

THE EFFECT OF TAUNGYA FARMING ON GBANGBA FOREST
RESERVE, GBAKO LOCAL GOVERNMENT AREA, NIGER STATE.

BY

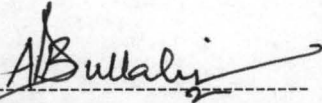
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MACRH, 2002.

DECLARATION

I declare that, this research work was carried out by the author in person of Abdullahi A. Toroko and presented to Geography Department of the Federal University of Technology Minna for the award of Post-graduate Diploma in Environmental Management. While the references and field trips are acknowledged, the tittle of this paper is yet to be presented in any University known to me.



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CERTIFICATION

I Abdullahi A. Toroko certify that this project work and its presentation was carried out by myself to Geography Department of the Federal University of Technology, Minna.

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DEDICATION

This dissertation is dedicated to Allah (the almighty God). And to my late father and mother in persons of Alhaji Abdullahi and Hajiya Hadishetu Abdullahi. May their souls rest in perfect peace (Amen). Also to my wife, children, brothers, sisters, lecturers and friends.

ACKNOWLEDGEMENT

Glory be to God the lord of the universe, with whose guidance and tremendous help made this work a sound success.

My deep appreciation goes to my Project Supervisor in person of Dr. Okhimamhe Appollonia (Miss), Department of Geography Federal University of technology Minna. She gave me credible assistance by offering timely suggestions, taking pain to read through my manuscripts, making necessary corrections and helpful comments. May God reward her abundantly.

My profound gratitude also goes to Mallam Adamu Gulu the Forest Chief Ranger in charge of Gbangba Forest Reserve who for a number of occasions accompanied and assisted me especially in the course of data collection via questionnaires and personal interviews as well as during the reconnaissance survey of the forest reserve and the surrounding communities.

Thanks to the Niger State Government via Ministry of Agriculture and Natural Resources for administrative support and encouragement throughout this course. I also appreciated the effort of the Post-graduate School of the University and in particular the entire lectures of the Geography Department for creating a conducive atmosphere for our studies.

Finally, I am grateful to the able Computer Operator in person of Abdullahi D. Yakolo and all those who have contributed in one way or another to my success.

ABSTRACT

This study highlighted the effect of Taungya Farming on the vegetation, landforms and soils, water sources, wildlife and fisheries in Gbangba forest reserve.

The methodology employed basically relied on reconnaissance survey, administration of questionnaires and personal interviews carried out by the author. Result from data analysis revealed that the main objective of introducing taungya-farming system in Gbangba forest Reserve (i.e. for sustainable management of the forest reserve), has been defeated. Instead the system have imposed a negative effects on these biophysical components of the forest reserve by gradual deforestation, soil depletion and degradation, extinction of wildlife and fisheries as well as dryness of water sources. Above all tree seedlings have not been provided for planting since the commencement of the taungya practice, thereby, changing the entire forest reserve to a mere grassland, the blame of which could be shared by both the participating taungya farmers and Niger State Government for this costly inefficiencies.

However, suggestions that may probably help in reversing or ameliorating the negative situation to a better footing of sustainability were also offered.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Taungya farming is a system of regeneration where agricultural crops are raised in combination with forestry crops (trees) on the same piece of land Enabor (1973). Under this condition, the agricultural crops allowed to be raised are of short life span as farmers are given between two to three years before they finally leave the farm so as to give room for development or establishment of the forestry crops (trees).

The farmers' involvement in this system is to cut down government's fund of raising and establishing the plantation. This is true as the farmer does the clearing operations like brushing, felling, packing and burning of the farms. Another objective of farmers being allowed to cultivate crops in combination with forestry trees is to create room for multiple land use because of scarcity of land for agricultural crop production. Recently from the available facts surrounding taungya system, it is clear that the system is more of a failure. The forest reserves are being depleted yearly to the benefit of the farmers not for the major purpose for which the system was introduced (i.e. establishing forest plantations).

The word "taungya" which literally means hill (taung), cultivation (ya) is of Burmese origin, and describe the method of raising forest trees with agricultural crops on the same piece of land Enabor (1973).

Kio (1972) defined taungya as the method of employing shifting cultivators to raise forest trees. Taungya system was reported to have originated from

Burma in 1856 when Diatrich Brandis was in Burma then part of British, Indian shifting cultivation was wide spread and there were several court cases against the villagers for encroaching on forest reserves. Brandis realised the detrimental effects of shifting cultivation on the management of timber resources and encouraged the practice of regeneration using Teak species via taungya system. Two decades later, the system proved so efficient that Teak plantation could be established at a very low cost in taungya way.

However, various names like agro forestry, agric silviculture, farm forestry are given to the system by the international community. Agro forestry encompasses any agricultural system, which combines trees with food crops, animal, fisheries etc. Taungya farming system was first introduced to Sakpoba Forest area in Bendel State of Nigeria in the 1926 – 27 planting season by Kennedy and Macgregor on a experimental scale, to find out the best method of regenerating the high forest. A number of tree species were planted at spacing of 1.8m x 36m between agricultural crops. By 1930 operation of taungya system became a condition of land in Benin division with specific request by government for an undertaking by the forestry department to make annually 100 acres of forest land for taungya farming in return for an additional one square mile to the forest estate.

1.2 BACKGROUND OF NIGER STATE.

The defunct North Western State was made up of Sokoto and Niger Provinces. On the 3rd of February, 1976, the area formally known as Niger province became Niger State (excluding the then Zuru Division) along with seven other new states created in addition to the twelve existing ones in Nigeria as at

that time. The state took off as an autonomous state in the federation on the 1st April 1976 by assuming full responsibilities for its services.

Niger State lies between latitude 8° and 11° 4¹ East meridian. The state covers a land area of about 7,356 square kilometres with a population of about 2,421,581 people (census 1991).

The land is flat and undulating with ranges of gravities hill, the southern parts are low and swampy forming the Niger Basin with mean annual rainfall of about 100cm. It enjoys a rainy season lasting about six months (March – September).

1.3 TAUNGYA SYSTEM IN NIGER STATE

Taungya was introduced in Niger State as early as 1977 under the oldest System (traditional system), where the land preparation and planting is the sole responsibility of the participating farmers. These farmers are not forest workers and the income from the food crops grown goes to them generally, taungya farming in Niger State has been more of a failure in terms of major objective for which the system was introduced (establishment of plantation). This is so because virtually practices are being carried out are more or less deforested and depleted, and the depletion of these forest reserves has resulted in drastic reduction of fodder for livestock, loss of water resources due to siltation and loss of farmlands to erosion.

However, the tillage system adopted in most of the taungya farms depends on the type of crops cultivated and the nature of the soil. For instance, in yam producing local government areas e.g. Paikoro, Gurara, Suleja e.t.c. the heaps being prepared always bid and round which requires the digging of the top

soil to a considerable depth and this gradually subject such areas to soil erosion especially where the land is undulating. Nevertheless, taungya practice has been in existence in many local government areas of the state and since then there is no significant improvement due to inability of the farmers to plant trees back and thus not maintaining sustainable management of the biophysical components of the entire forest reserves.

1.4 TAUNGYA SYSTEM IN GBANGBA FOREST RESERVE.

Based on the community's rights in the forest reserve at the time of Request in accordance with section 25 of the forestry ordinance chapter 75 of 1948, these communities were granted request to practice taungya farming in the above named forest reserve which was forwarded to the state government in the letter dated 13th March, 1986 through the then sole administrator of defunct Gbako Local Government. The farmers of these communities were faced with the problem of scarcity of land food agricultural food production, which compelled them to forward the application for taungya system in this particular forest reserve.

However, the approval to commence taungya farming in this forest reserve was granted on the 6th May, 1986, to demarcate 30 hectares of land to be divided among the farmers to start with, and this approval was based on the following conditions:-

- (a) That the farmers should be advised to take due care of all trees planted together with their farm crops and to ensure that they are properly maintained and protected.

- (b) That the local government should ensure that it has got sufficient seedlings to plant the area allocated to local inhabitants as contained in their application letter.
- (c) That during the harvesting period, all corn stalks should be neatly, arranged and packed in the central rolls of trees to avoid dry season bush fire.
- (d) That any farmer found wanting should be asked to withdraw from participating in the scheme.

Generally, these agreements seemed not properly adhere to and therefore the writer of this thesis intend to assess and evaluate the effects of this taungya farming on the entire bio-physical components of this forest reserve.

1.5 PROBLEM STATEMENT

Food production under taungya farming system in Gbangba forest reserve over the years has gradually devoid the forest land of trees and this signified that the system is more of a failure in terms of the major objective for which the system was introduced (i.e. establishing forest plantation). Rather, the practice resulted into deforestation, land degradation and destruction of biophysical components of the forestland. This is because in many taungya farms, trees are not planted by the farmers because of the fear of being vacated from the reserve earlier than required, and where trees are planted, they are not properly tendered to maturity. Therefore this study will examine and assess the effect of this system on the whole forest reserve in particular and its environmental impact on the surrounding communities.

1.6 AIM AND OBJECTIVES

The aim and objective of this study is to survey and as well assess some taungya farms in Gbangba forest reserve and possibly evaluated its effect on the vegetation, wildlife and fisheries, land forms and soil, water resources within the forest reserve and its general environmental impact on the surrounding communities. Also the objectives is to enlighten the farmers of the dangers posed on the forest reserve in particular and the environment in general, if they continue with the attitude of deforestation without planting back via taungya farming and to suggest the possible ways of sustainable management of the forest reserve.

1.7 JUSTIFICATION

There is no any survival or established plantation in Gbangba forest reserve via taungya farming system for sustainability of biophysical components of the forest reserve which is the main objective for the introduction of the entire system. Regrettably, the original vegetation and economic trees in the forest reserve are fast disappearing, the forestland being degraded and no new trees planted by the farmers or replacement, the blame of which could be shared by both farmers and Niger State Government.

Therefore, this project aimed at identifying these effects on the various ecosystem within Gbangba forest reserve and offer possible solutions that may correct their attitude of deforestation, land degradation, wildlife extinction, illegal exploitation, poor land tillage and farming systems as well as indiscriminate bush burning and to enhance the effectiveness of the management practices in the forest reserve.

1.8 THE STUDY AREA

Gbangba forest reserve is located in Gbako Local Government Area of Niger State. This forest reserve lies on latitude $9^{\circ} 26' 10''$ North, and longitude $6^{\circ} 9' 10''$ East. (Northern Nigeria gazette No. 59 Vol.10. 12th October, 1961). The forest reserve is about 15 km (untarred road) away from Lemu town which is the Headquarters of Gbako Local Government Area while it is about 1.6 km from Gbako Village. Gbangba forest reserve was constituted and gazetted in October, 1961 and it covers a land area of about 24 km².

Fig 1 Shows the locational Map of Gbangba forest reserve while Fig II is the map indicating the boundaries of the forest reserve.

1.9 BOUNDARIES

Gbangba forest reserve is bounded by paths, cutlines and Lemu Kataregi dry season motor road.

Starting from a point on the right hand side of the 1960 path from Gbangba to Edostu where it is joined by the right hand side of the 1960 path from Kotugi to Gbangba distance of about 3km from Gbangba and market by beacon No. 1 by the right hand side of the 1960 path from Gbangba to Edostu in a generally North-Easterly direction for a distance of about 2.5km to beacon No 2 on the right hand side of the 1960 parth from Gbangba to Edotsu: thence by a series of straight lines the bearings and length of which are as follows:-

(Table 1 Forest Reserve Boundaries in detail)

Beacon No.	Bearing (Degree)	Length (ft)
2-3	134	1,695
3-4	155	2,365
4-5	48	1,845
5-6	334	556
6-7	289	976
7-8	346	1,649
8-9	4	1534
9-10	4	4,860
10-11	92.5	1,925
11-12	117	886
12-13	47	4,608
13-14	11	3,862
14-15	218.5	917
15-16	198	936
16-17	135	685
17-18	107	262
18-19	11	5,042
19-20	223	920
20-21	153	1,158
21-22	58	737
22-23	"	4,957
23-24	191	2,150
24-25	"	1,408
25-26	18	1,408
26-27	277.5	11,545
27-28	197	1,084
28-29	"	1,810
29-1	"	12,751

(Source: Northern Nigeria gazette No. 59 Vol.10,1961)

1.1.0 POPULATION AND FARMING

The nearby communities include Gbangba, Wasagi, Edotsu, Gbandu, Kotugi, Ganabigi, Tandigi and Mijidadi. Majority of the people of these communities are farmers by occupation and mostly practice mixed and rotational cropping both within and outside the forest reserve.

1.1.1 TOPOGRAPHY AND SOIL

The land is flat and is drained by the Gbarigi stream which flows in south-Westerly direction to join with the Gbako river outside the forest reserve. The soil is sandy loam but the banks of the Gbarigi stream are rich in alluvial deposits.

1.1.2 VEGETATION

The area supports Savanna vegetation with plenty of Denellia oliverri, Parinari spp., Vitellaria paradozum and Terminalia spp. The fringing forest of the reserve consists mainly of Denellia oliverri and Elaeis guinensis.

1.1.3 CLIMATE

This area experiences distinct dry and wet seasons with annual rainfall of about 1250mm, which is distributed within 6 months of the year. That is between April to September or March to October depending on the variation in the onset and cessation of rainfall annually. The weather is averagely cool in rainy season as well as at the peak of the dry season. It is relatively hot in the middle of dry season especially between the months of January to March.

1.1.4 SCOPE AND LIMITATION OF STUDY

This study is confined to the effect of taungya farming on the vegetation, land forms and soil, water resources, wildlife and fisheries in Gbangba forest reserve as well as its environmental impact on the surrounding communities.

Also in the light of this study, assessment and evaluation of five communities taungya farms (Wasagi, Edostu, Tiwagi, Kolobu and Gusadi) shall be carried out in order to determine its adverse effect on the overall biophysical factors mentioned above.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 FORESTRY ACTIVITIES AND TAUNGYA SYSTEM IN NIGERIA.

The colonial administration in Nigeria realised the importance of forestry when a department of forestry was established around 1904 for the country.

Forestry is net to agriculture as a great land user not only in Nigeria but all over the world. Forestry role in land conservation has been recognised thousand years ago. The total forest reserve area of Nigeria is estimated to be about 93,569 1cm² which is about 10 percent of the total land area.

The ban on the exportation of processed and unprocessed timber came about 1976. Even before this time, the quantity of timber exported decreased from 566,000m³ (20 million ft³) in 1971 to 283,00m³ (10 millionft³) in 1975. (Ojo, 1977). The ban therefore is a realisation of one of the dreams of foresters. Even since, the Nigerian forestry services have been able to meet the wood requirements of the country despite the various developments. This was achieved via judicious management of the forestry resources of the country.

In the early days of forest operations in this country, when natural regeneration methods were considered for replacement of our felled woods throughout most states of the federation Ondo, Cross-River, Kaduna, Niger, Kwara e.t.c. the forest workers were given pieces of forest land on which they grew food crops for their consumption and in some cases, the surpluses were sold. Quantitative estimate of amount of the food produced is not available but one fact was certain, these forest workers were not competing to buy foodstuff

from the markets. This method was greatly improved upon about half a century ago by the establishment of taungya system in Sakpoba forest reserve.

Taungya system was first introduced to Nigeria in 1927 Sakpoba forest reserve and from there it spread to different parts of the country.

Omiyale (1982) described taungya as a form of silvicultural system of artificial regeneration technique in which forestry crops (trees) are interplant among agricultural crops. The two crops shared the fertility of the soil on which they grow. The system provides for increased food production and as well enhances plantation establishment with less cost in the Nigeria rural community. While the first attempt by foresters to produce food could be regarded as a form of subsistence farming, the present attempt starting about 1927 in Bendel State should be regarded as a form of commercial farming. Omiyale (1988).

Enabor (1981) reporting on the method adopted by foresters to cultivate food crops along with forest crops (trees) said "Development of taungya depends on the pre-existence of land hunger, under development and low standard of living among the rural communities. Apart from these three pre-requisites, other social economic factors contributing to the development of taungya includes, population growth, land availability, farm labour supply, food supply, income generating potential, availability of infrastructural facilities and organisational institutions". These factors have immensely contributed to the success of taungya system in the country.

Presently, in forestry circles, two types of taungya systems are recognised. Traditional taungya – the oldest system where the land is prepared by the participating farmers. Generally, the farmers are not forest workers and

income from the forest crops grown goes to the farmers. Departmental taungya involves simultaneous production of forest crops and food crops on forestland by the state forest department. A third dimension to taungya system was introduced in 1975 by Forestry Research Institute of Nigeria (F.R.I.N).

The method by forestry research institute of Nigeria is in line with departmental taungya except it consists of well scientific laid designed experiment to obtain systematic quantitative data on effects of forest crops on agriculture, use of different planting materials for species in use, soil properties, and spacing interaction between agricultural crops and tree crops.

All the various taungya systems are being constantly reviewed with a view to perfection by forestry services of the country.

2.2 OBJECTIVES OF TAUNGYA SYSTEM IN NIGERIA.

Omiyale (1988) outlined the objectives of taungya system in Nigeria as

Follows:-

1. To find a way to accommodating some aspects of agriculture within forestry.
2. To prevent forestlands from lost to agriculture due to growing population demanding more food.
3. To provide adequate fertile lands for farmers so as to enhance productivity.
4. To prevent rural drift to the urban areas.
5. To increase revenue base of rural dwellers.
6. To serve as weapon for rural development
7. To promote multiple land concepts

8. Provision of labour to both agriculture and forestry at a reduced cost.
9. To involve the entire population in afforestation efforts.
10. To provide raw materials for wood based industries. .

2.3 CONDITIONS NECESSARY FOR SUCCESSFUL TAUNGYA SYSTEM IN NIGERIA.

Fadipe (1975) also outlined some important conditions that can foster

Successful implementation of taungya system in Nigeria as follows:-

- (a) Land hunger: There must be either shortage of land for agricultural crops or the available agricultural land barren by wrong agricultural practices.
- (b) Unemployment and Underemployment: Unemployment of school leavers in the town and underemployment in the rural areas for a greater part of the year may constrain people to ask for taungya farms especially in areas where there is no adequate land for farming.
- (c) Low standard of living: The annual income per head below minimum of existence as a result of sterility of the existing farmland.
- (d) Supply of land in perpetuity: The forestry department in the country must be able to guarantee fertile soil to the farmers for a number of years.
- (e) Accessibility and travelling distance: The taungya centre has to be accessible from main road for easy transportation of farm produce. Naturally, farmers villages. Three kilometres radius is a popular maximum accepted distance from the farmers' place of living to his taungya farm.

CHAPTER THREE

3.0 DATA AND METHODOLOGY

3.1 SELECTION OF THE STUDY AREA

The location of the forest reserve and its nature was considered in terms of vegetation and biophysical components before taungya farming commenced inside it around 1986. This was compared to what the entire forest reserve presently looks like, and thereby developed interest to find out the lapses which resulted to the destructive condition of the forest reserve as at now instead of sustainable management.

It was a non disputable fact that farming depleted the trees and vegetation cover of any place via land clearing and tillage systems for a farming practice and that is why foresters are always cautions of introduction of taungya farming.

Therefore, the major interest for selecting Gbangba forest reserve as a study area is to examine the effectiveness of taungya farming on that forest reserve, more so, it has been gazatted since 1961 and it is under the management of the forestry department, Niger State Ministry of agriculture and Natural Resources Minna. Thus Gbangba forest reserve is a typical example of forest reserves in Nigeria and a good representative sample if put into proper protection and management phase.

Also owing to the availability of resources (at my disposal) for the project, in terms of fund and time, the Gbangba forest reserve was chosen as the study area.

3.2 RECONNAISSANCE SURVEY OF THE FOREST RESERVE.

“Seeing is believing” and therefore, having obtained the map of the forest reserve from the State ministry of agriculture and Natural Resources, Minna, I embarked on the field trip and reconnaissance survey of Gbangba forest reserve with the assistance of the Chief Forest Ranger in charge of the forest reserve. Some of the reasons for carrying out this field trip and reconnaissance survey are:

- (a) To familiarise myself with the forest reserve and some nearby communities.
- (b) To see physically the nature of its vegetation, landforms, taungya farms (both Fadama and upland areas) water source etc.
- (c) To make general consultations with the farmers and some community leader in order to obtain the necessary informations.
- (d) This field trip would also enable corroboration of information through questionnaires after comparison with what is obtained on the field.

For instance, it was discovered in the course of field trip that some of the community settlements near the forest reserve e.g. Tandigi Gbandu and Bangagi (as seen in the map) have migrated elsewhere. It was also discovered that no single farmer in Gbangba village is participating in the taungya farming of the forest reserve. The name ‘Gbangba’ was just given to the forest reserve based on the fact that Gbangba was then the seat of the village head controlling other communities therein.

Photographs of some strategic places like taungya farms, was source and erosion affected areas were also taken in order to buttress discussions in the subsequent chapters.

3.1 ADMINISTRATION OF QUESTIONNAIRE

Since the study is essentially on the effect of taungya farming in Gbangba forest reserve, the questionnaires were designed and administered specially to the participating farmers within various selected communities, bearing in mind that they would be in better position to give the reliable and relevant informations on farming practice in the forest reserve. Specially, questionnaires were administered to participating farmers in Edotsu, Wasagi, Gusadi, Tiwugi and Kolobu communities.

In the course of this exercise, it was realised that Wasagi community has the highest number of the participating farmers, the remaining communities has about five or less in number. The Wasagi community even claimed to be the original owners of about 90% of Gbangba forest reserve area before being constituted and gazetted as forest reserve in 1961.

3.4 PERSONAL COMMUNICATIONS

An inter-personal method of interview was also used especially when most of these communities populace are illiterates (unskilled). During the course of the interview, some categories of both forestry staff in the state Ministry of agriculture and Natural Resources Minna, community leaders and village heads as well as few individuals within the communities surrounding the forest reserve were interviewed. Although emphasis was laid in this case to those who do not necessarily have farm in the forest reserve but may have the idea of its nature

(forest reserve) even before taungya farming commenced. Virtually, the questions asked via the personal communications are the same as those designed in the written questionnaire, and this was aimed at comparing and contrasting informations in relation with the realities on the ground.

The professional foresters interviewed in the state forestry department was aimed at finding out the level of seriousness on the part of government in the sustainable management of Gbangba forest reserve as well as factors militating against such objectives. Thus their views, suggestions and complaints about taungya farming and management of the whole forest reserve are very significant, this will further enable me offer timely suggestions that may enhance management of taungya practices in this particular forest reserve.

3.5 PROBLEMS ENCOUNTERED IN ADMINISTRATING OF QUESTIONNAIRES

In the course of administering the questionnaires, some unavoidable problems were encountered. The first problem was that majority of the farmers practising taungya farming in the forest reserve were illiterates and therefore have to be asked and filling in questionnaires simultaneously with the assistance of the forest Chief Ranger in charge of the forest reserve. Secondly, the scattered nature of the surrounding communities with the feeder roads linking them also constituted a problem in terms of transportation. Although some roads are motorable, but they are very rough. Thirdly, there was also delay in filling the questionnaires due to the fact that some of the participating farmers were initially afraid of giving vital informations because they felt it will become a threat to them at the end of the day. Therefore I have to enlighten them with the assistance of

the forest Chief Ranger to feel free with the assurance that nobody will be penalised whatsoever for giving relevant informations before they co-operated with me.

3.6 STRUCTURE OF THE QUESTIONNAIRE

The information required in the questionnaires dealt with personal informations about the participating farmers including names, sex and ages. Others are duration of the taungya practice in the forest reserve, farming system, types of crop cultivated and the subsequent yield, types of trees and area planted so far.

Furthermore, informations were required on other activities in the forest reserve like hunting, fishing, collection of firewood and herbs, timber exploitation as well as intensity of grazing and forest fires, and general informations indicating the relationship of the surrounding communities with the forest reserve. Appendix (I) shows the comprehensive structure of the questionnaire.

3.7 RESPONSE TO THE QUESTIONNAIRE

It was not possible to reach every participating farmer within these Communities and thus five communities were selected namely Edotsu, Wasagi, Tiwugi, Gusadi and Kolobu to be administered questionnaires. Although plots used to be allocated in the forest reserve per head, but in some cases farmers work as a family and in that wise only the head of the family responded to the questionnaire.

Based on the above fact therefore only fifty questionnaires were administered and responses received out of the total one hundred copies initially produced. Also the low responses particularly from the participating farmers was

not unconnected with the fact that many of the farmers have beginning the forest reserve because the fertility of the reserve have drastically reduced if not exhausted and it affects the yield. Another biting issue according to them (farmers) is the frequent clashes between Wasagi and Edotsu communities who still claim the superiority as the original owners of that forest reserve over the rest communities and this not only affects the low response to the questionnaires but also engineer crises within the communities over the forest reserve land. Other problem of low responses could also be attributed to the fear of being victimised as earlier mentioned under the reconnaissance survey. But generally the few responses received were impressive and worthy of expression and assessment on the effect of taungya farming on Gbangba forest reserve.

3.8 RESULT OF PERSONAL COMMUNICATIONS

Basically, the information collected from both the participating and non participating farmers as well as some community leaders was the same. They invited that virtually, most of the Fadama areas for Rice production in these communities fall inside this Gbangba forest reserve, and Rice being one of the major cash crops for the farmers, there was no option than to request for farming there via taungya system. As time goes on, the farmers extended to the upland areas of the forest reserve for the cultivation of other food crops like Yam, Guinea corn and maize. Initially, according to the farmers, only small areas used to be cultivated for these food crops but they usually realised high yield due to the fertility of the soil. The fertility of the forest reserve soil therefore attracted the interest of the farmers and as such encroachment continued year after year,

thereby killing more trees in the course of land clearing thus depriving the forest of the trees and other vegetation cover.

The farmers and other people interviewed also admitted that they have not been planting trees in their farms due to the fact that the state forestry department for planting had not supplied them with any seedling so far. Illegal timber exploitation, collection of firewood and herbs by the surrounding communities is also reported to have been happening in this forest reserve. The people also highlighted the issue of cattle rearers (Fulanis who trespassed the reserve annually in the course of grazing. Annual fire disasters as a result of illegal poaching activities in and around the forest reserve were also discussed.

Some people also talked of using the forest reserve as the base for the annual festival called "WASA" i.e. the preparation of anti-snake vaccine locally. Flood is also reported to have been experienced in the forest reserve. Farmers also complained in their yield for subsequent years and this indicates the exhaustion of soil fertility of the reserve, which compelled some people out of the reserve. River Esso which cut across the forest reserve is also said to be drying recently at a fast rate, immediately the rainfall cut off and this could be attributed to the felling of trees yearly thereby exposing this water source to the direct impact of the sun.

Personal communications with both professional and technical staff of the State department of forestry reverted that inadequacy of fund and lack of logistics constituted a major problem for the effective management of taungya farming in Gbangba forest reserve. Because of lack of fund, nurseries are not in good order for the raising of enough seedlings to satisfy the taungya practice. Also lack of

mobility for transportation hindered the uniform and technical staff from effective patrolling and monitoring of taungya activities in the forest reserve. Manpower is also reported to handicap taungya supervision. However, due to the above mentioned lapses in one way or the other Gbangba forest reserve become a victim of circumstances and the consequences is the destruction of trees, vegetation covers, wildlife and fisheries, flood and land degradation and these in turn imposes a negative impact on the surrounding communities depriving them from the benefits from the above mentioned biophysical components indirectly via their own activities.

CHAPTER FOUR

4.0 ANALYSIS AND DISCUSSIONS OF RESULTS

4.1 ANALYSIS AND DISCUSSIONS ON THE CHARACTERISTIC OF RESPONDENTS.

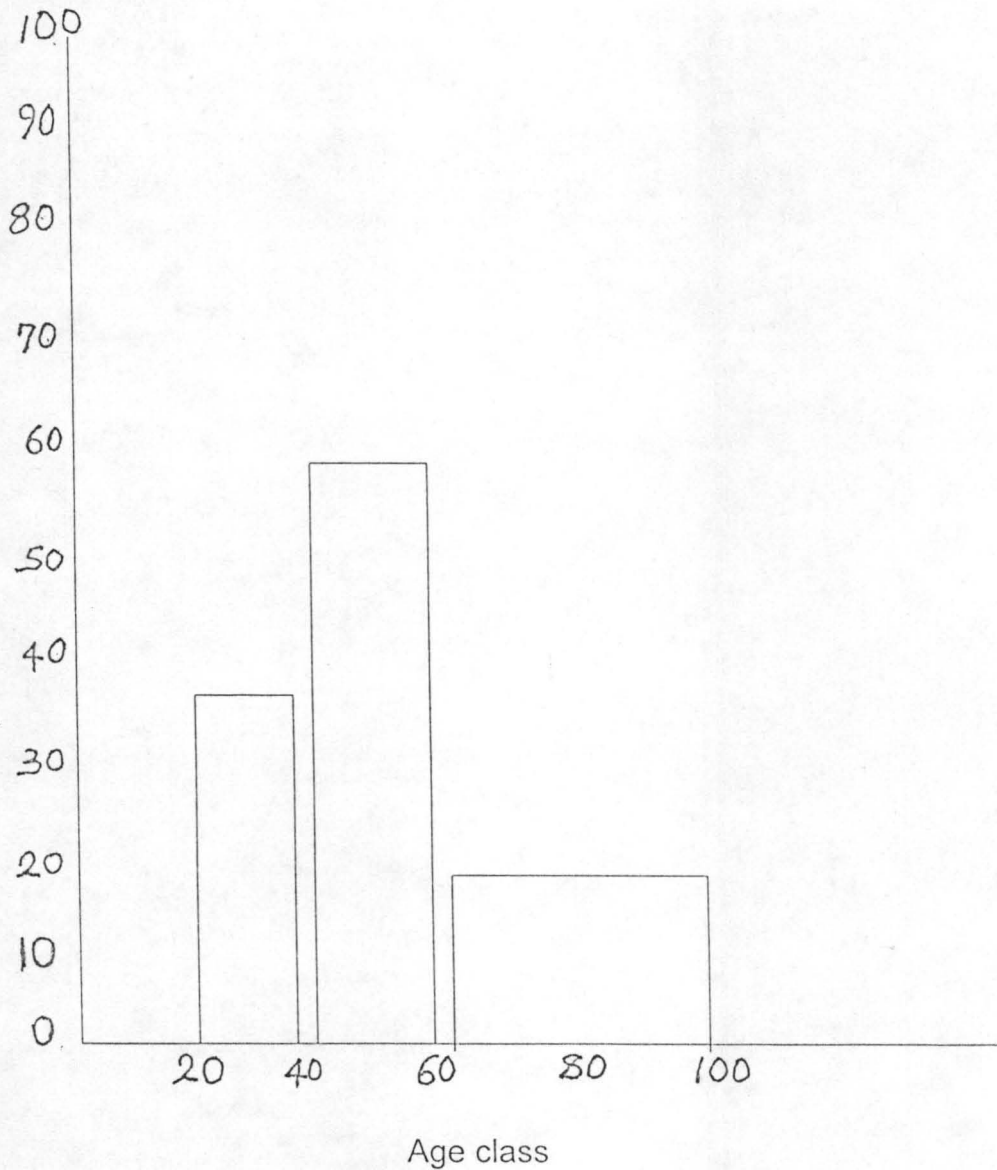
The data analysis result and discussions were based on the criteria with regard to the questionnaires administered to the sampled participating farmers in five communities namely Edotsu, Wasagi, Gusadi, Tiwugi and Colobu. The criteria are as follows:-

1. Age of respondents
2. Population of participating farmers in each selected community
3. Duration of their farming in the forest reserve
4. Reasons for their farming in the forest reserve
5. Farming system being practised and types of crops cultivated.
6. Reasons for not planting trees in the forest reserve so far.
7. Other activities being performed in the forest reserve
8. Cattle rearers (Fulanis) and five incidents in the forest reserve.
9. Other benefits derived from the forest reserve apart from taungya farming.
10. Environmental impact of forest reserve to the surrounding communities.

4.1.1 AGE OF RESPONDENTS

A total of fifty copies of questionnaire were administered and responses received as earlier mentioned in chapter 3 – methodology. The analysis of age categories of respondents is represented in the fig. 4.1.1

(Fig 4.1.1 Age categories of participating farmers)



(Source: Compiled by the author)

The fig 4.1.1 shows the age categories of respondents in percentage. From the result on the fig 4.1.1 it could be observed that 52% of the participating farmers are between the ages of 41-60 years, this is followed by 30% of those within 20-40 years while the least and perhaps the oldest farmers are 18% ageing between 61-100 years. This indicates that the active farmers are between 20-40 years and 41-60 years respectively. Thus, reasonable number of

people are participating in the taungya farming which will definitely affects the biophysical components of this forest reserve. There is also likelihood that the youth (i.e those below the ages of 20 years) are attending various schools and for those farming, are doing so under the umbrella of the elders individually or as a group. Appendix II shows the table of the above graph.

4.1.2 POPULATION SAMPLE

The population of the participating farmers in each of the selected Community was also determined based on the responses to the questionnaire in order to reflect it on the generality of taungya farmers in the entire forest reserve.

(Fig 4.1.2 sampled population distribution of farmers).

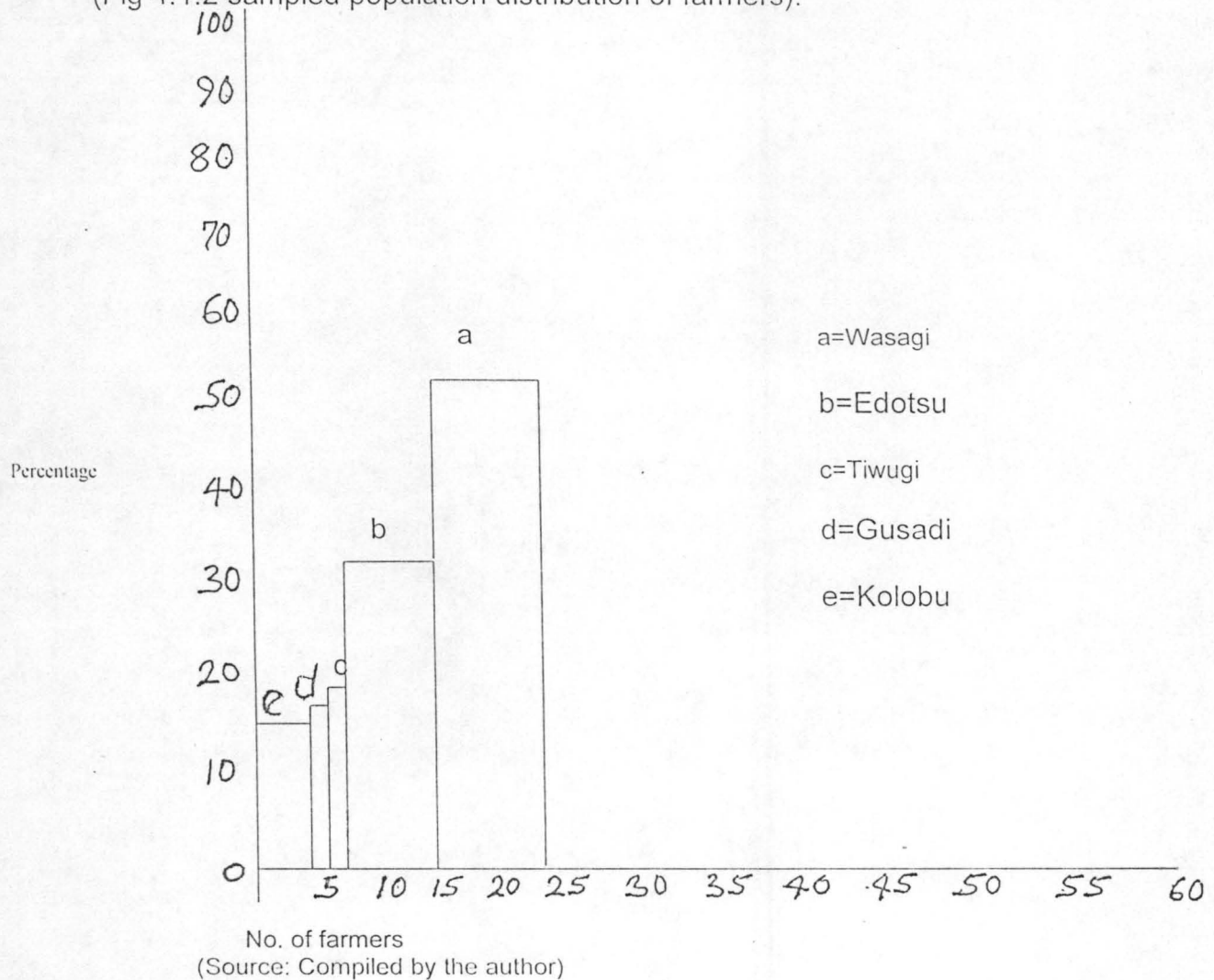
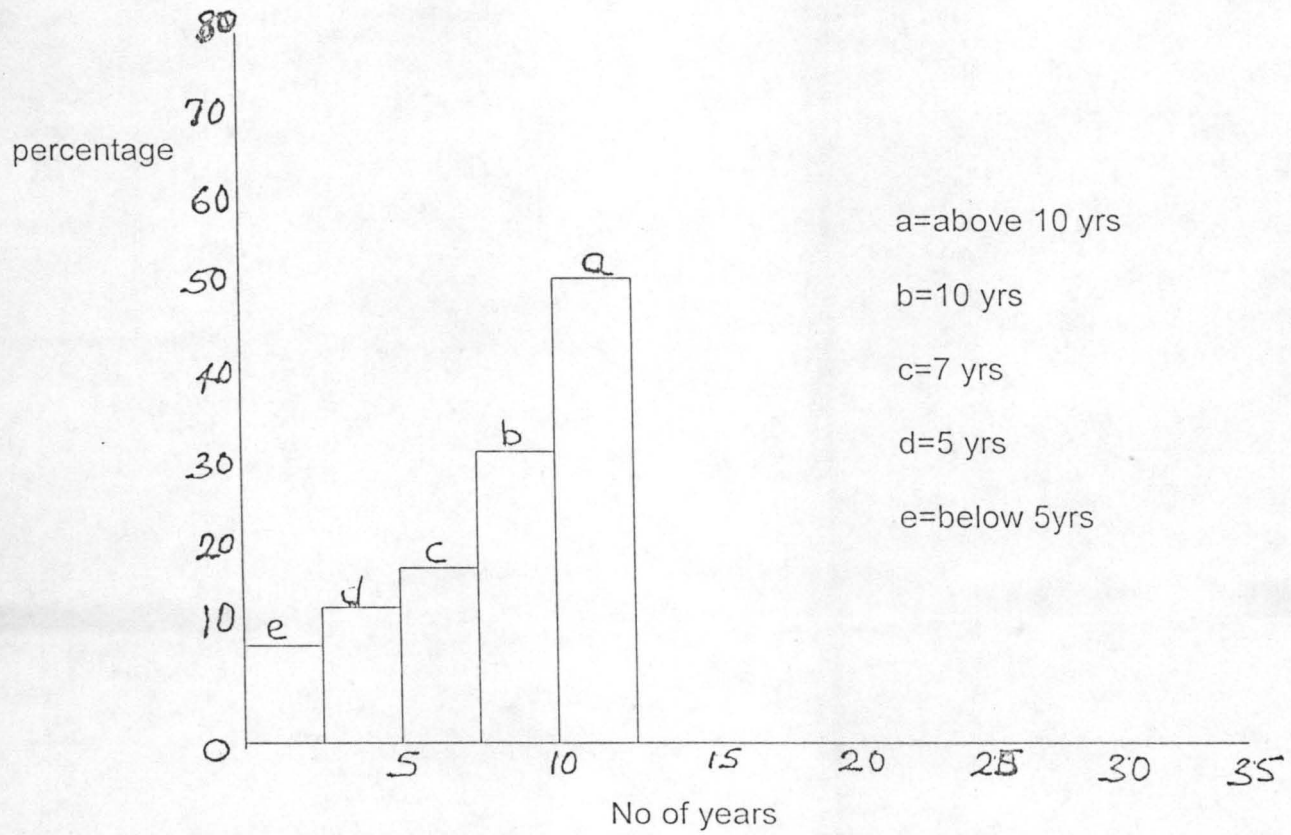


Fig 4.1.2 shows the population distribution of the sampled participating farmers in each of these communities in percentage. The result shows that Wasagi community has the greatest number of the participating farmers followed by Edotsu, Tiwugi, Gusadi and the least is Kolobu. However, the result of this analysis is in conformity with the information via personal communications that Wasagi village has the highest number of the participating farmers and thus claimed the original ownership of the greater part of the forest reserve land being constituted and gazetted, hence they could be brain behind the occasional land dispute that arise between the farmers within the forest reserve.

4.1.3 DURATION OF FARMING EXERCISE IN THE FOREST RESERVE

This was aimed at finding out how long the taungya practice have been existing in the forest reserve as this will give the impression of the intensity of farming exercise on the entire forest reserve.

(Fig 4.1.3 indicate duration of farming in the forest reserve)



(Source: Compiled by the author)

Fig 4.1.3 shows the duration of the participating farmers in the forest reserve. The result indicates that 48% and 20% of the farmers respectively which form the highest percentage commenced farming there 10 years and above 10 years ago which is quite a very long time now. Therefore, it could be deduced that greater part of the forest reserve land might have been exhausted bearing in mind that additional areas is being cleared yearly via farming expansion. The tabular form in appendix IV was used to plot the above Fig (4.1.3).

4.1.4 REASONS FOR THEIR FARMING IN THE FOREST RESERVE.

Similar various reasons were given by one hundred percent of the respondents that compelled them to embark on the farming exercise in Gbangba forest reserve as follows:-

- (a) Land Scarcity:- Shortage of fertile agricultural land outside the forest reserve especially the 'FADAMA' which is basically for rice production and most of Fadama in these areas fall within this particular forest reserve.
- (b) Fertility of the forest reserve land:- When the beginners of this system happened to realise a high yield of products with little areas being cultivated, more people developed interest in the participation of taungya practice.
- (c) Land tenure system of the Communities:- In most cases land heritage was the most existing land tenure system within these communities and therefore, those who were not privileged to inherit large hectares of the farm lands have no option than to join the taungya system especially with increase in farming size.

4.1.5 FARMING SYSTEM AND TYPES OF CROP CULTIVATED.

Simultaneously, one hundred percent of the respondents are practising and rotational cropping especially within the upland areas of the forest reserve. Although initially the major crop being cultivated therein was rice, the farmers later expanded to the upland areas via mixed and rotational cropping. The types of crop mostly cultivated under these systems include; Yam, maize, Guinea Corn and paper. Yam and maize are mostly cultivated under the system of mixed cropping while Guinea corn or paper used to be planted the second year where Yam is harvested in the first year under the rotational cropping and these systems continued since the commencement of the exercise.

4.1.6 PLANTING OF TREES

One hundred percent of the respondents admitted that they have not been planting trees in their respective farms since the beginning of taungya system in Gbangba forest reserve. The bare nature of the already cultivated farms in the reserve and killing of new trees in the course of land preparation for the next farming season, thereby making the whole forest reserve gradually to look bare evidenced this. This information is true and also in conformity with the one received from the state forestry department via personal communications that the department have not been providing seedlings to the taungya farmers not only in Gbangba forest reserve but also in the respective forest reserves where taungya system exists and this, according to the foresters is because of lack of funds, logistics and shortage of manpower hence farmers should not be single handily blamed in this case.



Plate I: Tree killed for yam heaps Preparation

Plate I shows a cross-section of a new Yam Farm under preparation in the upland side of the forest reserve. Trees here are being killed gradually by setting fire round each stump. Heaps are then prepared in the mist of these dead trees. It could therefore be observed here that within two or three years of farming on this portion without planting new trees which eventually resulted into a bare land.

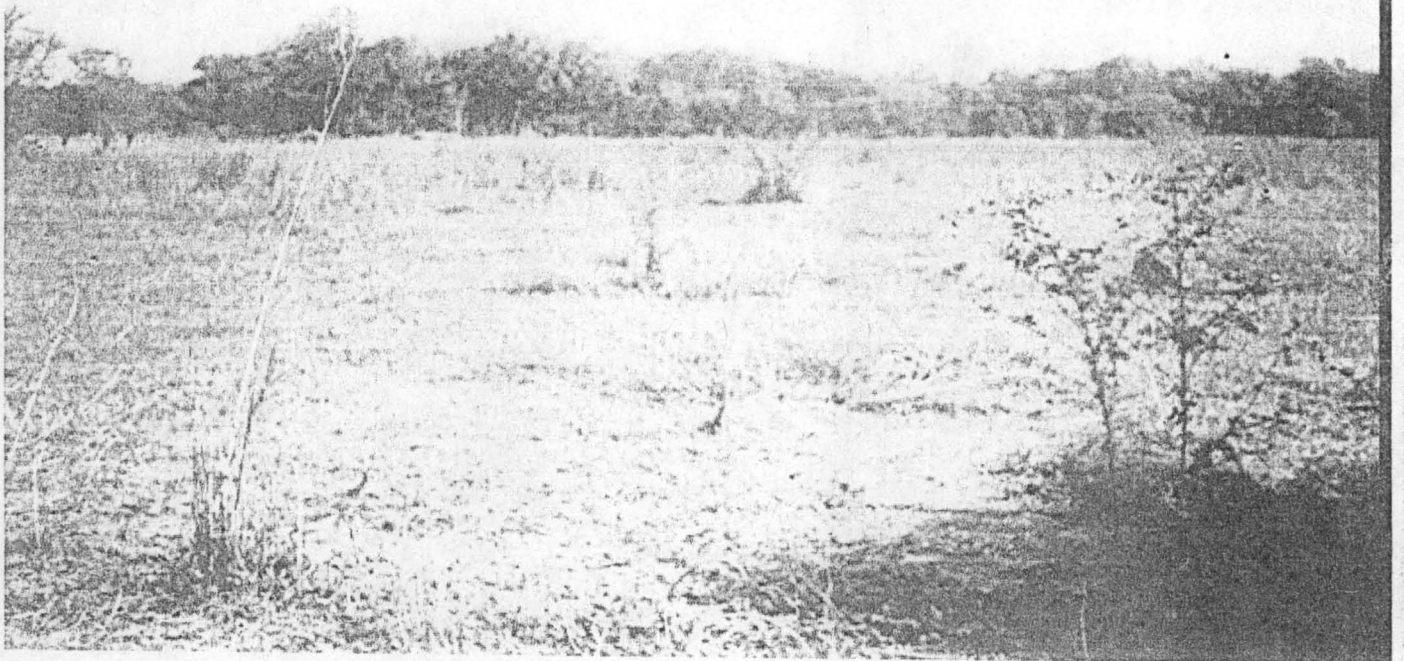


Plate II: Former rice farm

Plate II is a cross-section of a former rice farm (fadama) within the forest reserve. This place has been exhausted in terms of vegetation and soil fertility to the extent that flood occurs annually in this area and that was why it is abandoned. Supposing planting of trees was done at the initial stage, the vegetation of this place would have been regenerated and become a full plantation forest.

4.1.7 OTHER ACTIVITIES IN THE FOREST RESERVE

As a matter of fact, one hundred percent of the respondents also outlined Other activities being performed in the forest reserve apart from taungya farming as follows:-

- (a) Illegal timber
- (b) Collection of firewood
- (c) Hunting and fishing
- (d) Collection of herbs for medicinal purposes.

Apart from the above mention activities, cattle rearers also trace – passed the forest reserve in the course of grazing. Forest fires are also experienced annually via the cattle rearers (Fulanis) and poachers for the sake of quick sprout of grasses for pasture and hunting respectively. In most cases fulanis settled temporarily near the forest reserve boundaries in the dry season in order to foster their grazing both within and outside the forest reserved.

Generally, from the above enumerated activities apart from taungya farming that happened in the forest reserve, one can deduced that these activities will tremendously enhance the destruction of the ecosystem, land

depletion and degradation as well as entire biophysical components of the forest reserve.

4.1.8 OTHER BENEFITS DERIVED FROM THE FOREST RESERVE.

Basically, one hundred percent of the respondents admitted to be deriving Economic and social benefits from the forest reserve.

- (a) Economic benefits:- This entails benefits from the sales of their farm products, firewood, herbs for medicinal purposes (in the case of traditional doctors). In most cases majority of the farmers utilize the money realise from the sources to increase the number of their wives, build houses, sponsor the younger ones going to school and purchase of motorcycles or cars as the case may be.
- (b) Social benefits:- This forest reserve was formally used as a recreational centre by some farmers before even taungya farming commenced especially during the month of ramadan (fasting period).

Some people also used to go there at their leissure time and rest in order to enjoy the cool weather of the forest environment. Furthermore, this forest reserve is also used as a cultural centre especially by the Wasagi community for their annual festival called 'WASA', that is, the traditional way of preparing the anti-snake vaccine as earlier mentioned under the result of personal communications.

4.1.9 ENVIRONMENTAL IMPACT OF THE SURROUNDING COMMUNITIES

Obviously, one hundred percent of the respondents admitted previous positive environmental impact of this forest reserve to their communities in terms of:-

- (a) Wildlife Conservation:- most of the wild animals e.g. elephant, leopard, water buck and most green and red monkeys were found in this forest reserve, some of these animals in those days even move as close as to the peak of the villages to the viewing of even the children.
- (b) Water conservation:- River Esso which cut across the forest reserve formally retain water in large quantities all the year round before taungya farming commenced.
- (c) Soil conservation:- Soil used to be rich in vegetation cover and moisture conservation with the aid of tree canopy via prevention of direct impact of the sunlight to the ground.
- (d) Climatic amelioration:- Generally according to the respondents, at the time the forest reserve was still intact, the weather within the surrounding communities was generally cooler than the other communities far away from it even if it is during the hot period. One can therefore deduced that the ecosystem at that time was balanced and was what makes the forest reserve conducive to the wildlife therein those days.

4.2 THE EFFECT OF TAUNGYA FARMING ON VEGETATION AND SOIL.

From the result of data analysis and personal communications via field trip and reconnaissance survey, it is obvious that taungya farming have imposed tremendously a negative effect and entire vegetation of Gbangba forest reserve. The trees are being killed in large numbers annually in the course of land preparations for farming and no new ones planted. The soil as well is also deprived of the vegetation cover due to tillage systems. Simultaneously, these activities have presently rendered about 60% of the forest reserve land area

bare. The land is seriously depleted and degraded and as such erosion have beginning to emerge especially at the upland areas where the topography is undulating. Flood is also being experienced in some part of the flat and low land areas of fadama and this makes it impossible to cultivate rice in such areas and this forced the farmers to abandon certain fadama areas. On the other hand flood causes destruction when it occurs after the crop have already been planted thereby affecting the whole yield. The lack of trees, vegetation cover as well as compartment nature of the soil as a result of daily matching and annual tillage rendered the soil particles imperforable and therefore filtration capacity of water reduces and this enhances erosion and flood, especially when rain falls with high intensity even for a short time or with low intensity but for a very long time.

As a matter of fact, the vegetation and soil of this particular forest reserve is at a deteriorating stage and more trees are killed yearly in the course of land clearing against the next season and this will eventually end up in environmental hazards.



Plate III: Cultivated rice farm and the forest

Plate III shows a cross-section of the cultivated rice farm and that of the forest that remain intact. From this observation, it is an indisputable fact that if the deforestation exercise continued via taungya farming without planting trees for sustainability, the remaining part of the forest will one day become bare as the rice farm. Also the soil of the cultivated area cannot be compared with the remaining part of the forest in terms of fertility and biophysical components because it has already been depleted and degraded. Therefore it could generally be deduced that this system is a failure at this stage and condition on Gbangba forest reserve.

4.3 THE EFFECT OF TAUNGYA FARMING ON WILDLIFE AND BIOSPHERE

The entire ecosystem of this forest reserve is seriously under destruction in the course of the taungya farming and as such most of the wild animals that exist before taungya farming commenced e.g. elephant, leopard, and Monkeys e.t.c are no where to be found again in the forest reserve due to poaching and extinction exercise by the hunters for bush meet and for sale. Constant forest fires also kill most wildlife especially the younger ones while the older ones migrate from such environment.

It is obvious that fire destroys everything when it occurs and therefore biophysical components of this forest soil which will aid in decomposition of the litter falls to enhance the soil fertility are being killed and destroyed thereby contributing to the drastic reduction of the soil fertility.



Plate IV: Deforested and degraded portion within the forest reserve.

Plate IV represents a cross-section of the deforested and degraded portion within the forest reserve via taungya farming. The ecosystem of this area has already been destroyed and therefore it is impossible for wildlife and other biophysical components to live here because the environment is no more conducive or comfortable for their livelihood.

4.4 THE EFFECT OF TAUNGYA FARMING ON WATER SOURCE AND FISHERIES

The river Ezzo that cut across the forest reserve is the base and water source in which some farmers are carrying out fishing exercise especially during the dry season after they (Farmers) might have harvested their crops. However this exercise has drastically reduced because water bodies dry up easily immediately the rainfall cut off is a result of encroachment in trees exploitation and killing during land preparation for farming even to the peak of river banks and water bodies. This attitude exposes such river bodies to the direct impact of the sunlight thereby enhancing evapo-transpiration, and this eventually affects the fishes in such river rendering the water in conducive home for the fishes to live and thus a negative effect.

In the olden days, chemicals are sometimes also used by some of these farmers who were completely ignorant of the dangers imposed in the water body and aquatic animals as well by using such chemicals to catch fishes in the river. The resultant effect is that the entire animals in the water is generally killed including their eggs and this is opposed to the sustainable management and has also contributed negatively on the fisheries and water sources of Gbangba forest reserve.

Plate V show the cross-section of river Esso that cut-across the forest reserve. Although this river took its source outside the forest reserve, it is fast drying because of the serious encroachment to the riverbanks. The exposed area is part of the river body before but the exposure due to felling and killing of trees rendered it to the direct impact of sunlight and this will also have direct or indirect effect on fisheries.

CHAPTER FIVE

5.0 IMPLICATION OF STUDY, CONCLUSION AND RECOMMENDATIONS.

5.1 IMPLICATIONS OF STUDY.

This study exposed the participating taungya farmers in Gbangba forest reserve on their destructive role on the vegetation and biophysical components of the forest reserve as opposed to the agreement signed before the system commenced. On the other hand it revealed the attitude of inefficiency and effectiveness on the part of the Niger State government for failure to provide enough funds, logistic and manpower to the state forestry department for sustainable management of forest reserves under taungya practice. The resultant effect of these factors posed the entire forest reserve to destruction; trees are fast disappearing, wildlife and fisheries extinct, water sources drying up, land forms and soil degraded as a result of cultivation and over grazing. These factors will eventually pave way to water and soil erosion as well as flood. The long term implications shall now be environmental pollution which definitely can cause loss of lives and properties, and above all migration of the rural communities and animals from the affected areas.

5.2 CONCLUSION:

Results from this thesis indicate that afforestation via taungya practice in Gbangba forest reserve is a total failure. The primary objective of sustainable management of this particular forest reserve using taungya exercise in order to produce both food and trees was defeated. Instead the existing natural trees and vegetation are being cleared yearly in the course of land preparation and tillage for farming, and this has drastically depleted and degraded the soil. Wildlife and

fisheries diminished, water sources are drying up thereby giving room to both erosion and flood in some areas within the forest reserve.

However, there are many problems militating against the effective management of taungya exercise by the Niger State forestry department not only in Gbangba forest reserve but generally in various areas where the tungya system is being practised. These problems have been identified and the more serious ones include inadequacy of funds, labour, poor transportation and insufficient protection. Most if not all these problems confronting the effective management of taungya practice emanating from poor financing. Therefore, it is the opinion of the author that labour will continue to be in short supply to check the participating taungya farmers, if inadequate finance persists, and more so, if the present socio-economic problems like unemployment in the country is surmounted and when the rural populace have attained the reasonable level of economic development. Nevertheless, there are forms of interactions between the above enumerated problems, for instance, finance influences the amount of labour that can be employed and its productivity. Similarly, the brain behind inadequacy of transport facilities and patrols of the taungya farms is poor financing. Also inadequate transport facilities on the other hand affected the productivity of the labour force. On the part of the participating taungya farmers, they deserve serious enlightenment and supervision on their farming practices and the environmental impact of this forest reserve if it is completely destroyed.

Having highlighted the management problems, suggestions were offered based on my opinion (under recommendations) about how best to tackle the taungya farming systems. Although these suggestions may not be capable of

totally solving these problem, but they will go a long way towards sustainable management of taungya practice in forest reserves as well as environmental amelioration.

On the final note, government should provide funds commensurate with the need for effective and sustainable management of taungya systems in Gbangba forest reserve in particular and in Niger State generally.

5.3 RECOMMENDATION:

Based on the findings from the present study, the following recommendations are made:-

1. Government of Niger State should suspend taungya practice in Niger State for at least three to five years in order to assess the intensity of the previous destruction.
2. The environmental impact assessment of the affected forest reserves should also be carried out so as to determine the level of environmental pollution via taungya practice.
3. Government should increase the financial allocation to state forestry department in order to ensure intensive management of taungya practice.
4. A clear and unambiguous forest policy should be made so as to ensure stronger legislation and control and to devolve on the forestry department more judicial power to deal with forest offenders.
5. More vehicles and motorcycles should be provided to ensure effective patrolling and supervision of the taungya operations in the forest reserve.
6. Both Federal, State and Local Government should embark on massive afforestation programme and also create more awareness in the minds of

the people (especially rural areas) as to what forest is and its role in the Nigeria economy.

7. The forestry department should organise forest workshops especially at the rural level to enhance the awareness and skill of the participating farmers.

These recommendations will ensure integrated package of programmes designed to achieve effective and intensive management of taungya exercise in Gbangba forest reserve.

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APPENDIX I

QUESTIONNAIRE FOR ASSESSMENT AND EVALUATING THE EFFECT OF
TAUNGYA FARMING ON GBANGBA FOREST RESERVE, GBAKO LOCAL
GOVERNMENT AREA, NIGER STATE.

VILLAGE-----

1. Name of farmer.....
2. Sex: Male/Female
3. Age:.....
4. Do you farm in the forest reserve?
Yes..... No.....
- 4.1 How long? (a) Below 5 years (b) 5 years (c) 7 years
(d) 10 years (e) Above 10 years.
- 4.2 What compelled you to farm in the forest reserve?
(a) Scarcity of land (b) Fertility of the forest reserve land
(c) Land tenure system of the communities (d) All of the above.
- 4.3 What type of farming system do you practice?
(a) Shifting cultivation (b) Rotational Cropping
(c) Mixed cropping (d) Mono cropping (e) All of the above
- 4.4 What type of crops cultivated?
(a) Rice (b) Guinea corn (c) Maize (d) Yam
(e) Millet.
5. Did you notice any decrease (in terms of quantity) in the yield of the crops cultivated in the subsequent years? Yes..... No.....
- 5.1 Quantify your subsequent yield for the past 5 – 10 years.
(a) Below 20 bags (b) 20 bags (c) 25 bags
(d) 30 bags (e) Above 30 bags.
6. Have you been planting trees in the forest reserve? Yes..... No.....
- 6.1 How many hectares have you planted so far?
- 6.2 If you have not been planting, why?
(a) Lack of seedling (b) Lack of supervisory staff.
(c) Lack of proper management technique (d) Fear of being vacated from the forest reserve earlier than required (e) All of the above.
7. Which other activities do you perform in the forest reserve?
(a) Timber exploitation (b) Collection of firewood.
(e) All of the above.
8. Does the cattle rearers graze in the forest reserve?
Yes..... No.....
- 8.1 How long?
(a) Before constituted as forest reserve
(b) After constituted as forest reserve.
(c) All of the above.
- 8.2 Did you experience forest fires in the reserve?

- Yes..... No.....
- 8.3 Through what source?
(a) Land clearing for farming (b) Poachers (c) wild fires
(d) All of the above.
9. Has the forest reserve been of any other benefit to you, your family or community? Yes..... No.....
- 9.1 How?
(a) Economic benefit (e.g. Timber, food crops, firewood etc)
(b) Social benefit (e.g. Recreational centre, cultural centre)
(c) a and b (d) None of the above.
11. Comment on the environmental impact of this forest reserve to your community.
(a) Wildlife conservation (b) Water resources and soil Conservation
(c) Climatic amelioration (d) All of the above.

APPENDIX II

Table 1. Age categories of the participating farmers.

Age class	Frequency	Percentage
20 – 40	15	30%
41 – 60	26	52%
61 – 100	9	100%
Total	50	100%

APPENDIX III

Table 2.

Sampled population density in each of the selected communities.

No.	Name of Community	No. of Farmers	Percentage
A	Wasagi	25	50%
B	Edotsu	15	30%
C	Tiwugi	6	12%
D	Gusadi	5	10%
E	Kolobu	4	8%

APPENDIX IV

Table 3.

Duration of farming exercise in the forest reserve.

No. of years	Frequency	Percentage
Below 5 years	3	6%
5 years	5	10%
7 years	7	14%
10 years	10	20%
Above 10 years	24	48