

**TAUNGYA FARMING AND ENVIROMENTAL  
IMPACT IN BONU FOREST RESERVE  
GURARA LOCAL GOVERNMENT AREA  
NIGER STATE**

**BY**

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**PGD/2000/2001/118**

SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY SCHOOL OF  
SCIENCE AND SCIENCE EDUCATION FEDERAL UNIVERSITY OF  
TECHNOLOGY MINNA IN PARTIAL FULFILMENT OF THE REQUIREMENT  
FOR THE AWARD OF POST GRADUATE DIPLOMA IN ENVIRONMENTAL  
MANAGEMENT TECHNOLOGY.

**MARCH 2002.**

## DECLARATION

I hereby declare that this study, Taungya farming and Environmental impact in Bonu Forest reserve, was carried out by me as a requirement for the award of Post Graduate Diploma in Environmental Management Technology.



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(STUDENT)

27-3-2002

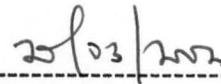
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## CERTIFICATION

This is to certify that Garba Musa Baba, carried out this study 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.



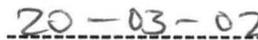
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## DEDICATION

This work is humbly dedicated to my parents who gave so much to me; and to my wife and children for their endurance.

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## ACRONYMS

DS – Dissolved Substances

EIA – Environmental Impact Assessment

FRIN – Forestry Research Institute of Nigeria

FRS – Forest Resource Study

G-7 – Group of Seven most industrialized Countries

IUCN – International Union for Conservation of Nature

KM – Kilometer

NEPA – (US) National Environmental Policy Act

PF – Soil Moisture Potential

RRA – Rapid Rural Appraisal

SNR – Strict Nature Reserve

SPP – Species

SS – Suspended Solids

UNCED – United Nations Commission on Environment and Development

UNECE – United Nations Economic Commission for Europe.

US – United States (America)

state in 1927, to find out the best method of regenerating the high forest. A number of tree species, including *Tectona grandis* were planted, whilst the farmers cultivated such common crops like *Dioscorea spp* (yams) *Vigna sinensis* (cowpeas) *Lycopersicum esculentus* (okro) and *Arachis hypogea* (groundnuts).

By the 1930s, operation of Taungya system became a condition for reservation of forest land in Benin division, with a specific request by Government for an undertaking by the forest department! "To make available annually, 250 hectares of forest reserve land for farming in return for an additional 250km<sup>2</sup> to the forest estate" (Ogbe, 1966).

From a rather modest and experimental beginning, the practice of Taungya subsequently spread to virtually every part of the country. Obviously, the initial stimulus in adopting the system by the forest departments, as reported by Enabor (1973), was the substantial reduction in the per hectare costs of forest plantation establishment and the consequent expansion of the total plantation area that could be established with given funds.

As a result of rapid population growth coupled with the pressure on available farming lands and the impoverishment of such lands, the need to accommodate needy farmers in rural areas, in order to improve their economic well – being and avoid political agitation for de reservation became compelling considerations for adopting the system in Niger State.

Hence the system was started in Niger State in 1978 and specifically less than a decade ago, that is in 1995 in Bonu forest reserve. So far, more than 150 hectares have been officially approved and put under Taungya farming in the study area and the participants are mainly from the Bonu community.

The approval of the scheme for the Bonu community became necessary as a result of the obvious 'land hunger' suffered by the community because of the proposal for the acquisition of a large percentage of their farming lands by the Niger State Government for the purpose of development of the re known Gurara water falls, so as to boost tourism.

To date, 50 farmers have been granted approval to practice Taungya farming and each was allocated 3 hectares of forest reserve land. Thus bringing the total area of farms under the scheme to about 150 hectares.

Under the conventional form of Taungya in Niger State, the forest crop is the dominant use and cultivation of agricultural crops is limited to a period when they do not constitute undesirable rivals of the forest crop, normally between 2 to 4 years. The farmer is regarded strictly as a tenant and exercises no legal interest in the land. However he retains complete little over his output of agricultural crops which he disposes as he wishes.

Presently, the following agricultural crops are planted in Bonu forest reserve

1. *Zea maize* (Maize)
2. *Arachis hypogea* (Groundnut)
3. *Lycopersicum esculentum* (Tomatoes)
4. *Musa sapientum* (Banana)
5. *Musa paradisiaca* (Plantain)
6. *Manihot ultissima* (Cassava)
7. *Sorghum spp* (Guinea corn)
8. *Vigna sinensis* (Cow peas)
9. *Oriza sativa* (Rice)
10. *Dioscorea spp* (Yams)
11. *Saccharum officinarum* (Sugarcane)
12. *Citrullus vulgaris* (Melon)

The rules under which the system is operated are formulated unilaterally by the forest department. These may include conditions of admission of farmers to the scheme, their discipline and termination, types of agricultural crops to be planted and designation of maintenance operations required of farmers.

The followings are among the regulations guiding the system in Bonu forest reserve.

- a) Planting up of Taungya farms with forest trees by the forestry department beginning from 1999, followed by fresh allocation of new farm lands to those

who have effectively tended the forest tree crops on their plots, after the forest trees must have started closing canopy.

- b) The prohibition of planting permanent crops such as fruit trees and the *Musa spp.*
- c) The prohibition of unauthorised expansion of farms by participants and the illegal admittance of new participants by incumbent farmers.
- d) The expulsion of farmers who flout laid down rules and regulations of the scheme.

## 1.2 PROBLEM STATEMENT

Forestry has many different harmful impacts on the environment because of the nature of the operations. For example, logging and clear felling operations could modify the ecosystem and trigger off erosion or aridity.

Taungya farming which involves the raising of forest trees together with arable crops on the same piece of land with the trees forming the main crop, has been practiced in Niger State for about 23 years now.

However its practice in Bonu forest reserve in a way that is contrary to the laid down rules and regulations, has become a precursor to extensive degradation of the environment. After a period of 6 years since the commencement of Taungya in this forest reserve, no single forest plantation tree species has been planted in the area by the forestry department, even when laid down rules and regulations

stipulate that the planting up of the Taungya farms should have been started in 1999 and continued in the subsequent years.

Thus Taungya farming in this forest reserve, particularly in the study area which was once rich in Biodiversity, could best be described as a system that is synonymous to shifting cultivation which has left behind an indelible mark of degraded areas, covered with farms and unplanted with forest trees according to the regulations establishing the scheme; completely deforested and exposed to further environmental hazards which has grave consequences for the forest reserve environment and beyond.

### 1.3

### AIM AND OBJECTIVES

The main aim of this study is to conduct a post-project evaluation of impacts of the practice of Taungya farming on the environment of Bonu forest reserve, in order to establish a relationship that would determine the possibility of continuing the scheme or rejecting it, and proffering solutions or alternative options for effective decision making.

Therefore the specific objectives for achieving the fundamental aim of this study include the following:

1. A survey of the current Taungya farming practices in Bonu forest reserve, in order to establish those practices that are detrimental to the environment.

2. An assessment of the biophysical environment in and around the Taungya farms.
3. Assessment of socio-economic concerns of the forest reserve environment and also Bonu community.

#### 1.4

### JUSTIFICATION

Forest reserves are natural habitats which have been legally set aside by Government for the purpose of conservation, protection and judicious management of resources there-in, in order to supply goods and services on sustained basis, for human benefit.

According to a reknown geographer, Camp (1956), Forests are known to have existed 300 million years before the advent of man. With the advent of man about a million years ago, the composition and distribution of forests all over the world has undergone some changes because of his deforestation activities, which must be viewed as a legitimate means of facilitating his practice of agriculture and industry etc, or for exploitation of forest resources for fuel wood and timber or non-timber forest products (NTFPS).

The goal of every good forest management is the provision of goods and services in perpetuity. However, the introduction of Taungya farming in Bonu forest reserve about 6years ago, and whose aim at that time was a multiple use concept adopted to address the issue of increased production of forest goods and services, together with high agricultural output and subsequent boosting of

socio-economic standards of participating community, has resulted in enormous land degradation. This has adversely affected the biodiversity and other biophysical and socio-economic components of the forest reserve, simply because the rules and regulations of Taungya farming have not been adhered to, coupled with bad farming practices.

This unhealthy development is obviously contrary to international efforts at promoting sustainable forest management. The International Union for Conservation of Nature (IUCN), believes that an attempt should be made to conserve viable populations of all species of animals and plants, and the genetic diversity they contain. Secondly, there should be concerted effort for the retention of sufficient forestland to provide for a nation's need for forest goods and services. Thirdly, there should be retention of forest on all land where its removal would bring erosion and flooding. Lastly, it is generally preferable to protect local and regional climates and retain options for future land use by retaining as much forest on other lands as possible (Omiyale, 1997).

Considering the extent of land degradation in Bonu forest reserve, particularly as a result of Taungya farming, the need to carry out a post-project environmental impact assessment in order to proffer solutions to the problems and hence aid effective and rational decision making on the status-quo of the forest reserve environment, can never be over emphasized. This would obviously enhance sustainable development which emphasizes "The handing down to future generations not only *man – made capital*, such as roads, Schools and historic buildings; and *human capital*, such as knowledge and skills, but also *natural /*

*environmental capital*, such as clean water, fresh water, rain forest, the ozone layer and biological diversity" (Glasson et al, 1999).

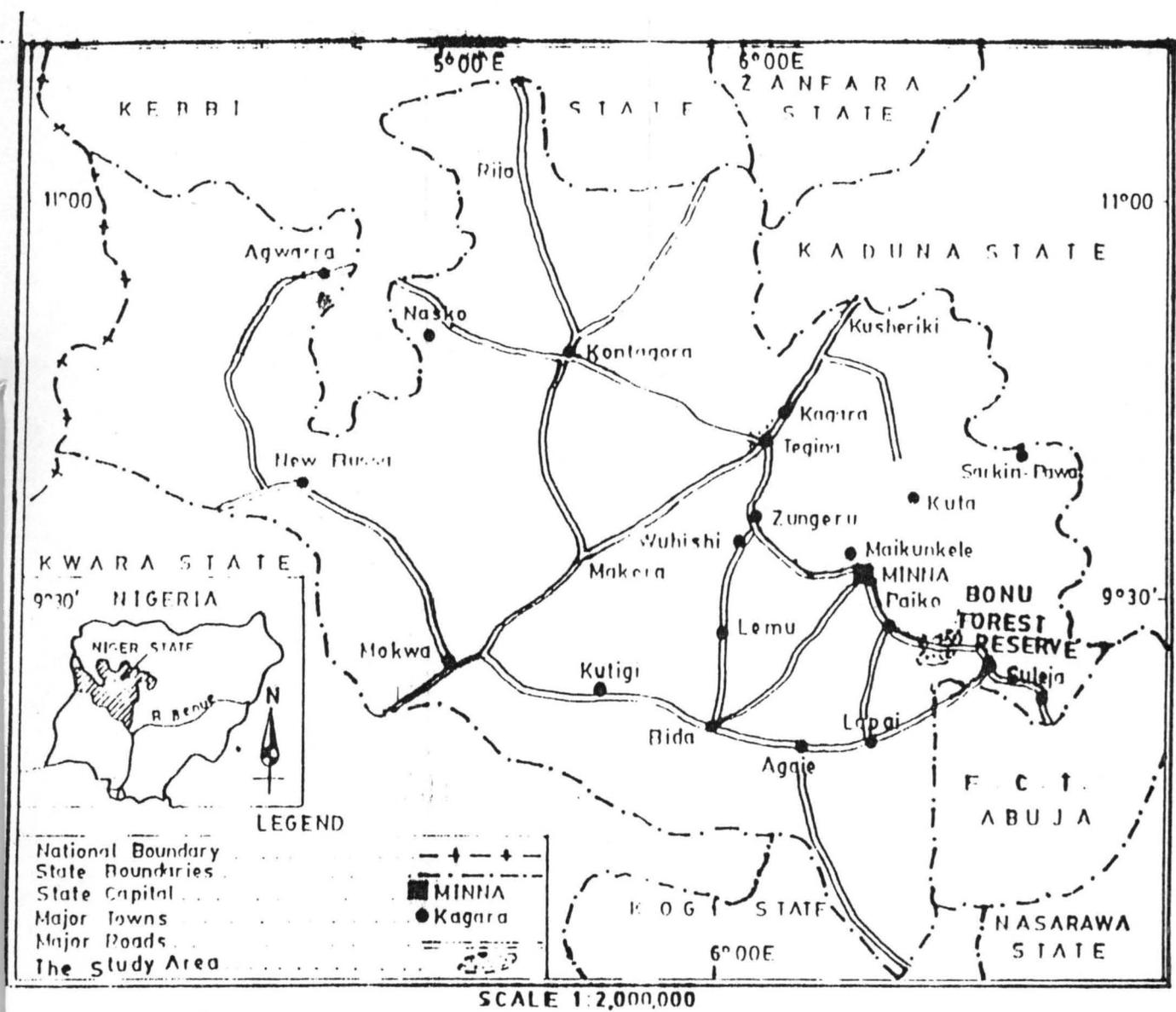
## **1.5 DESCRIPTION OF STUDY AREA**

### **1.5.1 LOCATION OF BONU FOREST RESERVE**

The Forest reserve which was legally constituted by the then Northern region and gazzeted as Gwari Native Authority Bonu forest Reserve order, 1960, is located in the Ednun district of Suleja Emirate, in Gurara Local Government Area, Niger State. It lies approximately between Latitude 9 degrees 19 minutes 43 seconds and 9 degrees 23 minutes 0 seconds, and Longitude 6 degrees 52 minutes 50 seconds and 7 degrees 2 minutes 5 seconds (source: Nigeria Forest Resource Study, FRS Data Base 1998).

It is situated about 64kms south of Minna town on both sides of the tarred motor road from Minna to Suleja and adjacent to the famous Gurara water falls, in the North westerly direction.

Fig 1.1 MAP OF NIGER STATE SHOWING THE LOCATION OF BONU FOREST RESERVE



SOURCE: FEDERAL DEPARTMENT OF FORESTRY

## **1.5.2 LAND AREA AND SURROUNDING COMMUNITIES**

The area of the forest reserve, according to the gazette (legal instrument) establishing it, is put at approximately 51.598km<sup>2</sup> and is presently surrounded by the following villages:

- |          |           |              |             |           |
|----------|-----------|--------------|-------------|-----------|
| 1. Bonu  | 4. Kutili | 7. Dagbanku  | 10. Dagigbe | 13. Kungo |
| 2. Gwalu | 5. Tuna   | 8. Lodna     | 11. Sanna   |           |
| 3. Bazhi | 6. Ebba   | 9. Chepkezhi | 12. Dado    |           |

## **1.5.3 THE TARGET COMMUNITY (BONU VILLAGE)**

Bonu, which is the only community officially participating in the Taungya scheme and after which the forest reserve is named, is situated close to the Southern boundary of the forest reserve. It is about 67 kms South of Minna town, on the right hand side of the Minna to Suleja motor road, West wards of the famous Gurara waterfalls, and is located in the Ednun district in Gurara Local Government Area, Niger State.

The community moved to its present location more than 100years ago, that is before the constitution of the forest reserve in 1960, from a location inside the forest reserve and which is presently covered by the Taungya farms in the western area of the forest reserve, very close to the Bomu Bobo stream and a traditionally preserved patch of frindging forest.

Based on estimates by the key informants in the community, the population of Bonu village is put at approximately 2200 persons, derived from a total of 70 house holds of an average of 32 persons per household. the people are predominantly farmers and they also engage in other occupations such as hunting, fishing and wood carvings.

#### **1.5.4 TOPOGRAPHY AND SOIL**

The entire forest reserve is undulating, with slopes facing different directions in different places. The altitude is up to 420 meters above sea level in some areas while other areas are relatively very low. The soil is freely drained sandy loam, founded from pre-Cambrian igneous rocks of the basement complex, basalt and gneiss. The surface layer is generally dark coloured, with humus. It is shallow, rocky or gravelly on hill slopes, but deep, rich and fertile in the lowlands (Annon, 1976).

#### **1.5.5 VEGETATION AND WILDLIFE**

The area which lies in the southern guinea savanna zone is composed of frindging forest and savanna woodland. The commonest families of the frindging forest include the Sterculiaceae, Ulmaceae and Moraceae which are made up of *Cola gigantia*, *Cola hispida*, *sterculia tragacantha*, *sterculia rhinopetala*, *celtis brownii*, *celtis zenkeri*, *Antraris africana*, *chlorophora excelsa*, *Drypetes floribunda*, *Elaeis guinensis*, *Thalia geniculata*, *Landolphia owariensis*, *Kaya grandifoliola*, *kaya senegalensis*, *Draceana fragens* and *Bombax*

*buonoponzense*. Other common species are *Adina microcephala*, *Diospyros mesipiliformis*, *manilkara multinervis*, *Malencantha alnifolia* and *Costus afer*.

On the other hand, common species of the savanna woodland include: *Uapaca togoensis*, *Milletia thonningii*, *Anogeissus leocarpus*, *Isobertinia doka*, *Danelia oliveri*, *Gardenia erubescens*, *Annona senegalensis*, *Parkia biglobosa*, *Vitellaria paradoxa*, *Vitex doniana* and *Adansonia digitata* e.t.c.

A typical fringing forest of Bonu forest reserve which is still growing along and around parts of Bomu Bobo stream is shown in plate I. The vegetation is in the western location adjacent to some Taungya farms and the relics of old Bonu. Hunting, fishing, farming, vegetal cutting etc are all strictly prohibited in the area, which is held sacred by Bonu community.

**PLATE I:** A portion of the fringing forest preserved for traditional practices.



SOURCE: COMPILED BY THE AUTHOR

Many varieties of herbs and grass species are also found in the forest and the entire vegetation is subjected to annual bush fires, which have devastating effects on flora and fauna. Most of the savanna trees and shrubs have developed fire resistance characteristics which is evident in the nature of their barks.

Fulani cattle also graze a large percentage of the vegetation and the availability of water for their herds has obviously encouraged many nomads to settle inside the forest reserve close to river Gurara.

Common wildlife species found in the forest reserve include *Phacochoerus aethiopiensis* (warthog), *Papio anubis* (Dog faced babbon), *Tragelaphus scriptus* (bush buck), *Coropitherus mona* (mona monkey), *Cerocebus turgatus* (mangabey monkey), *Cephalophus dorsalis* (Ray duiker), *Hyaena hyaena* (Hyaena), *Panthera pardus* (Leopard), *Syntherisma caffer* (Buffalo), *Python seps* (Rock python), *Hystrix sp* (crested porcupine), *Thyronomys swinderranus* (Grass cutter) and varieties of fish. *Crocodilus niloticus* (crocodile) species are also common in the river Gurara.

### **1.5.6 CLIMATE**

Bonu Forest reserve experience two distinct seasons: the raining season, which commences from April and end in October, with an annual rainfall of about

1250mm to 1500mm; and the dry season, which starts with the harmattan and shortly changes to hot weather, beginning from November to March. Temperatures could be as high as 38<sup>o</sup>c during the hot weather and as low as 10<sup>o</sup>c in the cold season. (Annon, 1976)

### **1.5.7 HYDROLOGY**

The forest reserve is endowed with some streams in and around it, and also the river Gurara. The streams are:

1. Sudanyi
2. Diridna
3. Bomu
4. Rafin Jatau
5. Gyadan
6. Bomu Bobo
7. Gbandiri

Most of these streams which used to flow perennially have now become seasonal and they all drain into the river Gurara.

The river Gurara forms about 5kms of the eastern forest reserve boundary, with the Sudnayi and Diridna streams joining it in the westerly and southerly directions respectively and also serving as parts of the forest reserve boundary in such locations; whilst the Bomu and Rafin Jatau streams also forms parts of

the forest reserve boundary respectively in other locations. The remaining streams which include the Gyadna, Bomu bobo and Gbandiri all exist and flow internally, inside the forest reserve.

## **1.6 SCOPE AND LIMITATION OF STUDY**

In view of the time available for this special project and the resources at my disposal, the study was limited to Taungya farms of the Bonu community only, which is conducted on an area of approximately 150 hectares in the forest reserve.

Therefore questionnaires were designed and administered on more than 20% of participating farmers in the community. Separate questionnaires were also administered on some officials of the Zonal Forestry Office, Gawun - Babangida (the field office in-charge of the management of the Bonu forest reserve) and officials of the Niger State Forestry Services, Ministry of Agriculture and Natural Resources, headquarters, Minna.

On the other hand, the identification of impacts was facilitated by the consideration and evaluation of impact indicators shown in table 1.1 below.

**Table 1.1 : IMPACTABLE COMPONENTS OF THE ENVIRONMENT AND ASSOCIATED IMPACT INDICATORS.**

ENVIRONMENTAL COMPONENT	IMPACT INDICATORS
Climate	Temperature, humidity
Air quality	Particulates, NO <sub>2</sub> and CO <sub>2</sub>
Water quality and quantity	Availability, Solids (SS, DS) Turbidity, Toxicity.
Hydrology	Drainage, Sedimentation, River or Stream bank and bed erosion.
Soil/Land use	Erosion, subsidence, farming, hunting.
Ecology	Diversity and abundance of aquatic and Terrestrial flora and fauna
Fisheries	Productivity, Abundance and diversity
Wildlife and Forestry	Habitat, conservation (Strict Nature Reserve) plantation establishment.
Archaeology	Cultural relics, sites
Socio – economic factors	Population, income, settlement pattern, health and safety.

Source: Balogun, I. (2001): Ecological Disasters: Types, Manifestations and consequences in Nigeria.

## CHAPTER TWO

### 2.0: LITERATURE REVIEW

#### 2.1 TAUNGYA FARMING AND ENVIRONMENTAL IMPACT.

Forestry has been making very vital contribution to the stability and development of rural areas by making available relatively fertile lands within forest reserves for arable farming under a scheme known as Taungya. The scheme, according to Enabor (1972), has ensured substantial reduction in afforestation costs, improved farmers incomes and eliminated disguised employment in rural areas. He concluded that, "Taungya system presents unusual opportunities for accelerating rural development in Nigeria".

Taungya Farming refers to farm forestry. That is, the simultaneous husbandry of forest crops (for wood products) and food crops. Fagbenro et al (1982) estimated that the total area under combined wood and food production in Nigeria was about 20,000 hectares, involving 50,000 farming families.

Enemouh (1966), has provided a summary of the economic objectives of Taungya in Nigeria. These include:

1. To reforest remote parts of the country and reduce establishment costs of forest plantations
2. To redistribute the population towards the less- dense rural areas.

3. To increase overall productivity of the country by bringing under food production the rich uncultivated parts of forest reserves.
4. To provide employment for the rural population and reverse the drift from the villages to cities.
5. To raise the living and social standards of the rural communities.

Though Taungya has many laudable goals and objectives that may enhance rapid rural development, its practice also impact negatively on the forest reserve environment in which it is conducted.

Taungya farming operations normally consist of clearing of vegetation and burning, cultivation and cropping of arable and forest crop. Given the die-hard tradition and economic conditions prevailing amongst peasant farmers, burning is likely to remain the most feasible method of clearing the vegetation or the post-harvest slashes in Taungya farms. Nwoboshi (1980).

The possible effects of these operations during the first rotation of a Taungya scheme has been discussed. Nwoboshi (1972), who examined the effects of burning on soil under Taungya, noted that when the vegetation is burned, most of the mineral elements locked up in the plant tissues are usually returned to the soil while some like Nitrogen and Sulphur are lost to the atmosphere.

According to him, burning the tropical rainforest vegetation in Sapoba brought about sudden increase in Potassium, Calcium, Magnesium and Phosphorus

and a decrease in Nitrogen content of a sandy loam soil. His earlier studies (Nwoboshi, 1970) further indicate that while burning per se did not significantly reduce soil fertility in Sapoba area, it did expose the soil to such destructive forces as high temperatures and the full impact of heavy rainfall and their attendant nutrient losses and the soil structure destruction.

It has also been reported that soil cultivation carried out under the Taungya Scheme, to reduce weed competition and improve soil aeration could lead to alteration of physical, chemical and biological properties of the farmland. For instance, cultivation significantly reduces the number and variety of microbes including atmospheric Nitrogen fixers, and producers of natural polymers that stabilize soil structures (Finck, 1973).

Andrae (1973) and Frinck (1973), have both noted that improved aeration due to cultivation, speeds up oxidation of organic matter. In soil where kaolinitic clay with small adsorption capacity predominates and both soil structure and fertility are dependent on organic matter as in most Nigerian forest soils. Such accelerated degradation of humus leads to impaired nutrient adsorption and water holding capacity as well as structural stability. Such soils tend to acquire the characteristics of a sandy soil and in the event of heavy rainfall, may be susceptible to considerable leaching and sheet erosion.

Babalola and Chheda (1972), who examined the extent to which various cultural practices in Nigeria have modified soil structure, concluded that cultivated soils have considerably less stable and smaller aggregates than

forest soils, have lost about 63 per cent of their organic matter content and about 40 per cent of their water holding capacity at *PF 1.6*. The authors have also claimed that almost all-single grain structure results from intensive cropping system.

Reduced productivity can also result from nutrient losses caused by export of food and wood materials from Taungya farmlands. The full impact of this source of nutrient loss on the productive potential of Taungya lands is enormous. In addition it is also often held that certain species of trees grown in Taungya farms tend to lead to speedy and adverse soil changes.

It is obvious that the combination of arable and short rotation tree crops provides opportunities for making increased use of the land potential. It however also increases the danger of environmental degradation as the land is more intensively used.

## **2.2 ENVIRONMENTAL IMPACT ASSESSMENT.**

Environment impact assessment (EIA) may be regarded as a central step in the achievement of sustainable development. The definition of environmental impact assessment by Munn (1979), as quoted in Glasson et al (1999), refers to "the need to identify and predict the impact on the environment and on man's health and well- being, of legislative proposals, policies, programmes, and to interpret and communicate information about the impacts".

Glasson et al (1999), also referring to an altogether more succinct and pithy definition by the United Nations Economic commission for Europe (UNECE), stated simply that environmental impact assessment is an assessment of the impacts of a planned activity on the environment. He stressed further that "Environmental impact assessment is a process, a systematic process that examines the environmental consequences of development actions, in advance and the emphasis, compared with many other mechanisms for environmental protection is on prevention".

EIA is not a substitute for decision-making but does help to clarify some of the trade-offs associated with a proposed development action, which should lead to more rational and structured decision – making. The EIA process has the potential to balance the interests of any development action and the environment.

Thus, environmental impact assessment was first formally established in the United States of America in 1969 as the US National Environmental policy Act of 1969 (also know as NEPA), and has since spread, in various forms, to most other countries.

Since the enactment of NEPA, EIA systems have been established in various forms throughout the world, beginning with the more developed countries – e.g. Canada in 1973, Australia in 1974, West Germany in 1975, France in 1976 and latter also in less developed countries. The early 1990s also witnessed a large growth in the number of EIA regulations and guidelines

established in South America and Africa (including Nigeria) (Glasson et al, 1999).

These EIA systems, according to the authors vary greatly. Some are in the form of mandatory regulations, Acts or statutes, which are generally enforced by the authorities requiring the preparation of an adequate environmental impact study before permission is given for a project to proceed. In other cases, EIA guidelines, which have been established, only generally impose obligations on the administering agency whilst other legislations allow government officials to require EIA to be prepared at their discretion.

In a decisive response to the many harmful impacts certain forestry operations have on the environment, Umeh (1981), stressed that; "It has become increasingly important to have preliminary assessments of environmental impact after the pre – feasibility studies before embarking on any forest project". He has also given guidelines on how to evaluate environmental impacts in forestry for the benefit of Nigerian forestry departments.

A unique factor of the guidelines include the stipulation that data should be collected on basic environmental information such as susceptibility of soil to erosion, relative stability of land forms, baseline water quality, habitats of key species and relative scientific value, and sensitivity to disturbance of various vegetation types.

The guidelines further stipulated that. "In detailed assessment, the technical description of the forestry project should also define the foreseeable biophysical and socio-economic impact region of that project". It finally directs that " Impacts should be written and structured so that they focus on significant issues that require administrative or political action". In conclusion, he drew the attention of all Foresters to the necessity of having a checklist of certain practices that could cause the deterioration of the forest environment. He also recommended that, "Forestry Departments while awarding contracts for feasibility studies should build in environmental impact assessment of the project into the study". EIA could be pre-project or a post-project analysis. Whilst the pre-project analysis consists of techniques which have been developed for estimating the environmental impact of proposed activities, the post-project analysis on the other hand is one way to study environmental impacts of developments which have been completed, or are in full swing. (Mitchell,1989).

Whether it is pre or post-project EIA, the concept must be viewed as a positive process that seeks a harmonious relationship between development and the environment so as to enhance overall sustainable development - " A Development which meets the needs of the present generation without compromising the ability of future generations to meets their own needs"(Brundtland et al 1987,Quoted in Baba, 1992). Sustainable development obviously means living on the earth's income rather than eroding its capital. As was rightly elucidated in Glasson et al (1999), " It maintains the

quality of life, maintains continuing access to natural resources and it also prevents lasting environmental damage”.

## **CHAPTER THREE**

### **3.0 DATA AND METHODOLOGY**

#### **3.1 DATA COLLECTION**

This study is based on primary and secondary data. The secondary data was collected from various sources including government and non-government documents, relevant published and unpublished reports.

##### **3.1.1 Data on Taungya farming and other socio-economic concerns.**

The Rapid Rural Appraisal technique (RRA) was used to collect primary data on socio economic aspects and the Taungya farming system as conducted by the Bonu community.

The practical approach of the technique used in the community was to meet a representative group of Taungya farmers in the village head's palace. Twelve Taungya farmers were in attendance and this number represents about 24% sampling intensity.

The aim and objectives of the study was introduced and explained to the audience after which some general discussions concerning taungya and environmental conservation in dialogue form was held with them.

The group was then split into 2 smaller units and each unit was engaged in further guided discussions based on the questionnaire prepared for the purpose. Two single individuals were also further probed as deemed necessary, one from each group, to get an in - depth information on the subject matter. These individuals have been classified as key informants. Because of the poor educational background of the audience, responses by them including those of the two individuals were marked or written on the questionnaires accordingly, by me.

The RRA method was adopted because of the rather short time available for data collection and also because of the nature of the target audience. The method enabled me to get immediate responses and comments from the farmers on issues raised, and which addressed some of the terms of reference of this study.

The information collected was not designed for statistical or quantifiable analysis; rather the strategy in which semi-structured questions were orally administered on the audience was adopted.

Two types of questionnaires were prepared; one was administered on members of the Bonu community engaged in the scheme while the other was for the state forestry officials both at the Zone and headquarters level. Questionnaires meant for the Niger State forestry officials were physically posted to the various officials concerned and written responses there - in were

latter collated for further analysis. The different types of questionnaires are presented in appendix 1(A) and (B) respectively.

### **3.1.2 Impacts Identification**

The physical examination of the existing Taungya farms and the surrounding environment was carried out in order to ascertain the farming practices such as land clearing methods, tillage systems, post harvest land preparation methods, and fertilizer application in relation to the environment;; so as to identify those practices that are possibly detrimental to the environment. Photographs of some cross-sections of the environment and Taungya farms were also taken for use in elucidating the problems there in.

In identifying the impacts, the characteristics of the Taungya farms and the surrounding environment were evaluated and considered in contrast with the pre - 1995 environmental characteristics as the baseline, in order to ensure that all potentially significant impacts (adverse or favourable), were identified and taken into account in the environmental impact assessment (EIA) process.

A simple checklist based on a list of biophysical, social and economic factors that have been affected by Taungya farming in the forest reserve, was used to identify and assess impacts and the magnitude of such impacts. The checklist is presented in appendix 2

### **3.2 METHODOLOGY OF DATA ANALYSIS.**

The data collected was not designed for statistical or quantifiable analysis.

Responses of the two categories of interviewees (Taungya farmers and forestry officials) were collated and analysed as much as possible in such a way as to facilitate further discussion.

The Biophysical environmental and other socio economic data were analysed using the magnitude of negative and favourable impacts of Taungya on the components concerned as a basic focus. Therefore three or more very important negative impacts on any one major environmental component or area of socio-economic concern, formed the basis for preparing a detailed impact report focused on that component or concern. This system is in line with the guidelines on how to evaluate environmental impacts in Forestry, which were given by Jessop (1978), Sinden (1978) and F. A. O (1978), as reported by Umeh (1981).

The strategy adopted also describes impacts in terms of the nature and magnitude of the change occurring or that has occurred, and the nature, location, number, value, sensitivity of the affected receptors. It considers the time scale over which the effects have occurred, so as to enable the making of further predictions clearly on whether impacts are short, medium or long term, temporary or permanent, reversible or irreversible.

A baseline vegetation of the pre -Taungya period ending specifically in 1994 was used as a standard for evaluating the dynamics of the forest reserve environment, particularly areas on which the so called Taungya farming is being practice.

## CHAPTER FOUR

### 4.0 ANALYSES AND DISCUSSION OF RESULTS.

#### 4.1 THE TAUNGYA FARMING PRACTICE

Responses from the Taungya farmers and forestry official's shows that the scheme has been in practice for the past 6 years, in Bonu forest reserve. It was stated in 1995 and up till date, forest trees have not been planted, despite the stipulated period of 4 years for planting up the farms with trees. This has been attributed to lack of funds and other logistic problems in the Niger state forestry services department.

The Taungya farms are located eastwards of the Minna to Suleja motor road on very steep slopes and in the valley along the Bonu steam, which parts before Taungya, used to be the "Strict Natural Reserve No. 7 " established as far back as 1958 by the Forestry Research Institute of Nigeria (FRIN) Ibadan. The object is to " preserve in perpetuity samples of the natural vegetation types of the area to serve scientific, economic, educational and cultural purposes. " Olatoye, (1976).

Other Taungya farms are also located about 300 meters across the tarred motor road in the westerly direction and right on the relics of old Bonu and along parts of the Bomu Bobo stream, down stream and adjacent to the natural vegetation that has been preserved by the traditional and spiritual practices of the Bonu community.

The establishment of the Taungya farms initially involved the massive deforestation and burning of the erstwhile fringing forests along parts of the two earlier mentioned streams and other very vulnerable areas such as the steep slopes. This was followed by cultivation of ridges for cereals and heaps for Yams. Since then, cropping of the land has continued in all the years without any fallow period or planting of forest trees.

Plates II and III are cross sections of Taungya farms around and along the Bomu stream and other vulnerable areas including of course parts of the destroyed "Strict Natural Reserve" (SNR) in the eastern location; and Taungya farms around Bomu bobo stream and on relics of old Bonu village in the western location of the forest reserve respectively.

The two plates tell very sad and unfortunate stories of enormous biodiversity destruction and the subsequent exposure of the very sensitive water resources and vulnerable landforms and soils to an almost irreversible and extensive degradation, all in the name of Taungya.

**Plate II: Taungya Farm in the Eastern Location**



SOURCE: BY THE AUTHOR

**Plate III: Taugya Farm in the Western Location**



SOURCE: COMPILED BY THE AUTHOR

#### 4.1.1 Detrimental Farming Practices.

Some farming practices which are significantly detrimental to the forest reserve environment were identified and are outlined below:

1. Massive deforestation in the process of land cleaning particularly of very vulnerable areas such as the steep slopes of the eastern location and the valleys of the same area along the Bomu stream and also of other areas around the Bomu Bobo stream in the western location, resulting in the degradation of land forms and the permanent or near - total destruction of water shed in the affected areas.

Plate IV below shows the remains of parts of the SNR NO 7 on a very steep slope, whose portions have been cleared and put under cultivation in the so called Taungya farms for more than four years now. This action has already triggered off erosion on the affected landform.

Plate IV: Massive deforestation of Strict Natural Reserve No. 7 and Cultivation on a very steep slope.



SOURCE: COMPILED BY THE AUTHOR

- II. Bush burning as a means of cheap method of land clearing particularly of secondary vegetation and the burning of crop residues during land preparation for subsequent cropping.
- III. Land clearing with the aid of herbicides such as gram ozone and other common post emergence weed control chemicals, on farmlands and slopes very close to the Bomu and Bomu Bobo streams.

The cleared area which is adjacent to the sorghum plot shown in the plate III is located on a gentle slope near the Bomu Bobo stream in the western location of the forest reserve, the area was cleared using gram ozone weed killer after which it was burnt, in preparation for the making of yam heaps in October 2001.

- IV. High manual tillage systems of ridges for cereals and heaps for yams.
- V. Cultivation on very steep slopes with such ridges or yam heaps not properly aligned along the contours.
- VI. Cultivation very near to and right at the banks of the Bomu and Bomu Bobo streams. The yam heaps and sorghum farm in plate II shows very good example of bad farming practices along the Bomu stream. The yam heaps were cleared using gram ozone herbicide whilst the sorghum was planted in the month of may 2001.

VII The dumping of crop residues and other farm debris into the Bomu and Bomu Bobo streams which forms suspended and dissolved solids, hence polluting the water.

VIII A much serious case in the area in the year 2000 was the report of the incidence of fishing with the aid of toxic chemicals (Gammalin 20) in parts of the Bomu stream by unknown farmers.

However, it is note worthy that because of the relative fertility of the low lands and valleys used for the Taungya Scheme, continuous cropping of the area have been going on far more than five (5) years now without fertilizer application. This condition has in recent times encouraged the influx of immigrant farmers from Paikoro local Government area, into the Bonu Community in order to take advantage of the scheme.

## **4: 2 DISCUSSIONS OF RESULTS**

Based on the conditions under which this study was carried out and the analysis of results or the findings therein, the following environmental and socio-economic impacts (adverse and beneficial) have been identified.

- I. Loss of Biodiversity.
- II. Reduction in water quality and quantity
- III. Land degradation and impoverishment.
- IV. Modification of the Microclimate
- V. Atmospheric pollution.

- VI. Reduction in fish and other aquatic population.
- VII. Wildlife out migration and reduction in their population.
- VIII. Destruction of Tourism potentials of the landscape.
- IX. Increased sedimentation of the River Gurara.
- X. Destruction of cultural relics.
- XI. Improvement in income of Bonu community members (participants of Taungya).
- XII. Increase in population of Bonu community because of the influx of immigrant farmers who seek to participate in the Taungya scheme.

## **4:3 ADVERSE IMPACTS**

### **4:3:1 Loss of Biodiversity**

The practice of Taungya in Bonu forest reserve has significantly destroyed the floristic composition and vegetation cover of the entire study area. It has resulted in the loss of valuable economic flora and fauna species and led to the destruction of the Strict Natural Reserve (SNR), which was established in the area in 1958.

In an attempt to save fast disappearing natural forests, the Forestry Research Institute of Nigeria established Strict Natural Reserves (SNR) in the high forests and other vegetational zones of the country for the purpose of scientific studies and environmental stabilization in certain places. Niger State has six of such reserves, with the one located in Bonu Forest Reserve classified as SNR No 7. It initially covered an area of approximately 150 hectares (Onochie, 1958). The reserve (SNR No 7) covered some parts of what has today become Taungya Farms. Infact a large percentage of the SNR No. 7 have been allocated to Taungya out of ignorance.

Strict Natural Reserves (SNR) have been defined by Oguntala, (1981), as plant communities preserved in perpetuity in their natural state for economic, scientific, educational, cultural, and aesthetic value (all treatments are banned).

Thus, it may be inferred that the Strict Natural Reserve No. 7 was a desirable and unique technique of biodiversity conservation. Biodiversity, according to Omiyale (1997), is one of the greatest values of the tropical forests because of the ecological, economical and social value associated with natural forests. The value of genetic diversity found in tropical forests is enormous.

Biodiversity is perhaps the single most tangible asset to be managed sustainably across generations, hence the proposal of negotiations by the leaders of the G – 7 meeting in USA in 1990, on international forest convention to curb deforestation, protect Biodiversity, stimulate positive forestry actions and address threats to the world's forests. This culminated into the adoption by consensus of nearly 180 countries: “The Rio Declaration on Environment and Development, Forest principles and Agenda 21”. Omiyale, (1997).

This declaration and other agreements to which Nigeria is signatory, has not been given serious attention in the country, the forests are being over exploited even to the point of extinction of large number of fauna and flora. The practice of the Taungya scheme particularly on areas covered by a Strict Natural Reserve (SNR), is a clear manifestation of the unsustainable Forest management systems in the country. It has obviously led to an irreversible loss of diverse biological species which may have very long term adverse impacts on the environment, socio – economically, educationally, scientifically, culturally and aesthetically.

### 4.3.2 Reduction in Water Quality and Quantity

Taungya farming in this forest reserve is carried out right to the banks of the streams; this unhealthy practice has virtually eliminated or significantly destroyed the much desired water shed, resulting in the rapid erosion of the stream banks and stream beds in the upper courses, coupled with the deposition of sediments in other areas down stream and particularly on the low lying areas of the river Gurara.

Plate V. below is a typical example of an eroded stream bank along parts of the Bomu stream, as a result of the destruction of watershed.

Plate V: Part of Bomu stream, which has been subjected to stream bank erosion and subsidence



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SOURCE: BY THE AUTHOR

Run off from farms and the action of bank erosion increases the turbidity of the water and hence reduces its quality for domestic and other numerous uses. The leaching of herbicides from nearby farms into the streams, the decomposing farm crop residues and debris inside the streams and above all the chemicals used sometimes by the farmers in fishing, all constitute serious water pollution. These have very grave consequences on aquatic life, micro – organisms and of course such toxicity makes the water unsafe for human use and consumption, as it could encourage the outbreak of certain epidemics of water borne diseases.

The destruction of the watershed most especially along the Bomu stream has exposed the water there–in to excessive evaporation. This, coupled with sediment deposition along its lower course has significantly reduced the quantity of water available in the dry season. In fact, the stream which used to be perennial before the Taungya scheme, now dries up in many parts in the dry season, and has thus been transformed into a seasonal stream by the bad farming practices of the so called Taungya farmers.

This has impacted negatively on nomads, who now have to migrate to other areas where there is adequate water supply through out the seasons.

#### **4.3.3 Land degradation and impoverishment**

The system of Taungya, as practiced in the forest reserve has the same effect on land as the vegetation firing in the bush fallow system, because of course, the land is not immediately replanted with a forest crop.

The methods often involve complete removal of vegetation from the soil surface and burning plants and other organic materials during harvesting in the form of grain stalks, leaving the ground bare and unprotected after harvest. This renders the soil very vulnerable to erosion by water making them less capable of supporting crops and other forms of vegetation.

Rill and gulling have already become prominent features on the very steep slopes that have been put under farming in the study area, while sedimentation of the valley and other areas have already begun. Run off from these areas and other areas contribute greatly to the turbidity of the Bomu stream.

The massive deforestation of the steep slopes has also significantly reduced the scenic beauty of the landscape that was characteristic of those areas before the introduction of Taungya. Deforestation and frequent firing of the area has exposed the site to excessive heat intensity, with serious implications for soil microbes, nutrient and hydrological cycling. Hence there is high degree of nutrient loss which has already been depleted as a result of continuous farming for over 6 years now, low underground water recharge, and also the drastic degradation of the soil structure which makes it become highly susceptible to erosion.

#### **4.3.4 Modification of microclimate**

Microclimatic parameters were not measured in this work; however, some general deductions could still be made in respect of the degraded state of the

Forest Reserve environment, particularly the Taungya farms and the microclimate of the area.

It may be suggested that the massive deforestation for Taungya in the forest reserve may increase solar reflectivity (ALBEDO) encourage a temperature rise and lower the relative humidity coupled with a high evaporation rate and the consequent lowering of the water table.

This suggestion is in line with the findings of a study conducted in 1985 by Oguntala, on the effects of forest types and the open on microclimate of FRIN experimental plots in Ibadan. He observed that the three forest types significantly influenced the temperature and soil temperatures of that area. The findings showed that the air and soil temperatures were lower in the three forest types compared to the open site. Hence the lighter the forest structure, the more the temperatures resemble that of the open site.

He further shows that higher soil temperatures increase the rate of mineralization of organic matter. This condition he maintained, impairs the stability of soil crumb structure. As a result the shear resistance of the soil surface is reduced and the soil becomes more easily erodible. It is therefore obvious that the degraded environment of Bonu Forest Reserve as a result of Taungya has adverse impacts on the microclimate of the area, which could lead to many other consequences.

#### **4.3.5 Atmospheric pollution.**

The major source of atmospheric pollution is the annual bush fires that are either started by unscrupulous farmers in search of game or nomads in order to boost the fresh flush of grass for their herd. Other contributors include the burning of secondary vegetation and weeds, crop residues and other farm debris, during subsequent land preparation by Taungya farmers. These release large amounts of carbon (IV) oxide and Nitrous oxide together with other suspended particles into the atmosphere, which contributes greatly to the global warming phenomenon.

Global warming, according to Barrett, (1998), is caused by the atmospheric gases that absorb infra – red radiation emanating from the earth surface. The concern is that: “increasing concentration of such green house gases may cause global atmospheric temperature to rise with severe consequences on climate and sea levels.” Barrett asserts further that: “Carbon (IV) oxide is the most significant global warming gas and contributes about 60% of the total global warming gases from human activity.”

Taungya farming in the study area whose activities also include enormous burning of vegetation and crop residues obviously contribute significantly to the global warming problem with its adverse impacts on a great variety of socio – economic concerns, locally, regionally and of course globally.

#### 4.3.6 Reduction in fish and other aquatic animal population

The destruction of a very large proportion of the water shed of the Bomu stream in the study area, through cultivation by Taungya farmers, the increased turbidity of the stream by the enormous influx of run off from exposed steep slopes and adjoining farmlands and of course the poisonous system of fishing through the use of gammalin '20' by some unknown farmers, have all contributed to the significant reduction in the population of fish and other aquatic animals in the Bomu stream.

In fact large numbers of dead and rotting fish caused by the toxicity resulting from the poisonous fishing method was observed in the Bomu stream in the year 2000. The carcasses of other small aquatic life forms were also witnessed. This tremendous reduction in fish population as a result of Taungya has impacted negatively on the protein source of the Bonu community and of course on the income of fishermen who utilize the study area for their fishing activities.

#### 4.3.7 Out migration and reduction in wildlife population

The erstwhile fringing forests along the streams of Bomu and Bomu Bobo used to be very rich in a variety of wildlife species, which could be compared only to a game reserve. In fact, these areas were respected and feared because of the number of carnivores such as the *Panthera pardus* (Leopard), *Hyaena hyaena* (Hyena), and other dangerous animals like the *Python seps* (Rock Python), and *Synerus Caffer* (Buffaloes), which were present in the area.

However, massive deforestation of these areas as a result of the introduction of Taungya has led to the gradual destruction of the wildlife sanctuary. Hunting by the farmers was also intensified with the smaller mammals whose habitats have become very exposed, falling victims of such hunting activities.

This has greatly reduced wildlife population in the area. Large numbers of wildlife have migrated out into the nearby hills around the study area to remain alive whilst others have completely given up that territory for other safer areas outside or inside the forest reserve, but very far from the study area.

This has adversely impacted on the Bonu community in terms of the protein and income derived from capturing wildlife, because the volume of capture have been drastically reduced.

#### **4. 3. 8. Destruction of tourism potentials**

Considering the number and variety of wildlife species and the water resources in the study area, prior to the introduction of Taungya, the site had all the potentials of a conservation area. The beauty of the vegetated landscape then helped to boost the inherent qualities of a conservation site. In fact the area could have been converted into a game reserve and annexed to the renowned Gurara waterfalls so as to boost Tourism and therefore enhance the revenue base of the state in particular and nation at large.

Unfortunately, Taungya farming in the area and the way in which it has been practiced has destroyed the scenic beauty of the landscape and dispersed wildlife population on a scale that is almost irreversible, therefore destroying the excellent Tourism potentials of the forest reserve.

#### **4. 3. 9 Sedimentation of the river Gurara**

It has been earlier pointed out that the Bonu Forest Reserve serves as part of the Gurara Water shed and the 2 main streams in the Taungya area all flow into the River Gurara. However the destruction of very vulnerable slopes and other areas for the purpose of Taungya have resulted in the unmitigated runoff during heavy rainfalls in these areas, which in turn increase the turbulence in the flow of water in the streams that have been stripped of their shed by the same Taungya, and hence accelerating erosion of the stream banks and even stream beds in some areas.

This chain of action culminates into an enhanced or increased turbidity of the streams, which eventually flow into the Gurara River where it augments the turbidity of the river there in. Obviously, this, on the long run, results in an increased sediment deposition down stream the Gurara River and even the incidence of flooding in some areas along the lower course.

Hence, the practice of Taungya farming in the forest reserve which serves as part of the Gurara Water shed contributes significantly to the incidence of flooding of farmlands down stream the Gurara River. However this negative contribution is limited to the period of 1995 to date only, when Taungya was started and is currently being practice in the forest reserve.

#### **4. 3. 10 Destruction of cultural relics**

Approximately 40% of the Taungya farms in the western part of the forest reserve near the Bomu Bobo stream and adjacent to the communally preserved area are located directly on the site of the old Bonu village. Virtually all structures that link Bonu with history has been destroyed and farmed by the Bonu people themselves.

The practice of Taungya on this site has obviously destroyed part of the Bonu history and cultural relics with negative effects on archaeology, which is a renowned science that deals with the study of ancient cultures, people and periods of history. It is rather unfortunate that most of the physical remains especially those found in the ground and which could be subjected to scientific analysis in order to link the culture and peoples of Bonu with periods of history, is still been destroyed in the name of cultivation for the practice of Taungya farming. An irreversible consequence of the continuation of Taungya in that area is the permanent loss of the ' Roots' of the Bonu people.

## **4. 4            BENEFICIAL IMPACTS**

### **4. 4. 1        Increase in income of taungya farmers.**

Responses from the Taungya farmers during interviews have shown that the relative fertility of the valleys of Bonu forest reserve and other areas in which Taungya is practiced, has resulted into higher yields and of course higher income accruing to them in the form of proceeds from sale of farm products.

According to the respondents, more people now own good houses; bicycles, domestic appliances and even a few motorcycles have been acquired with proceeds from the Taungya farms.

It may therefore be rightly put that Taungya farming in the study area has significantly improved the standard of living of the rural farmers of Bonu. In fact, it has led to the rapid socio – economic development of the community and Gurara Local Government Area.

However, the good returns from Taungya have obviously attracted immigrant farmers from the neighboring Paikoro Local Government Area into Bonu. This has also resulted in the rapid population growth of the community over the last 4 years, with the area witnessing an influx of more than 30 farming families that have come to take advantage of the scheme. This obviously has serious implications for the forest reserve as the immigrant farmers may resort to

encroachment into the forest reserve (illegally) for farming, therefore wrecking more havoc on the already devastated environment.

## CHAPTER FIVE

### **5.0 CONCLUSION AND RECOMMENDATIONS**

#### **5.1 CONCLUSION**

Based on the findings of this study and the conditions under which it was carried out, it may be concluded that the practice of Taungya in which forest trees were not planted by the Niger State Forestry services Department, has impacted adversely on the biophysical environment of Bonu forest reserve.

It has led to the loss of biodiversity. In fact, the Strict Natural Reserve (SNR) No. 7 has been substantially destroyed.

The massive vegetal removal of very vulnerable areas on the steep slopes, destruction of wildlife sanctuary and of course the much desired water shed, for the purpose of Taungya, have obviously resulted in erosion, out migration and reduction in wildlife population; and the reduction – in fish population, water quality and quantity of the Bomu and Bomu Bobo streams.

Taungya has also significantly destroyed the tourism potentials of the area.

However, the income and eventually standard of living of the farmers engaged in the scheme has been significantly improved, leading to the enhancement of overall rural development of Bonu community.

This study has shown that the challenges of our environment call that Foresters must face up to the issue. There is need for a change of attitude in management. Forestry of future should not be solely growing and harvesting of forest produce. It must be sure of its philosophical foundation – sustainable development; it must also be imaginatively practical. It must be applied ecology in its broadest sense, including men as well as nature.

## **5.2 RECOMMENDATIONS**

The following recommendations are hereby made in order to enhance sustainable development

- I. Considering the adverse nature of effects of Taungya in this forest reserve, it is strongly recommended that the scheme in the eastern location be discontinued immediately. This is because of the high vulnerability of the study area to degradation and the significance of the site in biodiversity conservation. This would encourage the natural regeneration of diverse species on the devastated area including the SNR No. 7.
- II. The scheme in the western location may be continued if and only if the forestry department can plant up the farms with forest trees in the next planting season and on condition that Taungya farms will be restricted only to the very gently undulating lands or relatively flat

lands. It must exclude the site of the relics of old Bonu and at least 100 meters away from the Bomu Bobo stream. This strategy if adhered to, will obviously preserve the cultural relics and also conserve water shed along Bomu Bobo stream.

- III. There is the need for the Niger state Forestry services in conjunction with the state Agricultural Services Department and the fisheries department to embark on intensive enlightenment campaign in Bonu Community with the objective of creating awareness and educating the farmers on environmental conservation and protection, good farming practices, proper management of farm residues, debris, good and healthy fishing methods and the values of Strict Natural Reserves etc. This will obviously enhance environmental friendliness and overall sustainable development.
- IV. The Niger State Government should provide adequate funds and vehicles to the Forestry services department and particularly to the Zonal Forestry office Gawun – Babangida, so as to facilitate the establishment of forest trees nursery and plantation on Taungya farms, and in order to enhance effective co – ordination of forestry activities in the forest reserve respectively.

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## APPENDIX 1(A)

### FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA GEOGRAPHY DEPARTMENT.

**NAME: GARBA MUSA BABA**

**COURSE:- PGD IN ENVIRONMENTAL MANAGEMENT TECHNOLOGY**

**SPECIAL PROJECT ON:- BONU FOREST RESERVE – IMPACT OF  
TAUNGYA FARMING: - QUESTIONNAIRE FOR FARMERS.**

1. Name of Taungya Farmer.....
2. Name of Community.....
3. Educational level: Primary/ Secondary/ Tertiary.....  
.....
4. Other literacy level / Status in Community.....  
.....
5. How long has your community been living in its present location?.....  
.....
6. How long do you have rainfall?  
(a) 4 Months (d) 7 Months  
(b) 5 Months (e) More than 7 Months  
(c) 6 Months
7. How many wards are there in your community?
8. Estimate the number of Households in each ward.
9. What is the estimated average number of persons per Household?
10. What are your occupations or occupation

- (a) Farming
- (b) Fishing
- (c) Hunting
- (d) Carving
- (e) Civil Servant.

11. Where are your farms of Farm located?

- (a) Inside Bonu Forest reserve
- (b) Outside the forest reserve

12. If your farm/Farms is/are located inside the Forest reserve, how did you acquire the land?

- (a) Through an application and subsequent approval by government/ for Taungya.
- (b) Through illegal encroachment.
- (c) Other means. (Specify)

13. What are the reasons for your participation in the taungya scheme?

- (a) Impoverishment of farmlands outside forest reserve.
- (b) Land hunger because of population pressure.
- (c) Deliberate interest in the exploitation of forest reserve land fertility
- (d) Other reasons.

14. How long have you been in the taungya scheme?

- (a) Less than 2 years
- (b) 3 years
- (c) 4 years
- (d) 5 years
- (e) 6 years.

15. (a) Are you aware of any rules/Regulations of taungya? YES/NO.

(b) List such rules /Regulations

(c) What is the size of your farm in the Forest reserve?.....

16. How do you carry out land clearing?

- (a) Manually
- (b) Chemical clearing
- (c) Mechanically
- (d) Burning vegetation

17. Which farming system do you practice

- (a) Taungya
- (b) Shifting cultivation
- (c) Crop rotation
- (d) Mixed cropping
- (e) Rotational bush fallow

18. How do you cultivate land?

- (a) Manually
- (b) Animal Traction
- (c) Mechanical

19. What kind of tillage system do you adopt?
- (a) Zero tillage
  - (b) Low tillage
  - (c) High tillage
  - (d) Heaps – Big /moderate sized /Small sized.
20. If you use herbicide in land clearing or for post emergence weed control, please list the types used.
21. (a) Do you apply fertilizer on your crops? YES/NO
- (b) What are your sources?
- I. Government allocation
  - II. Free Market.
- (c) How easy is it to get?
- I. Relatively easy
  - II. Very easy
  - III. Difficult to get.
  - IV. Very difficult.
22. List the types of arable crops planted on the Taungya Farm.

23. Attempt a comparison of the yield of such crops with those cultivated outside the forest reserve.

- (a) Less yield
- (b) Equal yield
- (c) Greater yield
- (d) doubled
- (e) Tripled

24 (a) Have you or the forestry departments over planted trees on your taungya Farm? YES/NO

(b) If your answer is no, please advance reasons for the lack of performance.

(d) If your answer is Yes, use the table below to show or indicate your performance

Year of planting	Forest tree species planted	Expected Target in hectares	Achievement in Hectares.

25 When rules /Regulations of Taungya are contravened. What actions do the forestry department take against such persons?

- 26 (a) Please list the type of wildlife species found in the forest reserve.
- (b) If you fish/hunt in the forest reserve list the methods used for each activity.
- (d) Compare the volume of catch or number of animals captured in the area over the year i.e. before and after Taungya.
- 27 (a) Do you harvest NTFPs in the forest reserve?
- (b) List such NTFPs
- (c) How has Taungya affected such collections (still abundant/have become rare)?
- (d) Use the table below to itemise the major NTFPs collected under the following subheadings if you find them appropriate: Food, Energy, Medical uses, Industrial uses, Household construction materials, Religious uses, Festivals, cultural uses and farming systems.

Major NTFPs	Uses

28. I. Are you in contact with forestry staff? YES/NO

II. Do they visit the Taungya farms? YES/NO

III. How often?

- |                 |             |
|-----------------|-------------|
| (a) Daily       | (d) Monthly |
| (b) Weekly      | (e) Rarely  |
| (c) Fortnightly |             |

29. What specific functions does the forestry staff perform in the forest reserve?
- (a) Silvicultural activities.
  - (b) Forest protection activities.
  - (c) Forest exploitation activities.
  - (d) All of the above.
30. Please discuss as much as possible your awareness about environmental conservation/ protection.
31. List the environmental problems that could have been possibly caused by your activity in the forest reserve.
32. List some possible socio - economic problems arising from your practice of Taungya in the forest reserve.
33. How positively has Taungya affected the socio – economic growth of your community?
- (a) Rise in income

- (b) Increased ownership of good houses
- (c) Increased ownership of domestic appliances
- (d) Increased ownership of bicycles/Motorcycles/Motor vehicles
- (e) Other benefits (specific).

34. In what ways do you think the system could be effectively modified to ensure that you continue with the scheme?

11. Please briefly outline the basic rules/regulations of the system in Niger State and in Bonu Forest Reserve in particular.
  
12. Which category of staff is directly involved in the implementation of the scheme?
  - a). Professional staff
  - b). Technical staff
  - c). Uniform staff
  - d). Silvicultural staff
  - e). All of the above
  
13. How are the farms allocated and what is the average size of farms?
  
14. How many farmers are involved in the scheme?
15. What is the total area of land under Taungya practiced by the Bonu community.

16. What are the factors that guided the choice of the present site of Taungya farms?

17. (a) Has the Forestry department planted forest trees on the taungya farms?  
(b). Please use the table below to indicate performance.

Year of planting	Forest tree Species planted	Expected Target (ha)	Achievement (ha)

18. If no trees have been planted, please advance reasons for such failure.

19. Evaluate concisely the status of the environment using 1994 as a baseline.

20. i. Do you visit the forest reserve and the Taungya farms? Yes/No

ii. How often do you visit?

- a) Daily
- b) Weekly
- c) fortnightly
- (d) Monthly
- (e) Rarely

21. Discuss the role of your department in environmental conservation education of Bonu Community.

22. Are you aware of a Strict Natural Reserve (SNR) in Bonu Forest Reserve?

23. What is its present status?

24. If the SNR has been encroached upon, please state the reasons for such unhealthy development.

29. Give any advice you deem useful for the successful and continuous practice of the scheme in this forest reserve in such a way that will enhance sustainable development.

## APPENDIX 2

### BONU FOREST RESERVE-IMPACT OF TAUNGYA FARMING

#### CHECK LIST FOR PRE-ASSESSMENT OF BONU FOREST RESERVE ENVIRONMENT

ENVIRONMENTAL COMPONENT OR SOCIO-ECONOMIC CONCERN	MAGNITUDE				
	Aspect liable to be modified or new structure of feature	Not Applicable or Negligible  (b)	Minor  (c)	Major  (d)	Permanent Or Irreversible  (e)
<b>A. BIOPHYSICAL ENVIRONMENT:</b>  1. Land Forms and Soils  2. Water Resources  3. Climate and Air quality  4. Vegetation  5. Wildlife and Fisheries					

ENVIRONMENTAL COMPONENT OR SOCIO-ECONOMIC CONCERN	MAGNITUDE				
	Aspect liable to modified or new structure of feature	Not Applicable or Negligible (b)	Minor (c)	Major (d)	Permanent Or Irreversible (e)
<b>B. SOCIO- ECONOMIC CONCERN</b>					
1. Local cultures and economy					
2. Demographic, economic expansion					
3. Epidemiology					
4. Conservation					
5. Others					