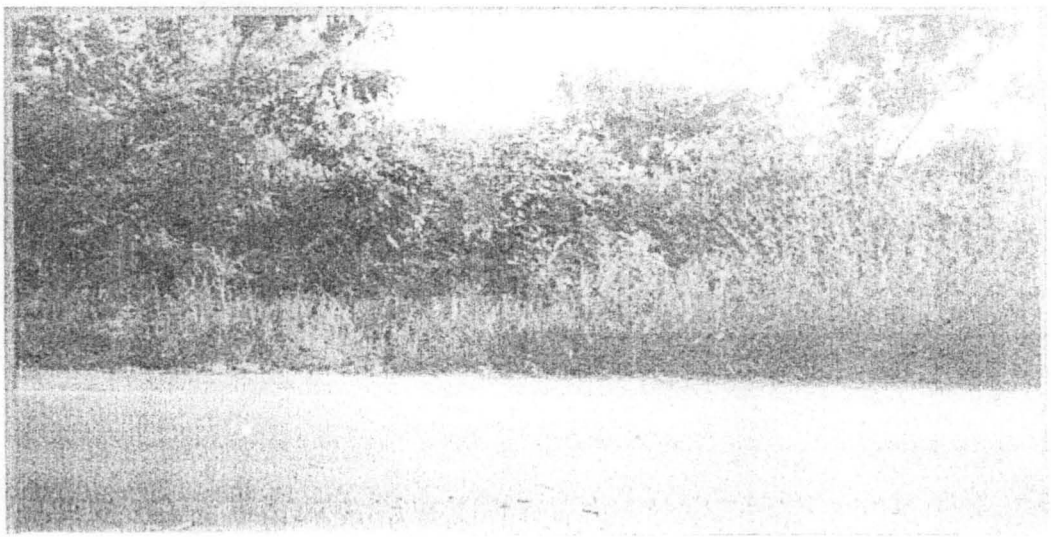

PLATE 3 - A typical bush fallow

PLATE 4 - Gully erosion along Takpagi Yiba Road. The bridge eroded away – Excessive deforestation long Guineas farm.

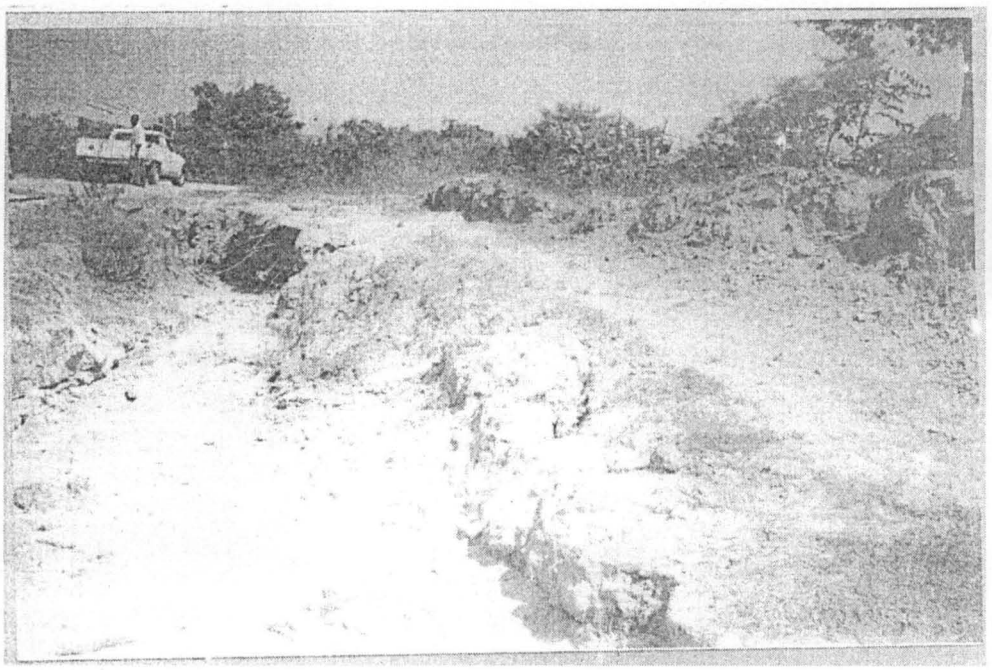

PLATE 5 - Erosion and collection of sand along Tekpagi – Yiba Road and consequently siltation of River Tekpa

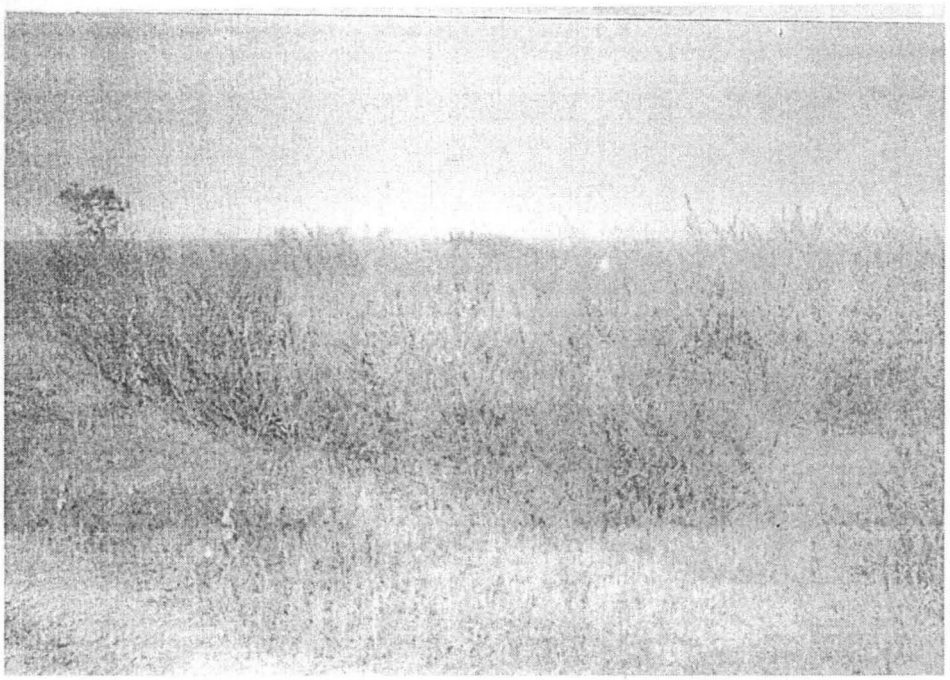

PLATE 6 - Northcort/National grains New grasses introduced

As a result of intensive farming at the Guineas farm along Bida - mokwa Road, gully erosion emanating from the farm at Tekpagi Road to Yiba 2 kilometers inside. The erosion during the rain season destroys the bridge and cut off the road, which affects the socio-economic-activities of the area. The photograph plate 4 and 5 below shows the extent of the siltation of Tekpa stream. The land completely lost its fertility and new species of grasses and trees took over.

4.1.5 RURAL ENERGY NEEDS THROUGH FUEL WOOD

The fuel wood contribute to about sixty percent 60% of deforestation in Mokwa local government area as every day wood must be used in each household for cooking purposes and smoking of fish.

Ceremonies like marriages is not left out in deforestation as after the occasion girls numbering 5 – 10 will fetch wood for the Bridegroom for complete

3 month non-stop to enable woman after delivery cook food and boil water, as well to keep the room warm all the time.

Charcoal are also fetched from the forest intermittently to enable black smiths construct hoes, langa-langas machetes and knifes. Charcoal is also used for smoking fish, meat and pressing cloth where there is no electricity. Bakeries use wood for their end product, which is bread. There are eleven baking house in Mokwa town alone.

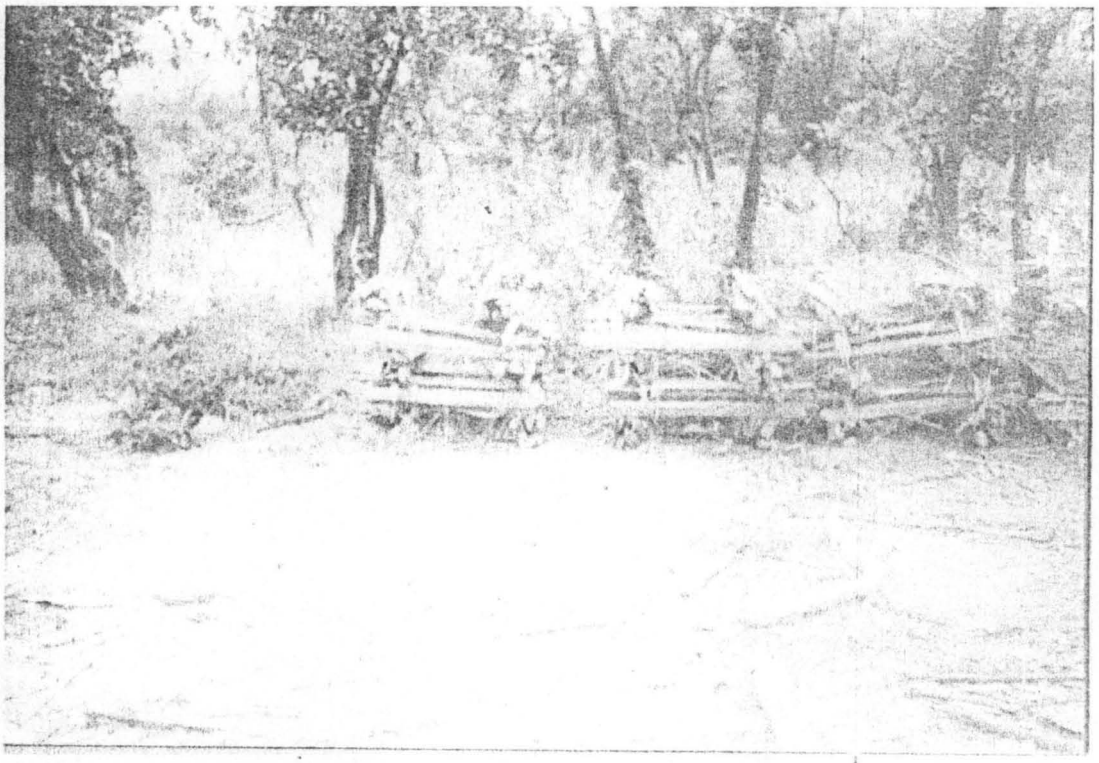

PLATE 7 - A fuel wood Depot for rural energy

4.1.6 GRAZING

Over grazing is one of the most important factor of deforestation in the area and poses a great danger for the water shade of the area. Mokwa local government serves as buffer zone between North West and South West. Because of the riverine nature of the area, cattle rearers are present throughout the year.

Also contributing to their presence is the cattle market at Kara near Jebba. Apart from compacting the soil, species composition are usually changed, trees are browsed to death and the remaining ones cut down by cow Fulanis for their domestic needs. As a result of overgrazing Rabba irrigation project is nearing silting up and collapse.

4.1.7 EXPLOITATION AND LOGGING

Exploitation and logging contribute in no small measure to deforestation in Mokwa local government area, which if not checked, can result into micro climatic distortions. The table below shows the number of Saw mills and Timber contractors as well as the amount of wood cut down known to the Authority of Niger State Forest Department.

TABLE 1

S/NO.	NAME OF THE SAWMILL	YEAR OF ESTABLISHMENT	NO. OF TIMBR CONTRACTORS ATTACHED TO THE SAWMILL
1.	ALHAJI A.K. BELLO NIG. LTD.	1983	4
2.	ALHAJI SULE OGBOKOLO NIG. LTD.	1994	4
3.	YIP NIG. LTD.	1999	3
4.	EMMOLA NIG. LTD.	2000	3
5.	ABAYOMI NIG. LTD.	1998	4
6.	NONO NIG. LTD.	1998	2

YEARLY – MONTHLY RECORD OF STUMPAGE PERMITS ISSUED FROM ZONAL FOREST OFFICE MOKWA

1998 **TABLE 2**

MONTH	NUMBER OF TREES STUMPS		TREE TYPES
2nd January	2 permits	12 stumps	Daniellia Oliveri
4th February	4 permits	15 stumps	Isoberlina Doka
5th March	5 permits	20 stumps	Daniellia Ohveri
2nd April	2 permits	12 stumps	Daniellia Ogea
3rd May	3 permits	16 stumps	Daniellia Oliveri
June	----	----	----
July	----	----	----
August	----	----	----
September	----	----	----
October	3 permits	12 stumps	Daniellia Oliveri
November	4 permits	15 stumps	Daniellia Oliveri
December	5 permits	16 stumps	Daniellia Oliveri
TOTAL	118		Daniellia Oliveri

1999 **TABLE 3**

MONTH	NUMBER OF TREES STUMPS		TREE TYPES
January	15 stumps		Daniellia Oliveri
February	3 permit	17 stumps	Daniellia Oliveri
March	2 permits	12 stumps	Daniellia Oliveri
April	3 permits	13 stumps	Daniellia Oliveri
May	1 permits	13 stumps	Daniellia Oliveri
June	3 permits	17 stumps	Daniellia Oliveri
July	----	----	----
August	----	----	----
September	----	----	----
October	3 permits	20 stumps	Daniellia Oliveri
November	6 permits	26 stumps	Daniellia Oliveri
December	5 permits	19 stumps	Daniellia Oliveri
TOTAL	148	stumps	Daniellia Oliveri

2000 TABLE 4

MONTH	NUMBER OF TREES STUMPS		TREE TYPES
January	5 permits	20 stumps	Daniellia Oliveri
February	6 permit	30 stumps	Daniellia Oliveri
March	6 permits	31 stumps	Daniellia Oliveri
April	4 permits	28 stumps	Daniellia Oliveri
May	4 permits	21 stumps	Daniellia Oliveri
June	1 permits	12 stumps	Daniellia Oliveri
July	5 permits	10 stumps	Albizia Zygia
August	10 permits	18tumps	Pterocarpus Erinacious
September	----	----	----
October	10ermits	3 stumps	Alias guineansis
November	6 permits	3 stumps	Daniellia Oliveri
December	4permits	30 stumps	Daniellia Oliveri
TOTAL	266	stumps	Daniellia Oliveri

2001 TABLE 5

MONTH	NUMBER OF TREES STUMPS		TREE TYPES
January	1 permits	10 stumps	Daniellia Oliveri
February	STOPPA GE		
March	7 permits	35 stumps	Daniellia Oliveri
April	4 permits	30 stumps	Daniellia Oliveri
May	5 permits	32 stumps	Afzelia africana Daniellia Oliveri
June	4 permits	22 stumps	Afzelia africana
July	1 permits	4 stumps	Ceiba petandra
August	----	----	----
September	----	----	----
October	2 permits	12 stumps	Daniellia Oliveri
November	5 permits	30 stumps	Daniellia Oliveri
December	4permits	40 stumps	Daniellia Oliveri
	TOTAL NO. OF PERMITS 33 permits		**TOTAL NO. OF TREES 215**

Before 1983, exploitation was minimum because forestry department was in the social sector. During this time, funds and other logistics for effective management were provided. These enhance maintenance of forest reserves and establishment of new plantations, Reafforestation water shade plantations, development, Roadside plantings and community based woodlots.

However when the Dept was moved to Economic sector revenue generation started. The target of revenue to be collection must be made. This lead to over exploitation of and burden on our forest both gazetted and un-gazetted forests and no effort is made to replace them. Deforestation therefore became a problem both in the constituted, gazetted forest reserves and forest at large. While reafforestation was not a priority. As a result of this trend of revenue generation, more sawmills were considered for establishment by the private individuals and myriad of Timber contractors. The above tables 1- 5 are licensed Sawmills, Timber contractors and the wood obtained through permits.

However, there are dozens of illegal exploiters floating in the forest who do more damages, apart from revenue being lost by the government. They equally split wood in the forest where the sawdust and tree branches form hazards which aid wildfire, which eventually kills the undergrowth, destruction of organic materials and animals. Though not within the scope of this study for the time limit the rate of deforestation through logging would adversely affect the climate of the area. As indicated in (climate change information sheet 12) "Forests are reservoir of Carbon, containing some 80% of all the carbon stored in land vegetation, and about 40% f the carbon residing in soils, large quantities of carbon may be emitted into the atmosphere during transitions from one forest type to another

because mortality releases carbon faster than growth absorbs it. Forests also directly affect climate on the local, regional and continental scales by influencing ground temperature, evapo-transpiration, surface roughness, albedo (or reflectivity). Cloud formation and precipitation. An effect of logging is biting hard along the streams of Gbeke, Zhibi, Yako as both surface water are now drying up. Formally these streams are all year round (perennials). After the drying of the stream at Kpakiko they restored to digging wells but the wells became so deep not knowing the level of the ground water is deep. Also as a result of reduction of vegetation direct suns rays heat the ground hence high reflectivity and change in temperature, erosion and increase in flood.

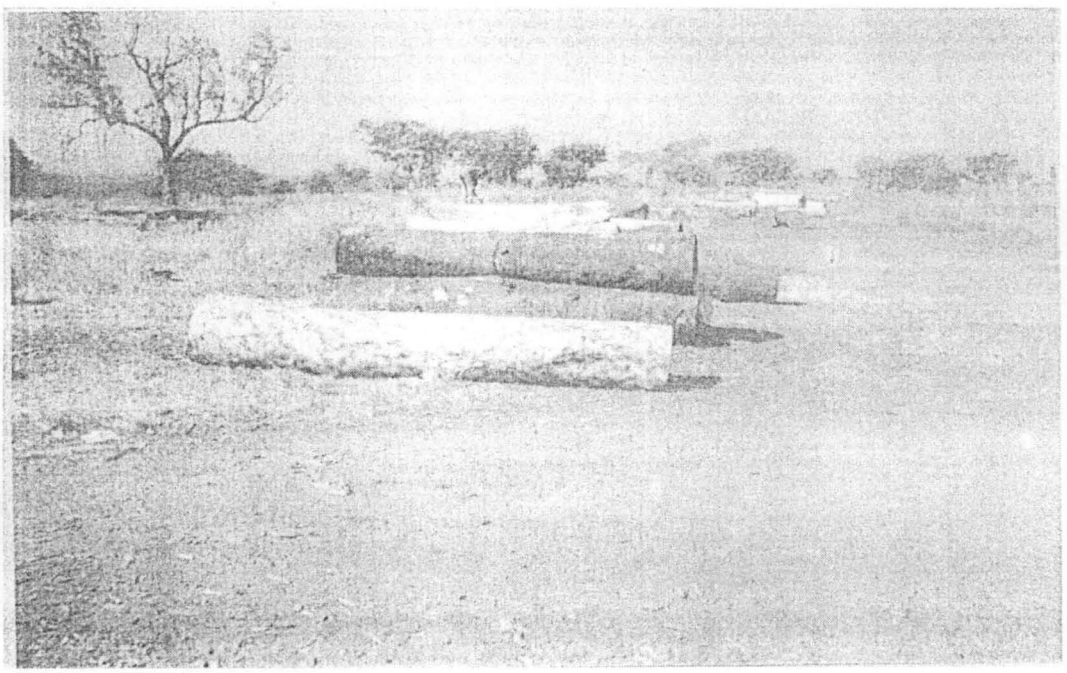

PLATE 8 - Logs brought in to sawmill

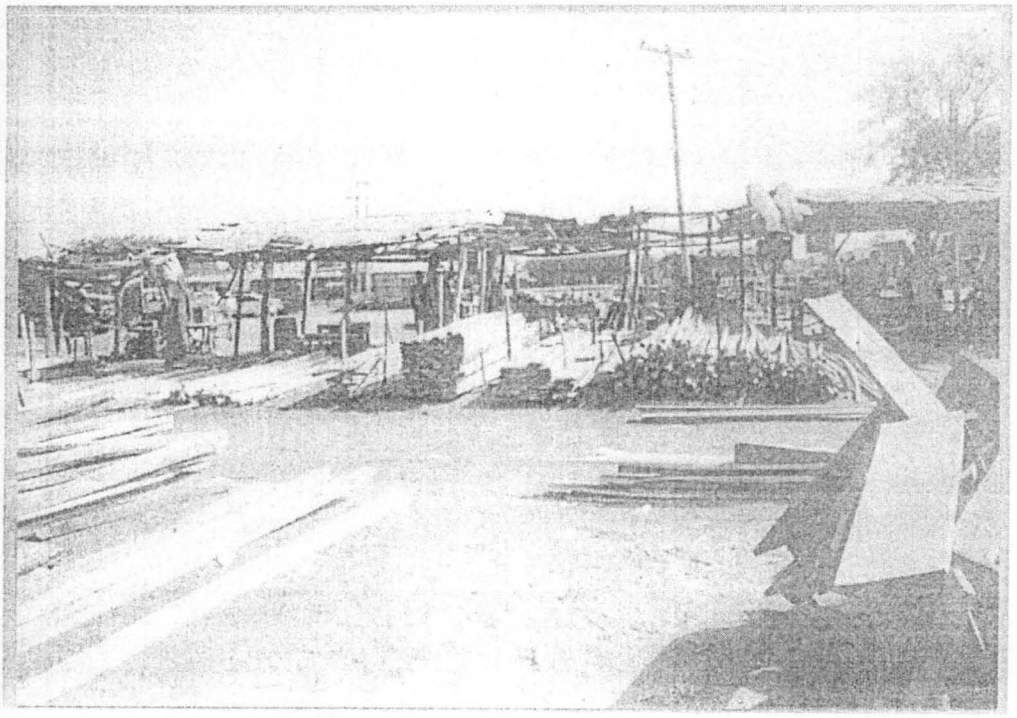

PLATE 9 - A saw mill at Mokwa

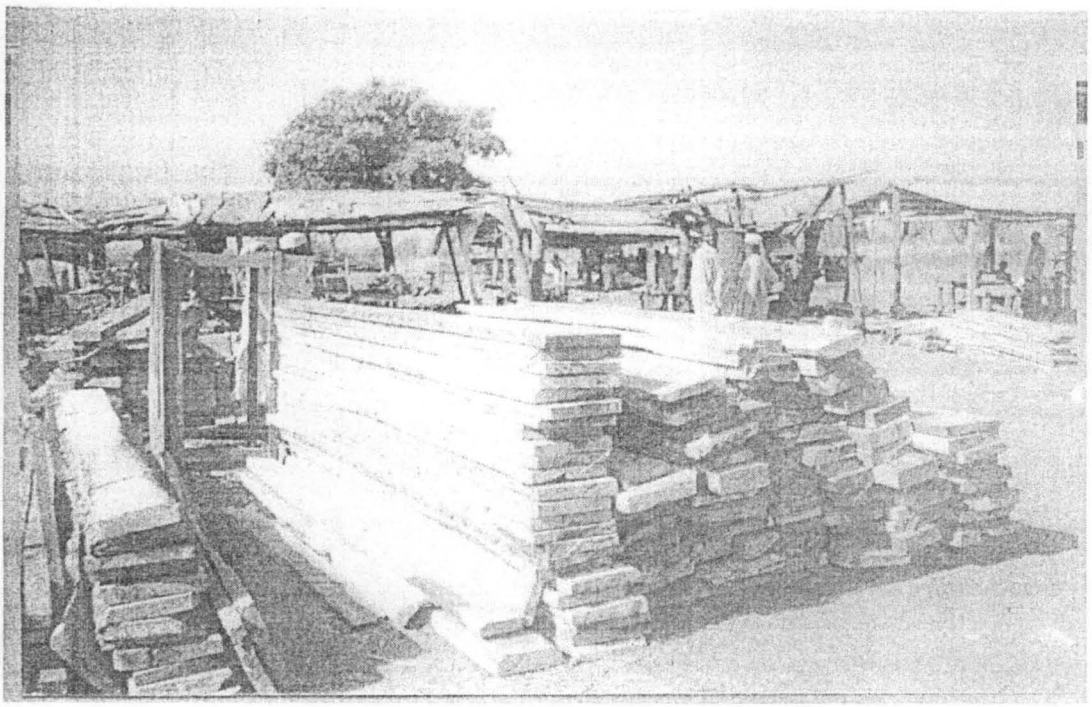

PLATE 10 - Arrested illegal power sawn splitted wood at Mokwa

4.1.8 WILDFIRE AND BUSH BURNING

From the information obtained from the farmers, its every year affair. As after harvesting, they burnt down their farms to prevent cattle rearers from grazing their farms for fear of compaction and introducing different grasses into their farm and also in avoidance of the rearers eating up their finished product. In settling their farms finished into five little effort is made in putting it off, which escapes into near by farms or even villages destroying valuable goods and properties which later on causes economic hardships to the community.

Fulanis are also known to set fire into the bush to pave way for their animals and also to stimulate sprouting of fresh grasses for their feeds.

Wildfire and uncontrolled bush burning give rise to the following environmental consequences.

a) Loss of lives, properties and settlements particularly the rural areas.

b) Loss of Biodiversity (flora and fauna) and the ecosystem; their value to our lives medicine, food, protein source, etc.

c) Reduces soil fertility for agricultural output as it burns the soil litters humus layers and microbes.

d) Leads to soil erosion and desertification; leave soil bare and exposed to agents of erosion.

e) Aggravates global warming through the emission of Carbon Dioxide and "green house effects" phenomenon.

f) Loss in the rate of evapo-transpiration.

4.1.9 RAINFALL AS ANOTHER FACTOR OF DEFORESTATION IN MOKWA

Rainfall pattern in the Local Government Area has drastically changed since 1988 – 2001, compared to 1999. Though the yearly rainfall is within the same range, the spread and distribution is quite different in 1979, there was a rain throughout the year while in 1998 it was only 8 months, 1999, seven 7 months 2000, 8 month, 2001, 8 months. Below are monthly rainfall of 1979, 1998, 1999, 2000 and 2001.

1979 MONTHLY RAINFALL RECORDS FOR MOKWA

MONTH	MOKWA (MM)
January	1.0
February	7.0
March	22.0
April	68.0
May	113.0
June	187.0
July	170.0
August	169.0
September	233.0
October	91.0
November	7.0
December	1.0
TOTAL	**1069**

Sources: Minna & Mokwa records from "A management plan for Dagida Game Reserve"

CLIMATE DATA FOR FOUR STATIONS

MOKWA

$9^0$18'N,	$5^0$04'E
Altitude (m)	152
Rainy Days	180
Mean Annual Rainfall mm	1, 069
Mean Maximum Temperature ^{0}C	33.5
Mean Minimum Temperature ^{0}C	20.6
Crowing Season	210 – 230

ANNUAL RAINFALL 1999(mm)

MONTH	MONTHLY TOTAL	MONTHLY MEAN
JANUARY	-	-
FEBRUARY	-	-
MARCH	-	-
APRIL	38.5	1.28
MAY	139.1	4.63
JUNE	84.3	2.81
JULY	150.9	5.03
AUGUST	248.3	8.28
SEPTEMBER	473.8	15.8
OCTOBER	182	6.1
NOVEMBER	-	-
DECEMBER	-	-
	13169	**43.93**

Sources: College of Agriculture Mokwa

ANNUAL RAINFALL 1998(mm)

MONTH	MONTHLY TOTAL	MONTHLY MEAN
JANUARY	-	-
FEBRUARY	21	0.7
MARCH	-	0
APRIL	26.6	0.9
MAY	128.1	4.27
JUNE	376.6	12.53
JULY	154.5	5.15
AUGUST	121.0	4.0
SEPTEMBER	224.8	7.49
OCTOBER	153.3	5.11
NOVEMBER	-	-
DECEMBER	-	-
TOTAL AMOUNT	**1205.9**	**40.15**

Source: College of Agriculture, Mokwa

ANNUAL RAINFALL 2000(mm)

MONTH	MONTHLY TOTAL	MONTHLY MEAN
JANUARY	-	-
FEBRUARY	-	-
MARCH	1.5	0.05
APRIL	58.5	1.95
MAY	90.9	3.03
JUNE	224.8	7.5
JULY	230	7.7
AUGUST	196	6.53
SEPTEMBER	237.6	8.0
OCTOBER	102	3.4
NOVEMBER	-	-
DECEMBER	-	-
TOTAL AMOUNT	**1141.3**	**30.66**

Source: College of Agriculture, Mokwa

ANNUAL RAINFALL 2001(mm)

MONTH	MONTHLY TOTAL	MONTHLY MEAN
JANUARY	-	-
FEBRUARY	-	-
MARCH	0.9	0.03
APRIL	44.3	1.5
MAY	106	3.53
JUNE	198	6.6
JULY	320	10.7
AUGUST	170.5	5.7
SEPTEMBER	354.8	11.82
OCTOBER.	57	1.9
NOVEMBER	-	-
DECEMBER	-	-
TOTAL AMOUNT	**1251.5**	**41.78**

Source: College of Agriculture, Mokwa

As a result of the rainfall distribution many food crops withered off as a result of moisture reduction capable of sustaining them. (Adefolalu 2000) alerted the nation of impending agricultural drought so advised that food crops should not be planted very early. Downward Niger valley a variety of rice called Dzwangwa which last nine month did not put on good yield because of lack of enough moisture.

It is therefore imperative that for lack of good spread some varieties of Rice and guinea corn will become extinct in the near future, also for lack of sufficient water for drinking some animals will die or migrate to a conducive area where there is enough water. Also for lack of relative humidity grasses will dry up speedily, therefore aid outbreak of intense fire out break in the event of rain, as a result of bare ground, albedo, run off will be high, the resultant therefore will be erosion and flooding.

It is strongly believed that with the rise in mean temperature heavy down pour between the months of June and September and the resultant speedy run off carries sediments on to the rivers and streams causing heavy flooding.

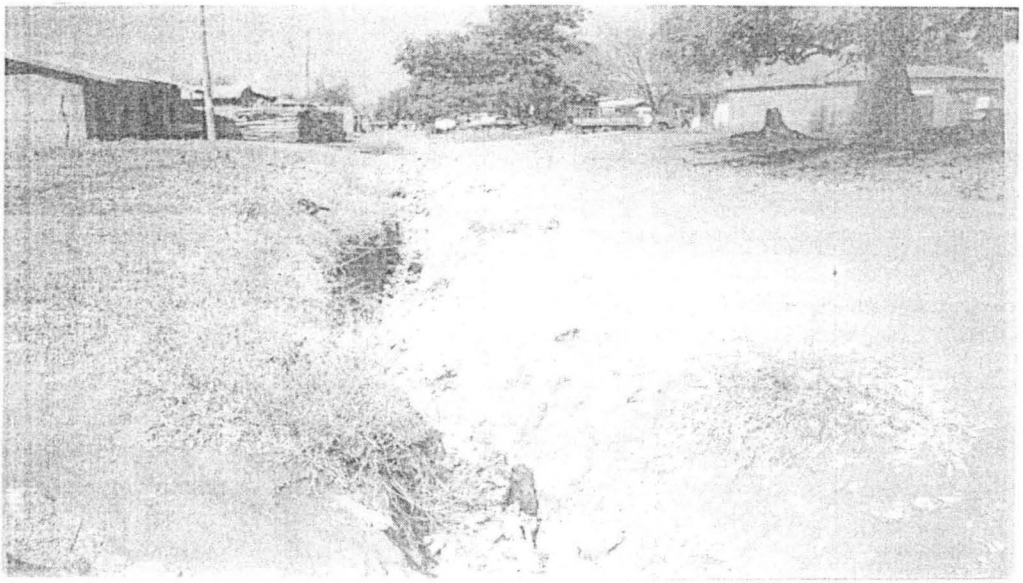

PLATE 11 – Erosion as result of intensified farming at Mokwa town

4.1.10 POPULATION PRESSURE

Population growth is another important factor of deforestation as postulated by (FOS 1984) Mokwa Local Government is not left out. Most of the fallow land at Mokwa gave way to Hausa farmers from Katsina, and Sokoto States and in Labozhi area forest who existing there are also giving way. Not only the neigbouring state, even indigenes of Niger State from Edati, Lavun, Gbako Local Government have left their place of origin to farm at Mokwa Local Government Area. Population growth has additional impact on deforestation as new settlements spring up to accommodate new families. Existing towns grow into major urban centers thereby swallowing up adjoining farmlands and pushing

back the forest boundaries to create new farmlands. Large areas of forestlands have been taken over by electrification of rural area causing erosion to roads.

5.0 MITIGATION

Deforestation is a world phenomenon which bothers every country of the world, hence there is an urgent need of finding a sustainable solution.

5.1 REACTIVATION OF NURSERIES

There is need of reactivation of Government nurseries so as to make substantial tree seedlings available and sold to the public at subsidized rate. Private nurseries to be encouraged.

5.2 IMPROVEMENT ON THE SYSTEM OF FARMING

E.g the tillage system and ploughing be done against the slope. Cultivation near the streams or rivers should be avoided at least within 50 meters radius. Total clearing of the trees for agricultural purposes be stopped to prevent land degradation.

5.3 PROTECTION OF OUR EXISTING FOREST BE PROPERLY PROTECTED

Timber exploiters issued with permit be followed by the forest guard and see that the stump be hammered before removing the log which was the practice during the colonial area as this will minimize illegal act.

5.4 Enlightenment campaign be taken to the door steps of each community stressing usefulness of trees in the provision of shade, maintaining the water shade balance, reduction of evaporation. Also stressing trees as a renewable

resource. The campaign should also be taken to colleges and encourage the formation of forest clubs.

5.5 WOOD LOT BE ESTABLISHED IN DEGRADED AREAS

This can be done by the community around the area. Woodlots can be established by farmers at the fallow land. Cashed are known to grow at any soil available and can reclaim degraded farms and for its economic nature. So its seedlings be made available to individuals and community.

5.6 Irrigated farms belts be established to reduce runoff and siltation of the dam. Also reduce evaporation.

5.7 Logistics vehicles be provided to track down the illegal exploits and make easy the transportation of trees.

5.8 Administrative bottlenecks be removed, unnecessary protocols be swept away.

5.9 Availability of fund must be provided.

5.10 Removal of forestry from economic sector to social sector.

5.11 Reforestation

Massive re-afforestation programme should be done in our deforested areas. Water shade areas be planted up. Also degraded land be reclaimed to their past glory.

5.12 Provision of an alternative energy source other than use of fuel wood. To reduce the level of deforestation. Gas and cookers be provided for the public at subsidized rate if not free distribution. Solar energy be research on and encouraged.

5.13 LEGISLATION - Legislation be made against splitting with power saw and indiscriminate bush burning. Proper punishment be given to serve as a deterrent to other offenders, e.g confiscation of the power saw and heavy fines.

CHAPTER FIVE

SUMMARY

Deforestation must be seen as a means of providing for man's legitimate needs for wood and wood products and expanding agriculture.

The age long tradition of shifting cultivation by small scale farmers and rural energy of fuel wood were the only factors identified to deforestation, until recently, when wood identified to be of good timber quality were being used for construction. Then myriad establishment of sawmills started, more havoc to our forest through illegal exploiters became rampant. With Nigerian's population growth rate conservatively estimated at about 2.5 percent per annum, the population about doubles every quarter century. The national requirement for wood and wood products has more than kept pace with this rate of population increase (Theeline 1971, Umeh 1980), as shown by estimated annual growth rate for demand for saw wood, plywood, paper products, poles and fuel wood being 8.9%, 17.0%, 11.5%, 13.6%, 1.8% and 1.2% respectively (Umeh, 1984). Rapp (1974) lists man's role in deforestation to include: Burning of vegetation, Overgrazing, Woodcutting and Cultivation of marginal lands and concludes that vegetation degradation is solely caused by man's action climate being only a supporting factor. The occurrence of dry periods has always existed but, in the past vegetation in equilibrium was able to recover whereas nowadays vegetation depleted by various misuses cannot do so because of man's and animal's pressure rain forests are falling not so much at the demand of the timber merchant, but far more to that of the village avid for more agricultural land

(Church 1968). FAO (1969) reported studies on shifting cultivation in West Africa in which it was estimated that each additional cultivator clears an average of 4 hectares of forests in the course of his working life, destroying in the process a volume of wood several times larger than the quantity which he and his dependants are likely to consume during their life time.

It is obvious from the foregoing that in Mokwa Local Government Area and indeed the nation, with the present high rate of population growth and with over 80 percent of the population in rural areas and up to 90% of total wood consumption is for fuel, deforestation is not likely to abate in the foresable future consequently environmental problems associated with it are likely to persist until better forest protection and utilization policies are evolved and vigorously implemented.

The known consequences of deforestation are numerous, these include:

a. Soil erosion and land degradation.

b. Flooding

c. Siltation by deposition of sediments along rivers and streams until perennial water sources become seasonal or eventually disappear

d. Increament of runoff which results erosion and flooding.

e. Atmospheric increase of Co_2 content by up to 10% and a consequent increase in global temperatures through greenhouse effect as a likely result of removal of all tropical rain forest Richards (1977) discusses.

f. Reduction soil moisture, precipitation relative humidity and consequently albedo.

g. Reduction in soil fertility.

h. Increase in wind velocity.

i. Destruction of water shade and consequent high evaporation of under ground water.

CONCLUSION.

Based on the field data, interviews and fieldwork deforestation has contributed in no small measure in the land degradation of Mokwa Local Government. Farming along the streams and River Valleys have contributed in no small measures in their siltation and sedimentation.

Wildlife which is dense along the two River Kaduna, Niger and Lanfa forests have disappeared within a decade, this is due to deforestation and farming activities forests is a renewable resources hence Government, NGO's individuals should rally round to plant more tree in order to reclaim back our forest.

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