

**IMPACT ASSESSMENT OF BUSH-BURNING
ON THE ENVIRONMENT.**

**(A CASE STUDY OF IBETO,
MAGAMA LOCAL GOVERNMENT NIGER - STATE).**

BY:

**MOHAMMEDI BARRU
PGD/GEO/555E/2000/2001/177**

**SUBMITTED IN PARTIAL FULFILLMENT FOR
AWARD OF POST GRADUATE DIPLOMA IN
ENVIRONMENTAL MANAGEMENT,
POST GRADUATE SCHOOL,
FEDERAL UNIVERSITY OF TECHNOLOGY,
MINNA, NIGER - STATE,
NIGERIA**

MARCH 2002

DEDICATION

This project is specially dedicated to the glory of Allah . To my affectionate loving and industrious late father Mallam Ibrahim Maikanti and my beloved Senior Brother Alhaji Jibrin Ibrahim for their cares and love to the family.

March 2002



MUHAMMAD BARAU

DECLARATION

I hereby declare that, this is my original work and has not been presented elsewhere for the award of a Post-Graduate Diploma at any University or any institution of higher learning.

The information and data derived from published and unpublished works of others have been acknowledged.



MOHAMMAD BARAU

0904/2002

DATE

CERTIFICATION

This is to certify that this project is an original work undertaken by **Mohammed Barau**, PGD/GEO/SSSE/2002/2001/177 and has been prepared in accordance with the regulation governing the preparation and presentation of projects in Federal University of Technology Minna.

MOHAMMED BARAU
STUDENT NAME


9/27/2012
SIGNATURE DATE


DR. M.T. USMAN
PROJECT SUPERVISOR

20/3/02
DATE


DR. M.T. USMAN
HEAD OF DEPARTMENT

20-03-02
DATE

PROF. J.A. ABALAKA
DEAN, POST-GRADUATE SCHOOL

DATE

EXTERNAL EXAMINER

DATE

ACKNOWLEDGMENT

In writing the dissertation it has only been made possible as a result of many people's aids. Infact many pages would be required to list them all. However, the following are pre-eminent.

I am particularly indebted to my able major project supervisor, Dr. M.T. Usman who is as well the Head of Geography Department and Programme Co-ordinator, for his guidance, encouragement, love and useful criticism. I am also appreciative for the trouble he took in reading through this write-up.

I wish to express my gratitude to Dr. Khalil and Dr. Peter Akinyeye for putting me in the right path of the initial stage of the write-up and for their tireless encouragement.

On the domestic side. I am grateful to members of my family, friends, course mates and well-wishers who contributed tremendously towards the successful completion of my project.

Finally, to ALLAH be the glory for sparing my life to see the successful completion of the Post-Graduate Diploma in Environment Management.

ABSTRACT

The problem of Bush-Burning locally, nationally, and globally poses a serious threat to our survival on the earth surface.

The theme of this research work is to carefully analyse in precise and coincide from causes, impacts of Bush-Burning in Ibeto Community and providing realistic and practicable solutions to them.

The sources of data for this research work include, questionnaires, reconnaissance surveys and personal interviews.

Based on the findings, possible and practicable solution has been given the authority concerned on how to reduce, and / or abolished Bush-Burning in the area.

TABLE OF CONTENTS

<i>Content</i>	<i>Page</i>
Dedication - - - - -	<i>i</i>
Declaration - - - - -	<i>ii</i>
Certification - - - - -	<i>iii</i>
Acknowledgement - - - - -	<i>iv</i>
Abstract - - - - -	<i>v</i>
Table of Contents - - - - -	<i>vi</i>
List of Tables - - - - -	<i>viii</i>
List of Figures - - - - -	<i>ix</i>

CHAPTER ONE

1.0. Introduction - - - - -	1
1.1. Background - - - - -	1
1.2 Study Area - - - - -	1
1.2.1 Vegetation - - - - -	2
1.3. Problem Statement - - - - -	2
1.4 Aims & Objectives - - - - -	3
1.5. Justification - - - - -	3
1.6. Scope and Limitation - - - - -	4

CHAPTER TWO

2.0. Literature Review - - - - -	5
2.1. Bush Burning Globally - - - - -	7
2.2. Bush Burning in Nigeria - - - - -	8
2.3. Bush Burning in Ibeto - - - - -	9

CHAPTER THREE

3.0. Research Methodology	-	-	-	-	-	-	10
3.1. Design of study	-	-	-	-	-	-	10
3.2. Sources of Data	-	-	-	-	-	-	10
3.2.1. Administration of Questionnaires	-	-	-	-	-	-	10
3.2.2. Reconnaissance Surveys	-	-	-	-	-	-	11
3.2.3. Personal Interview	-	-	-	-	-	-	11
3.3. Presentation & Data Analysis	-	-	-	-	-	-	11

CHAPTER FOUR

4.0. Causes of Bush Burning	-	-	-	-	-	-	19
4.0.1. Population Pressure and Urbanization	-	-	-	-	-	-	19
4.0.2. Refuse Dumps/Scattered Waste Materials	-	-	-	-	-	-	19
4.0.3. Surface Tanks Oil Sellers	-	-	-	-	-	-	20
4.0.4. Volcanic Eruptions	-	-	-	-	-	-	20
4.1. Impact	-	-	-	-	-	-	21
4.1.1. Desertification	-	-	-	-	-	-	22
4.1.2. Deforestation	-	-	-	-	-	-	24
4.1.3. Drought	-	-	-	-	-	-	30
4.1.4. Erosion	-	-	-	-	-	-	34
4.2. Pollution	-	-	-	-	-	-	37
4.2.1. Air Pollution	-	-	-	-	-	-	38
4.2.2. Water Pollution	-	-	-	-	-	-	40
4.2.3. Land Pollution	-	-	-	-	-	-	44

CHAPTER FIVE

5.0. Summary, Conclusion and Recommendation	-	-	-	-	-	-	45
5.1. References							
5.2. Appendix							

List of Figures

<i>Title</i>	<i>Pages</i>
1. Illustration showing the degree of awareness against bush-burning using pie-chart - - - -	17
2. Illustration showing the degree of awareness against the negative consequences of Bush-Burning Using pie Chart. - - - - \ - - -	17
3. Illustration on different sources of energy using histogram -	18
4. Volcanic eruption - - - - - - -	21
5. An Organogram Component arms of desertification -	23

List of Table

<i>Title</i>	<i>Pages</i>
1. Questionnaire Distribution and response Collection - -	12
2. Engagement in any Agricultural Activity - - -	12
3. Types of Clearing methods adopted - - - -	13
4. Hectres of Land Cultivated - - - - -	14
5. Sources of Energy at Home - - - - -	14
6. Awareness Campaign against Bush-Burning - - -	15
7. Awareness nagative Consequences of Bush-Burning	16
8. Burning of Vegetational Cover - - - - -	16

CHAPTER ONE

1.0. INTRODUCTION

1.1 BACKGROUND

Man's inadvertent of interaction with the environment particularly the study area of this thesis (Ibeto) presents an interesting paradox, while there is the need to protect the environment, man's ever expanding need for survival as a component of the biotic environment have caused over exploitation of the natural resources of the ecological environment.

In general, Bush Burning causes land degradation, therefore, degradation is a major environmental problem that has captured the interest of environmental scientist the world over. This is due to the physiographic, health and socio-economic problems they create. Environmental degradation refers to the process that may act or force the condition of a part of the earth surface or it's surrounding atmosphere to become unpleasant or less useful to man. Specific aspects relate to Deforestation, harzard, desertification, Drought, Erosion harzard, water and Air Pollution, all are extreme impact of Bush-Burning.

Over many years Nigeria has experienced Deforestation, Desertification which leads to droughts as a result of bush-burning. The country has witnessed relative stable rainfall until the middle 1960 when another gradual decline in precipitation was noticed. The gradual reduction in precipitation continued till it reached a peak in the 1972/73 period.

1.2. STUDY AREA

The study area is Ibeto, it is a town about 30km west of Kontagora along Sokoto Road, Ibeto is in Magama Local Government Area, with a population of about 30-40,000 covering an area of 6km².

1.2.1. VEGETATION

Ibeto lies within the guinea-tropical savanna, woodland/deciduous forest consisting of Orchard bush. The vegetation is believed to have been derived from forest through prolonged cultivation and annual burning.

Major vegetation covers types are trees shrubs and grasses. Some of the trees includes, Locust bees, shea butter and baoba trees. They form covers and attain heights of about 8-10mtrs the grasses are mostly in the class of Rhizons, which have long roots that enable them survive drought conditions, dry seasons and during the wet seasons, the grasses spot and grow rapidly especially the elephant grasses which grows 1-3 or 5 meters.

1.3 PROBLEM STATEMENT

The study area Ibeto, biotic resources are being threatened by the following main problems namely, Deforestation, Desertification, and Drought, Erosion and Pollutions and Loss of Bio-Diversity.

Bush-Burning is a major global environmental problem and can be defined as the indiscriminate burning of grasses/shrubs or forestland either naturally or man-made which causes a lot of damages to the man and his environments. In Ibeto, bush-burning has brought in it's wake a host of other environmental problems such as pollutions accelerated soil erosion, declining soil fertility, Loss of bio-deversity, loss of agricultural land, and inability of these forest to regulate the village's climate by absorbing carbon dioxide and returning water to the atmosphere through transpiration.

From the foregoing, there is the need for drastic measures to be taken to address the problems of bush-burning in Ibeto Village so that the natural resources in the environment can be harnessed for a sustainable development.

1.4 AIMS AND OBJECTIVES

The aims and objectives of the projects are

- a. To analysis and assess critically the causes and effects of bush-burning on man and his environments.
- b. To proffer adequate solution to bush-burning so that the natural resources in the study area can be harnessed to floral sound environmental management and a sustainable development.
- c. To create awareness among the villages and alert Niger State Government on the inherent dangers of bush-burning to man and his environment.
- d. To suggest guidelines for improved environmental aesthetics and preservation of areas of unique natural beauty and scenery for historical and scientific interest.

1.5 JUSTIFICATION

Biological resources are renewable resources, but they are being exploited at the rates that exceeded their sustainable yield in the study area (Ibeto)

Bush-Burning has greatly contributed towards deforestation which leads to unsustainable logging and fuel-wood collections, burning of telecommunications cables both over heads and undergrounds types, and as well as the electricity cables and wooden poles types in the area.

Due to the other environmental problems created by the bush-burning in Ibeto, it therefore becomes imperative to critically analyses the causes and proffer adequate solution or remedies to this globally acclaimed environmental problem.

Therefore, this project from proffering adequate solutions to bush-burning, will also provide guidelines for the Local Government and State Government as well to maintain their scenery natural landscape, conservation for the natural environment for the future and present generations.

1.6. SCOPE AND LIMITATION

The scope of this project is limited to Ibeto village, though intervene was drawn from the project about environmental hazards within the same geo-environmental area, the death or unavailability of data maps affected the gathering of materials and data for this project and therefore prevented the spatial extension of this research effort.

Infact there is no available map demarcating Ibeto town itself. Only physical natural feature such as rivers, hills and streams dermacate the town.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. BUSH-BURNING

Bush-burning or Bush fires as it's globally called and known is an environmental degradation. Environmental degradation has various courses, which could be broadly grouped in to natural causes and man-made causes, some of natural causes include volcanic eruptions, lands slide, earthquake and change in atmospheric circulation. The man-made causes include, over cropping which gives rise to infertility of the soil, misuse of water and soil resources giving rise to high salinity status of both soil and water, release of the solid, liquid and gaseous wastes leading to pollution of the atmosphere surface and beneath (Abdul Kadir 1993).

However, discussion will however be restricted to the kind of environmental degradation that mostly encourages, deforestation desertification, drought, erosion, and pollution which is as result of bush-burning, Ibeto in particular.

Scientist like Warren (1984) has attributed land degradation to man-made induced climatic effects, sometimes known as the "Charney" effects after one of the meteorologist who investigated it in the contest of Sahara, Simply but, the charney effects begins when there is gradual depletion of vegetation cover, due to bad land management practices like bush-burning. Loss of vegetation covers brings about an increase in albedo (i.e. the amount of sun's energy reflected by the earth's surface.

Moreover, from time immemorial, scientists, scholars and academicians, of high repute have been making scientific and theoretical statement concerning the interactions of man with the environment, Human History is said to be "Largely

written in terms of the struggle between man and nature over term's existence" (Barkley and Seekler 1972) According to Ehrlich et al, fosters human well-being directly, a reducible but not removable burden of environmental destruction by the technology undermines well being. This negative burden includes, direct effect of technology accident and effluents human life and health.

Also in the words of Ehrlich, et.al (1977) "Humanity shares the physical vehicle of earth with an enormous diversity of other living things, plants, animals and micro-organisms" which constitute a living web (biological commodity) incased in a finite physical environment (abiotic elements) To survive, members of this living web including man must intract with one another and also with the physical (abiotic) elements and thus creating a State of interdependence.

This-day (06/03/2000) reported that the Department of Meteorological services of Federal Ministry of Aviation in collaboration with the Nigerian Meteorological Society (NMS) are not lacking behind in advising the Government on the impact of bush-burning and other environmental problems in the new millennium, 2000. At their conference with the theme "Climate and Sustainable development in the next millennium they urged the Federal Government to strengthen it's capability and increase collaboration with the relevant institutions in the environmental monitoring. They equally called for the application of agro-meteorological knowledge which is increasingly being required to ensure sustainable agricultural development for food security and poverty alleviation.

The conference also recognised the need for a National Climate Committee as directed by United Nations whose objective of the committee is to develop a national climate programme. The conference urged the government to provide adequate funds, necessary legal frame work to the urgency for effective implementation of programme and projects needed for carrying out the nation's objectives of weather forecasting

and predictions for public awareness campaign on the impact of climate change and environmental degradations such as bush-burning which may leads to many dangerous effects.

The Nigerian Conservation foundation which pioneered national awareness in Nigeria on conservation, preservation on our natural resources and endanger species has played a major role in creating awareness on dangers of deforestation to Nigerians and the environments. According to NCF Official letter (Vol. 1 No. 1 1999) many seminars essay competitions were organised for them to practice the spirit of conservations.

2.1. BUSH-BURNING GLOBALLY

Forest, covers almost 1/4 of the earth's land surface but research has showed that they contain virtually all living things on land. More than half of all the flora and fauna on earth is known to exist in tropical forest, presently, the greatest rates of burning are mostly occurring on the wood land savanna and tropical regions are shrinking at alarming rates, of because of bush - burning, for instance the bush fires in Australia.

Human beings have cleared forests throughout history. A few thousand years ago, rainforests once covered most of central Europe, but during the 11th century a major phase of bush burning which began within 200 years almost cleared most of the forest in in Europe. Similarly in the North America, before the Colonist arrived forest occupied some 170 million hectares between missisipi and Atlantic seaboard and today only about 10 million hectres remain. Also in a study, the food and Agricultural Organization of United Nations (FAO) published in October 1982, the most through to date and involving satellite and aerial photograph reconnaissance in 88 countries, it was estimated that the rain forests are disappearing gradually.

The annual rate of destruction is running at 25% more than a decade ago, half of which is taking place in Africa.

In tropics, generally ten (10) trees are being burnt for every one (1) planted in Africa this rate is twenty nine (29) to one (1) about a decade ago, Ethiopia had a 30% forest today it is less than 1%.

From 1974-1994 it was estimated that 1,600 million people will be added to the world's population, while about 960 million will be added within 1990-2000 (NN 8/3/2000) this, while there is a massive decline in resources and world's population. These rich and complex ecosystems will be gone before long, depriving us of a wealth of diversity and the potential use of many of their unique biological compounds often of great medical value.

2.2. BUSH-BURNING IN NIGERIA

The area of the republic of Nigeria is 913,072,645sqkm, Its greatest length from east to west is over 1,120km and North to South is 1,040km.

Nigeria's environment is the major source of raw materials for our industrial and Agricultural sectors. It is also responsible for absorbing the negative production externalities from these sectors and services, various other functions, which support life in the atmosphere, bio-diversity, health, amenities and transportation.

The critical problem is that in most instances, the environment is assumed to be available at no cost with unlimited absorptive capacity and therefore can be degraded to a very large extent without causing serious threats to it.

The Nigerian Environment is passing through difficult periods. Our natural environment is being degraded to unsustainable levels. For instance, bush-burning for expansion of our agricultural land causes problems of soil erosion, forest depletion, extinction of natural habitats of many of our wildlife species and soil.

In Nigeria, our resources exploitation to improve our welfare have also exacerbate the nations environmental problems such as bush-burning. In fact the twin problem of satisfying our environmental resources and using our resources to satisfy the need of other countries is mostly responsible for a number of environmental problems such as deforestation, desertification, biological diversity loss, unsustainable agriculture, pollution etc.

It is believed that nearly 40% of Nigeria was originally clad with tropical deciduous forest while the remaining (Northern Part) were tropical woodland. It is worth mentioning that Sahel and Savanna did not exist a century ago. Today, only 10% of the rainforest are left in reserves and on in accessible high lands, the rest of the original forest zone having been deduced to a patch work of farmlands due to problems of bush-burning.

2.3. BUSH-BURNING IN IBETO

Ibeto is one of the rural towns in Magama Local Government Area of Niger State. It is a district Headquarters of Ibeto Districts, under Kontagora Emirate. It has a population of about 30-4000 based on 1993 census, having a land mass of 6km².

Bush-burning, has becomes a long time altitudes of the settlers which for a long periods been causing so many dangers to the commodity such as Agricultural and other landed properties destructions and other animal destructions. Ibeto lies within guinea tropical woodland which consist of orchard bush and woodland with trees of about 10-15mtrs in height. Report indicated that Yawurawas and Hausa/ Fulanis and Kambaris are the original settlers of the village, used the area for farming, hunting and lumbering of firewood for domestic purposes.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY AND DATA ANALYSIS

This chapter describes the Design of study, sources of Data and methods of data analysis.

3.0. RESEARCH METHODOLOGY

3.1 DESIGN OF STUDY

As stated earlier, this research works is designed to find-out the causes, impact of bush-burning in Ibeta and proffer adequate and practicable solution to solve this environmental problem.

3.2. SOURCES OF DATA

Due to dynamic and intricate nature of Bush-Burning coupled with time constraints, the following methods was used to obtain necessary data for this research work:

- i. Administration of Questionnaire
- ii. Reconnaissance Surveys
- iii. Personal Interviews.

All the above sources of data gave me the necessary insight and ample opportunity to gather adequate and necessary information needed for this project.

3.2.1 ADMINISTRATION OF QUESTIONNAIRE

The Questionnaire was designed for all citizens living in Ibeta Commodity particularly the stake holders which include farmers, civil-servants, the villagers. For the Questions asked, a number of response options was supplied which have direct and indirect bearing on the causes of Bush-burning. But note that most of the Questions were translated into Hausa Language for a proper and quicker comprehension due to the high degree of illiteracy. Stratified sampling technique was usually used in administration of the questionnaire.

3.2.2. RECONNAISSANCE SURVEYS.

The reconnaissance surveys entails the physical observation and assessment of man's physical activities on the environment e.g. Agricultural Cultivation activities. It usually involves watching, evaluating the extent of bush burning and carrying - out an inventory of the damage done to the environment.

A part from giving me the first hand information, the reconnaissance surveys also provides an ample opportunity to know the problems created by bush-burning.

3.2.3 PERSONAL INTERVIEW

All the stake holders particularly the farmers were personally interviewed about all the pertinent problems concerning this study. Inquisitive and well-informed questions were asked to allow for a detailed information from the targeted group. This gives intensive explanation on the causes of bush-burning in Ibeto.

3.3. PRESENTATION AND DATA ANALYSIS

Having carried-out the necessary research to acquire the required data, it becomes expedient at this stage to present, analyses and interpret the data and information. This data analyses was based on frequency percentage method where tabulations, graphs and other statistical data were used to enhance the method. This method of analysis was chosen by me to ensure simplicity, reliability, easy understanding and to allow for retentive ease of presentation and interpretation.

Fifty (50) questionnaires were randomly distributed to relevant people in the village using a stratified sample technique. The questionnaire were administered directly to them and after some days about thirty five (35) duly completed questionnaire were returned.

Table 3.1. QUESTIONNAIRES DISTRIBUTION AND RESPONSE COLLECTION

Category of People	Number Distribution	Percentage (%)	Number Returned	Percentage (%)
Farmers	20	40	15	35
Civil Servants	30	60	25	55

Source: Survey Data 2002

From the above, 40% of the questionnaire was issued to farmers and 15 was returned and also 30 questionnaires was issued to civil servant and 20 were both returned duly completed.

DO YOU ENGAGE YOURSELF IN ANY AGRICULTURAL ACTIVITY?

This is to know the numbered and percentage of people who are engage in any agricultural activity and to show the impacts of bush-burning in Ibeto.

Table: 3.2. ENGAGEMENT IN ANY AGRICULTURAL ACTIVITY

Options (Agric)	Frequency	Percentage (%)
Yes	60	73
No	22	27
Total	82	100

Sources: Survey 2002

From the above table, 73% of the respondents engaged themselves in agricultural activities. Some as full time farmers while the others do it as part-time to support their salaries. The engagement of this percentage (73%) surely has negative impact on the forestlands in Ibeto.

WHAT CLEARING METHOD DO YOU USE.

This is to show on induced the percentage of soils disturbance and extent of farmland cleared in Ibeto.

Table: 3.3. TYPES OF CLEARING METHODS ADOPTED.

Options (Clearing method)	Frequency	Percentage (%)
Bush-burning	60	75
Manual	22	25
Total	82	

Sources: Survey Data 2002.

From the above 75% of respondent use bush burning system in clearing their land. The impact of their on land is devastating because it can lead to increase in soil infertility, Erosion and thereby having direct bearing on the existing vegetational covers in the study area.

HOW MANY HECTARES OF LAND DO YOU CULTIVATE OR PUT INTO USE.

This becomes necessary in order to have an in-depth knowledge on the rate and extent of bush-burning in Ibeto.

Table 3.4. HECTARES OF LAND CULTIVATED

Options (Amount of land)	Frequency	Percentage (%)
< 5 hectares	12	15
>5<10 hectares	10	12
>10<30 hectares	60	73
Total	82	100

Sources: Survey Data 2002.

From the above, 73% of respondents cultivated more than ten hectares of land less than thirty hectares of land. This cultivation of forestland from the above table clearly attests to the rate of bush-burning in Ibeto through cultivation of forest land.

SOURCES OF ENERGY AT HOME

The sources and domestic use of energy at home is one of the basic causes of burning in Ibeto as seen in the analysis of the table below:-

Table 3.5. SOURCES OF ENERGY AT HOME

Options (Sources)	Frequency	Percentage (%)
Gas	0	0
Fuel wood	80	95
Kerosine	2	2
Electricity	0	0
Total	82	100

Sources: Survey Data 2002.

From the above table, 98% of respondents make use of fuel-wood as their source of energy after bush-burning for their domestic use. 0 respondent or 0%

makes use of gas 2 respondents or 2% of the respondents use kerosine while 0% respondents representing make use of electricity.

From the above analysis, it is very glaring that the urge for fuel wood is one of the major cause of bush burning.

AWARENESS CAMPAIGN AGAINST BUSH-BURNING

A well formulated campaign against bush-burning in Ibeto will surely discourage people from indiscriminate burning of bushes.

Table 3.6. A AWARENESS CAMPAIGN AGAINST BUSH-BURNING

Options (Awareness)	Frequency	Percentage (%)	Degree
Yes	10	12	44 ^o
No	25	88	316 ^o
Total	35	100	360 ^o

Sources: Survey Data 2002.

From the above survey data 88% of the returned questionnaires are not aware of the current local, natural, and global campaign against bush-burning while only 12% are aware.

A good formulated, implemented policy and campaign against bush-burning is one of the anti-dotes necessary to solve problem of bush-burning in Ibeto.

AWARENESS OF NEGATIVE CONSEQUENCES OF BUSH-BURNING.

The creating of necessary awareness will be a great weapons and means of fighting bush-burning in Ibeto Community .

Table 3.7. A WARENESS NEGATIVE CONSEQUENCES OF BUSH-BURNING

Options (Awareness)	Frequency	Percentage (%)	Degree
Yes	5	11	40 ^o
No	30	89	320 ^o
Total	35	100	360 ^o

Sources: Survey Data 2002.

From the table, 30% respondents representing 89% are not aware of any negative consequences while 5 or 11% are aware.

From the foregoing, it can be concluded that many people are not aware of the negative consequence of Bush-Burning hence the need for awareness programmes to enlighten and educate the people.

BURNING OF VEGETATION COVER

This practice of burning vegetation cover is very common in Ibeto and the consequences have been devastating on agricultural products. Infact it is the fastest rate of soil degradation.

Table 3.8. BURNING OF VEGETATIONAL COVER

Options (Burning)	Frequency	Percentage (%)
Yes	30	76
No	5	24
Total	35	100

Sources: Survey Data 2002

From the table above, 30 respondents 76% burnt the vegetational cover while 5 respondents representing 24% do not burn vegetational cover. This burning of vegetational covers also contribute to deforestation, desertification and leads to Droughts.

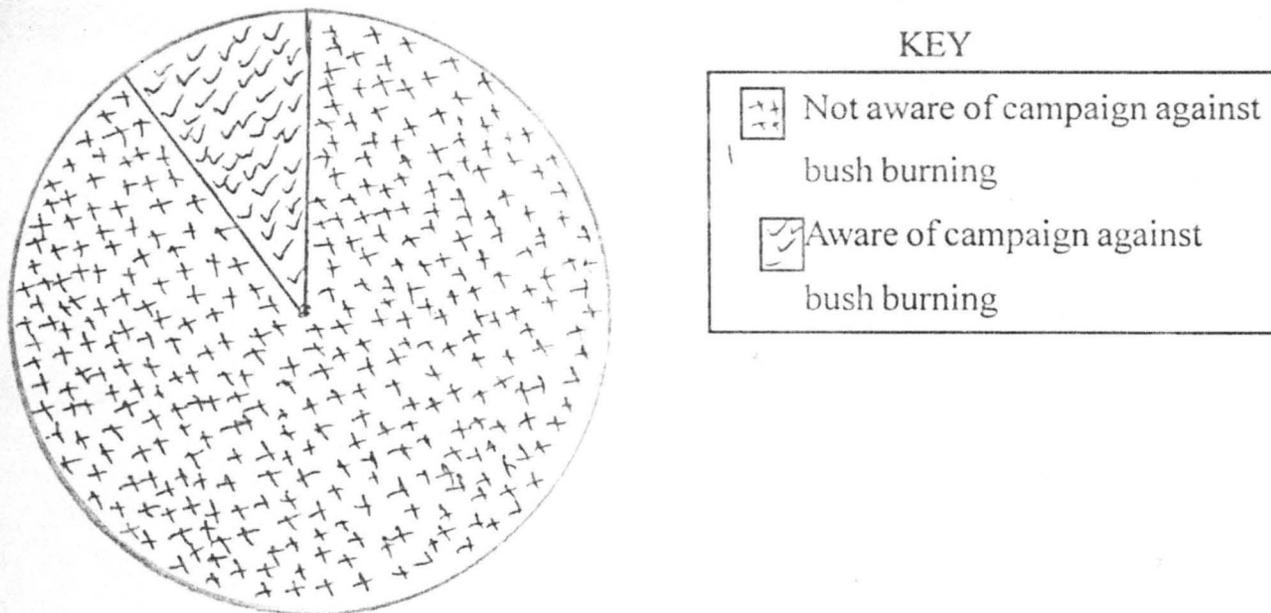


Fig. 3.1. Illustration showing the degree of awareness against bush-burning, using pie chart

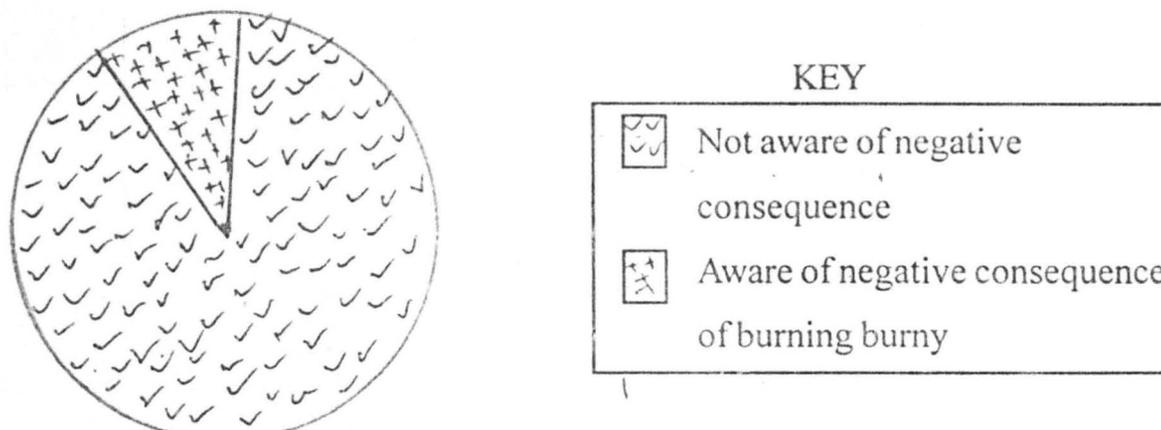


Fig 3.2. Illustration showing the degree of awareness against the negative consequences of bush-burning using pie chart.

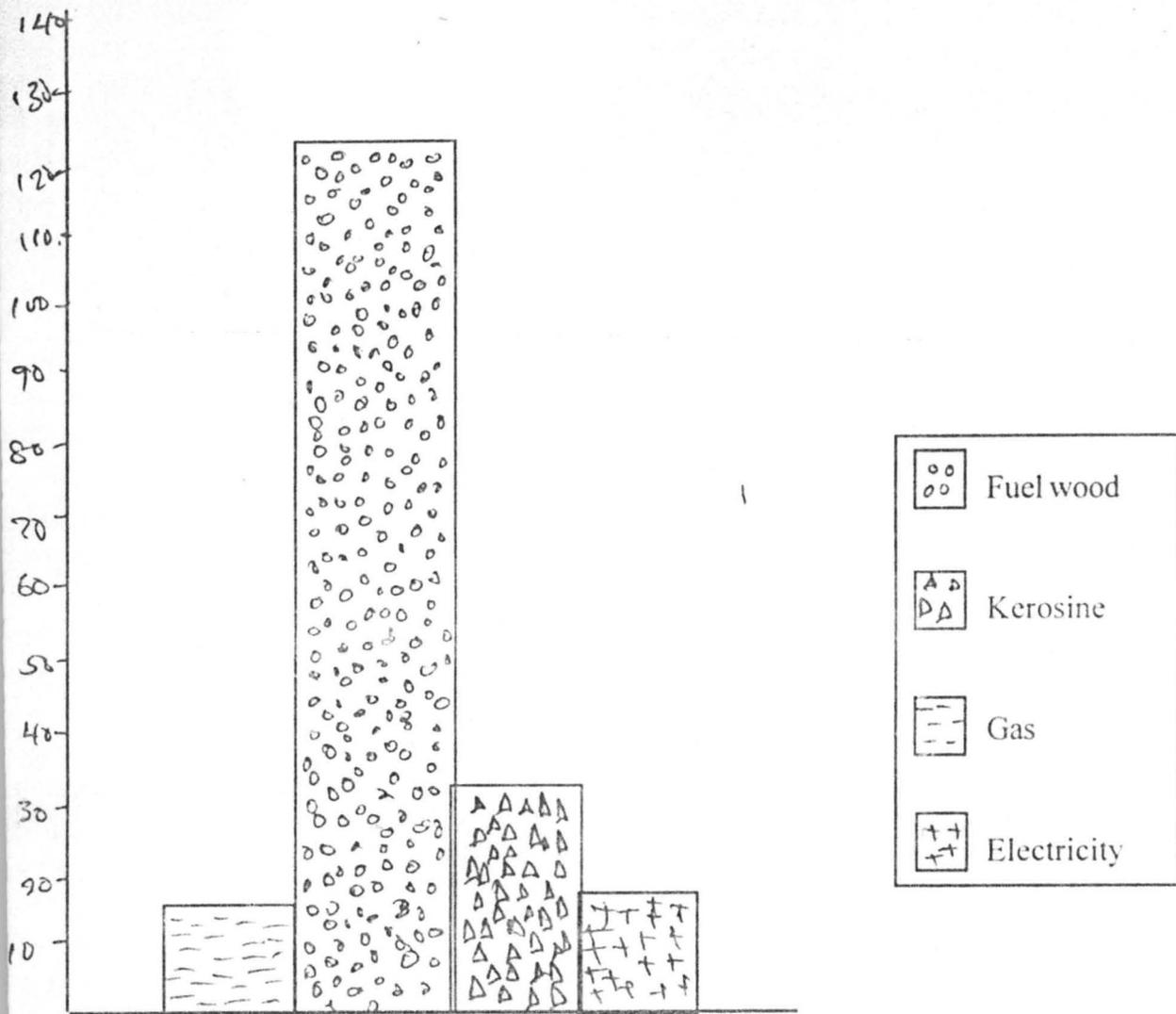


Fig 3.3

Illustration on different sources of energy using histogram.

CHAPTER FOUR

4.0. CAUSES OF BUSH-BURNING.

Bush-burning:- is the indiscriminate or intentional and or natural or man-made putting catching of fire on the vegetational cover of earth surface. Therefore are lot of causes of Burning-burning on the earth surface which could be seen below.

4.1.1 POPULATION PRESSURE AND URBANIZATION

Based on the findings and analysis in chapter three, the causes of bush-burning in Ibeto is population pressure, provision of fuel-wood (fire wood) urbanization and general bush burning itself. The population pressure on land is as a result of increasing demand for food, wood fibre, fuel, cultivable and pastoral land, hunting for meat because not all the members of the community can afford to go market and buy meat as well as housing needs. This has equally endangered the life of certain species and survival of some ecotypes in the town.

The impact on the community of accelerated population growth normally result in desperate need for extra amenities including schools, housing and other things necessary to sustain lives.

4.0.2. REFUSE DUMPS/SUNCKED MATERIALS.

Ibeto Community do not have refuse dumps, of a modern society, therefore refuse are dumps any where within or outside their houses, And most of this refuse contains ashes of fire which would carelessly be thrown away into the nearly grasses and within no short time fire may engulf without the knowledge of the person who dump it.

In Ibeto Community there use to be an annual fire plays festivals popularly known as "WAWWO" and normally takes place during the dry season. This also contributes to bush burning. Another factor on the causes of bush-burning is the local hunting, which is locally or popularly known as "FARAUTA". This type of Local hunting is by way of putting fire on the vegetation cover where animals would get scattered and so that they can easily be caught.

4.0.3. SURFACE TANKS OIL SELLERS

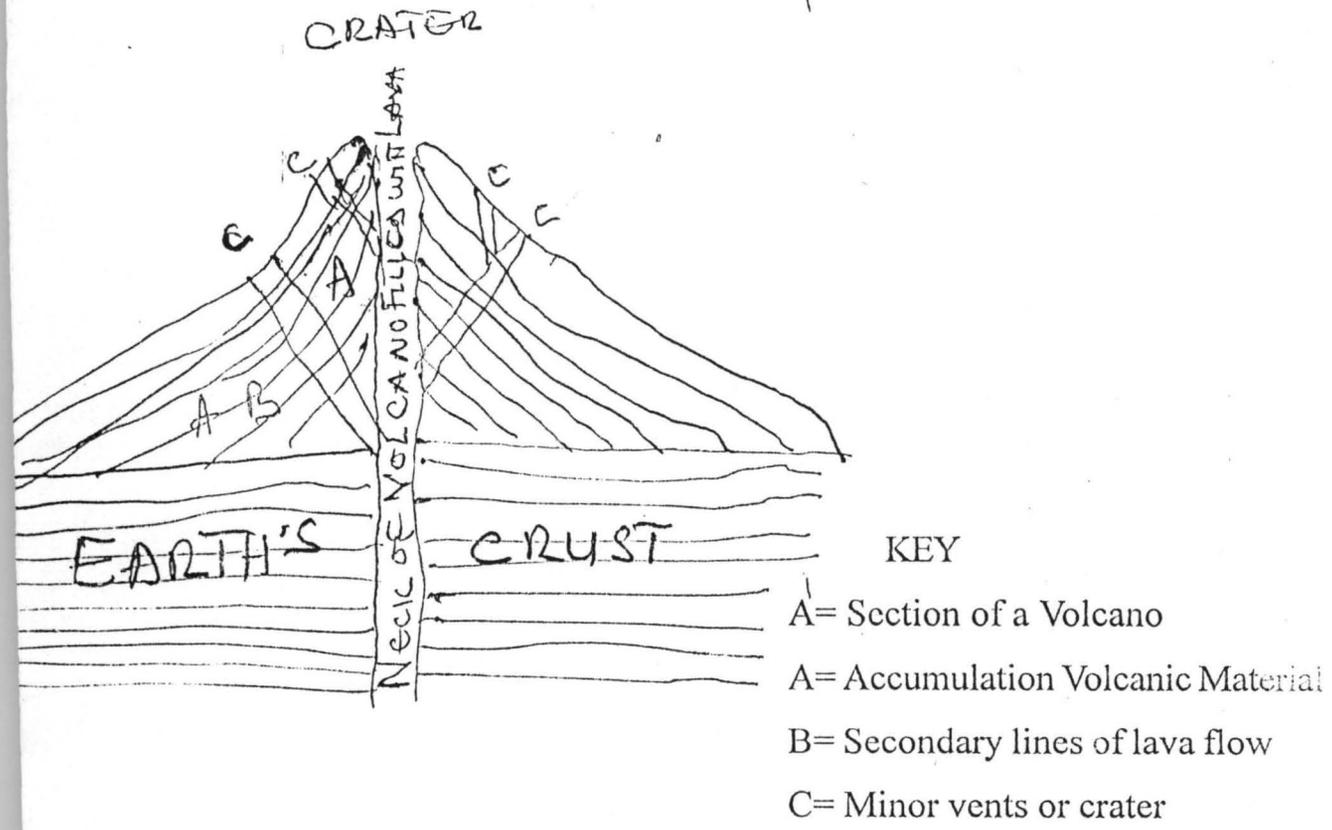
Surface tank oil sellers, started operating sometimes in the nineties (90s) when Nigeria as a nation stated experiencing shortage of fuel (pms) when few individuals started diverting the products outside filling station to what is called black marketers. In the process of off loading, some quantities of Petrol must be dropped on the ground. The market usually operates outside the town where if fire catches, it easily spreads.

4.0.4. VOLCANIC ERUPTIONS

A volcano is a hole in the earth crust through which are ejected hot rocks, ashes, lava, steam, mud and various gasses. Such holes occurs where there is a thinness or weakness in the earth crust. The materials which are ejected, falling around the hole or creater, gradually build-up a mountain that is roughly conical in shape and has a creiter at the top. (Fig 4.0.4) Good examples of such mountains are foji Yama in Japan, vasavious in Italy and Chimborazo in the andes. Tall or more or less conical, volcanic mountains are composed mainly of ashe with a central plug of lava filling the vent, when such volcano have long been extinct the soft ash may be removed by erosion, leaving much of the relatively hard lava plug as an isolated volcanic crag, volcanic mountains consisting mainly of lava tend to be dome shaped rather than conical.

Volcanoes are said to be “active” when eruptions occur frequently, “dormant” when no eruptions has occurred over long period of time/years. and “extinct” when no eruptions has occurred during the historic time.

Note that volcanic erulation is only mentioned here for academic consumption and for this thesis not that it has actually occurred in Ibeto even once.



INPACTS OF BUSH-BURNING

The environment is subject to Natural and man-made changes. In this context, we are concerned with man-induced changes which refers to the actions and inactions of man that causes environmental effects which may be positive and negative from the point of view of desirability. Distinction is made between the terms “effects and impacts” A man induced change is often called an effect while the harmful and / or beneficial consequence are called “impacts” Another convention is use the term impacts to denote only harmful effects. (Munn, R.E., 1979 P.)

In this context we are therefore concerned with the impact of bush burning on the environments and the followings are the impacts.

4.0.1. DESERTIFICATION:

Deserts are regions where there is too little rain for most forms of life. Without adequate rain plant cannot grow properly and hence do not provide enough food for animals. Large parts of the central and northern Sahara are virtually rainless as in much of Atacama Desert of Chile as well as a few regions on other continents. These rainless areas are true deserts, occupied by dry rock surface or expanses of shifting sand.

More extensive than the deserts themselves are the wide areas of semi-desert scrub, savannahs and dry deserts that surrounds them. These semi-arid or sub-humid areas normally experience a short rainy season marked by a few torrential rainstorms every year, during and after which the local ecosystem work furiously to achieve their years quota of new tissues (biomass).

Desertification simply mean diminution or destruction of the biological potential of the land. This means the intensification or extension of desert conditions leading to reduced biological productivity with consequent reduction in plant biomass in the lands, carrying capacity for livestock in crop yield and human well being. Desertification is the impoverishment of arid and semi-arid and some sub-humid ecosystems by the impact of mans activity. Desertification results from interactive processes of drought and man.

Desertification therefore is a general name given to the processes whereby ecosystems loose the capacity of revive or to repair themselves.

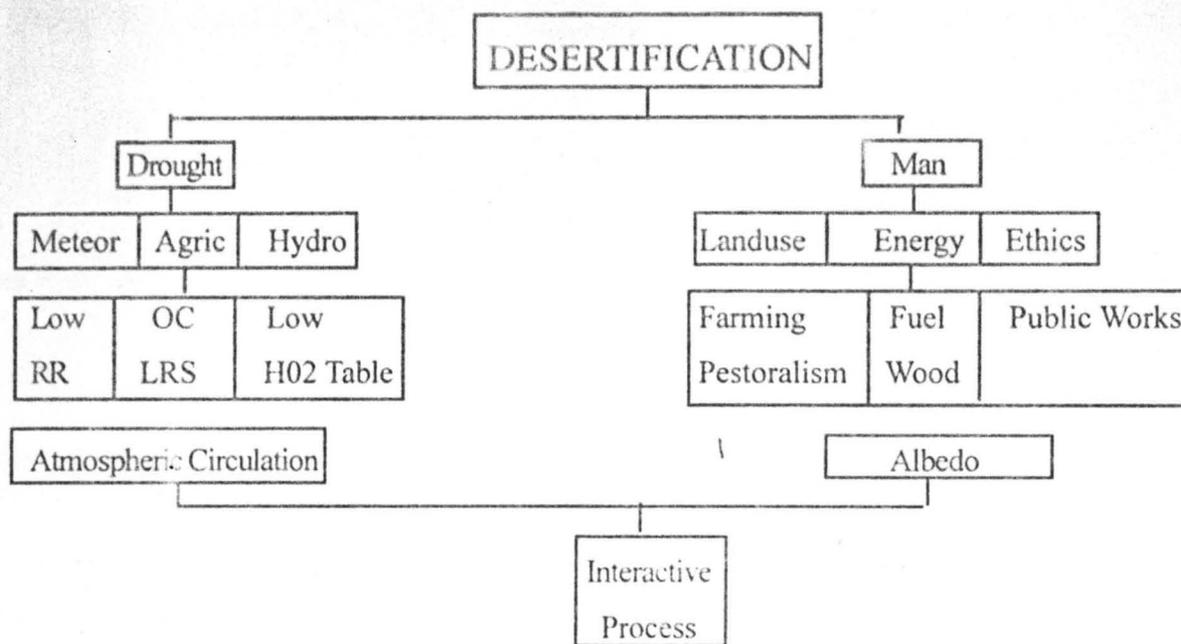


Fig. 1: An organogram Component arms of desertification.

Meteor = Meteorological

\emptyset = Onset Date or Rains

Agric = Agricultural

\emptyset = Cessation Date or Rains

Hydro = Hydrological

RR = Rainfall

LRS = Length or Rainy Seasons.

Fig. 1: An organogram Component arms of desertification.

CAUSES OF DESERTIFICATION:

The actions people take that cause desertification are methods of landuse which are inappropriate in the sense that they apparently lead to environmental degradation. These include overgrazing, overcultivation, deforestation. etc.

OVERGRAZING:

Livestock-based livelihood are an important component in both subsistence and commercial economic activities in dry lands. Traditional pastoral nomad systems have been very important in northern Africa, some parts of Southern Africa, Arabia and Central Asia for thousands of year. Plant Community is destroyed by animals.

Plant disturbance of root systems by scuffing and compaction of the surface, reducing rainfall infiltration all contribute to damage. Degradation has especially been regarded as ensuring from situations where herd sizes are allowed to increase in an almost uncontrolled and irresponsible manner. Rising livestock numbers in dryland grazing systems have particularly been seen to lead to desertification.

OVERCULTIVATION:

Some authorities believe that overcultivation is one of the principal causes of dryland degradation. Such degradation has led to declining yields of staple food crops, especially in sub-Saharan Africa and some South American countries. Overcultivation is a consequence of changes in the application of traditional dryland rainfed agricultural methods and the introduction of inappropriate methods developed in other environments.

Several attributes of cultivation are seen to create problems. Shorter fallow periods lead to nutrient depletion which is a serious problem in African drylands. This lowers the potential for production and reduced yields result. Soil erosion by wind and water may result from weaker soil structure but more significant in this respect may be the growth of mechanised agriculture with its attendant large fields and the ability to deep plough, further damaging soil structure.

DEFORESTATION:

Clearing forest and woodland to create agricultural and pasture land has been a human activity since time immemorial. The scale of clearance has increased as modern agricultural methods have been implemented, both for mechanised ploughing where large fields are most cost effective and for application of irrigation schemes.

Naturally-forested upland areas are particularly susceptible to water erosion following clearance. Deforestation for fuelwood, agriculture, industry and homecraft to an extent is increasing at an alarming rate and this is causing serious land degradation.

URBAN AND INDUSTRIAL ACTIVITIES:

Waste disposal and pollution from industrial activities are not major causes of land degradation but they can take on local significance for example in the Middle East and in the oil producing states of Central Asia. Urbanization has been a major feature since World War II and is likely to continue. The physical expansion of built land reduces or totally removes the biological production of the land and is therefore strictly a desertification process.

The indirect effects of growing urban population on demand for food and fuel are very significant features in rural land use changes and processes. This has contributed to the need for practices such as irrigation, notable in the dry lands of the USA, Mexico, Egypt and Indian sub-continent but also increasing in Africa.

EFFECTS OF DESERTIFICATION:

There is a drastic reduction in the fraction of soil covered by vegetation. As a result of large expanses of bare soil, there is a consequent rise in the reflective capacity (albedo) of the surface for solar radiation. This in turn leads to climate change. There is a considerable and often permanent loss of perennial plants, especially woody shrubs and trees. Soil erosion and impoverishment are wide spread, because of removal by wind of mineral and organic material and because of rapid oxidation of remaining litter and soil carbon. Gully and sheet erosion of soils by occasional heavy rainfalls tends to accumulate the eroded materials on valley floors or in basins. Consequently agricultural lands are lost. Other accompanying consequences are famine and hunger, loss of animals and humans by death, shift in population (migrations).

Inadequate water supply lowering of water table and conflict over grazing farmlands.

CONTROL OF DESERTIFICATION:

Climate variation cannot yet be predicated with any certainty but knowledge of climatic processes help combat desertification. Long term proper monitoring of climate and of associated hydrological and ecological processes is absolutely central to the battle to restrict desertification. Satellite observations should be employed because it allows continuous monitoring of various climatic elements that have hitherto been hard to observe e.g. cloudiness.

Landuse control is the key to improving climates and to minimizing the effects of desertification (this include afforestation, controlled grazing, controlled tree falling/deforestation, legislation or controlled (against) bush burning, controlled use of wood as fuel). Surface micro-climates are adversely affected by desertification.

Environmental education is essential. All countries in the arid zone should provide advisory and technical services that make use of historical and current information about weather and climate. Extensive research is needed into microclimatological relations and vegetational changes.

It is necessary to warn against suggested remedies, flooding of land desert basins, for example is not likely to increase regional rainfall. Tree planting, although often beneficial to the soil and nearby cropped areas will not significantly alter the microclimate.

4.1.1. DEFORESTATION

The role of deforestation in global environmental dynamics is gaining increasing attention at all levels ranging from some village community in developing countries to

international summits in Developments nations. The extension of the Data base on the scale and the ratio of deforestation in recent years has evoked and serves concern from the world public to extent threat there is now a growing perception that deforestation is one of the most pressing contemporary environmental problem. The United National Conference on Environment and Development (UNCED) identified deforestation as one of the three specific topics (the other two being bio-diversity and climate change) in 1992 conference. Practical measures were taken at the international Monetary Fund, World Bank Development Committee, meeting in 1989, where it was suggested that a global fund be provided to encourage developing countries to undertakes environmental protection & activities. This created or resulted in the creation of the global environmental Bio-diversity among others GEF” has for instance provided 10 million US Dollars (US\$ 100M) to the Congo tropical forest reservation project in the effort to protect the global commons.

Deforestation is the indiscriminate felling of trees or wanton exploitation or clearance of the forest in a particular geographical location without any effort to replace it.

CAUSES OF DEFORESTATION:

Deforestation is caused by human and natural factors. The most important human causes are population pressure, cultivation of crops, provision of fuelwood and charcoal, timber harvesting and bush fires. Natural factors include strong winds e.g. hurricane, bush fires from lightening and drought.

POPULATION PRESSURE:

Is the most important factors causing large scale deforestation in West Africa. Most other main causes are either directly or indirectly linked to population pressure. One of the characteristics of almost all Developed Countries is that of a high population growth.

LAND CLEARANCE FOR CULTIVATION:

Of great importance in the deforestation process is the large scale clearance of land for cultivation due mainly to increasing population. The level of disturbance associated with such land use can be either intermediate or high. The traditional bush fallow cultivation system of West Africa is characterised by the annual cycle of forest clearance, to forest, the length of the fallow (nowadays) being mainly determined by land availability and population pressure.

PROVISION OF FUELWOOD AND CHARCOAL:

The demand for domestic fuel is another factor accelerating deforestation. In West Africa for example, firewood and charcoal are the main sources of energy for domestic purpose. Some tree species are particularly important due to the heating efficiency of their wood. The most important are *vitex doniana*, *prosopis Africana*, *Bombax costatum*, *Borassus asthiopium*.

The low income levels of the local people preclude the large scale use of conventional forms of energy used in the Developed Nations. As population increases, more energy is needed for domestic purposes such as cooking food, baking bread, heating water and ironing clothes. The bulk of this energy is derived from forest products in the form of either wood or charcoal. A rise in population therefore should, within the constraints of limited use of fossil fuel, lead to greater demand for firewood and charcoal and corresponding increase pressure on forests.

TIMBER:- Timber trade is another important factor causing deforestation in West Africa, Although its importance is rapidly declining in most West African Countries.

BUSH FIRE:- Forest degradation by bush fire must be included in any discussion of forest destruction in West Africa. Some of the fires are started accidentally but others

are started deliberately. Thickest forests, woodlands with understory grasses near main roads and footpaths are most prone to accidental fire than other vegetation types. Fires may be set to a patch of land to manipulate the vegetation, for example to try to eliminate weeds from pastures as is sometimes done in Nigeria.

MINOR CAUSES: Some trees have medicinal properties. Extracts are made from the leaves branches, barks and roots and depending on the type of medicine and intensity of extraction, this may cause trees to die. Other minor causes are settlement and urbanization, construction of roads, buildings etc. grazing and mining.

EFFECTS OF DEFORESTATION:

The possible consequences of deforestation are invalid. These are loss of species and biodiversity, increase in atmospheric carbon dioxide (Co₂) (with the subsequent rise in global temperatures) regional decrease in rainfall, increased soil erosion and decline in soil fertility. Other effects include desertification, lowering of water table, distortion due to exposed soil. All together, the commulative effect is one of increased poverty. To these might be added regulation of nutrient cycle and increased sediment load of rivers and the consequent alteration of fluvial competence and capacity.

METHODS OF PREVENTION:

- Afforestation - plant of more trees
- Reafforestation - hit one. plant three.
- Immediate replenishment.
- Creation of forest reserves.
- Improved farming methods.
- Selective cutting down, of full grown trees to give room for replenishment.
- Through legislation
- Education (enlightenment campaign).

4.1.3. DROUGHT

Drought is a periodic reduction in moisture availability below average conditions. Or simply defined as the non-availability of adequate amount of water for man, animals and plants. Drought severity depends on the degree of moisture deficiency, the duration and (to a lesser extent) the size of the affect area. The definition of drought varies from one discipline to another.

TYPES OF DROUGHT

Three major types of drought recognised namely, meteorological, Agricultural and hydrological, usually associated with environmental degradation. This classification is based on the different used made of precipitating water by man.

Meteorological Drought:- This is regarded as dryness due to lack of precipitation. This infers lower than normal rainfall amount over a specified period of time. This refers to the temporal cycles off negative fluctuations from the mean annual precipitation over an area. Meteorological drought has been experienced in West Africa in the Sahel Region. It was the main cause of the Sahelian drought of 1968-1973 and that of 1982-1984. Meteorologists recognize two types of drought namely absolute and partial drought.

An absolute drought is defied as a period of atleast 15 consecutive days, none of which is credited with 0.2mm or more of rainfall, while partial drought is a period of atleast 29 consecutive days, the mean daily rainfall of which does not exceed 0.2mm.

Climatologists usually define drought in terms of rainfall departures from the long-term mean called the normal. Thus a drought is said to occur when the rain received in a year or season is less than a specified percentage of long term annual or seasonal average. Various percentage deviation from the mean are used to denote different intensities of drought.

Table 1: Climatic definition of drought of various intensities.

Types of Drought	% deviation from mean
Slight Drought	11 - 25%
Moderate drought	26 - 45%
Severe drought	46 - 60%
Disastrous drought	More than 60%

Agricultural Drought:- Refers to the shortage of water in the soil for plant growth, development and maturity. It normal results from either late onset of rains or earlier than normal cessation dates of rains (for season climate in West Africa). This results in shorter than usual length of rainy season. Agricultural drought is most marked in areas experiencing high seasonality of rainfall. These are areas within continental interiors such as Northern Nigeria and other Sahelian regions of West Africa. The only planning strategy to combat such drought in those areas is to provide a stand by irrigation facility.

Thortwaite (1944) identified four types of agricultural drought:

- i. Permanent Drought:- found in arid environment where in no season is precipitation enough to satisfy the water needs of plant e.g. Sahara and Kalahari deserts.
- ii. Seasonal drought occurs in areas with well-defined wet and dry season e.g. Savanna and Sahelian zones of Nigeria. It is expected every year as a result of atmospheric circulation pattern.
- iii. Contingent drought is due to rainfall variability. They occur anywhere but not in humid and sub-humid area.
- iv. Invisible drought occurs any where but most common in moist region even where there is rain every year. Here rain does not meet the evaporative demand of the atmosphere.

Hydrological Drought:- This is a period during which streamflow are inadequate to supply established uses under a given system of water management. This suggests

a deminition in the amount of underground water which takes time to replenish. Hydrological drought relates to declining amount of surface ground water and hence lowering of water table as a result of prolong tapping of underground water by man, together with the additional effects of both meteorological and agricultural drought. Reduced infiltration due to compaction of soils at the surface by man and animals, increased albedos at surface due to deforestation, and additional cases of meteorological droughts have resulted in the decreased volumes of underground water. This has resulted specifically to the now experienced water table lowering in Northern Nigeria, resulting in well deeping annually.

CAUSES OF DROUGHT

A direct cause of drought is lack of precipitation. Drought is intensified by high temperatures, strong wind, and low humidity, all of which increase the loss of moisture by evapotranspiration. Human interference by way of increased landuse, urbanisation, industrialization, over cultivation, overgrazing, deforestation. also contribute to drought. These landuse practices tend to increase runoff, decrease vital soil moisture storage resulting in high temperatures, strong winds and low humidity. Also several years of abnormal dry weather are usually accompnied by above average temperatures that accentuate the drought conditions.

Drought continues to occur over many parts of the globe in varying degrees of severity and duration. In many regions, drought are rooted in global ocean- atmospheric circulation variations, some of which occur dramatically in association with El Nino/ Southern Oscillation (ENSO) episodes. The warm episode of ENSO has been shown to be associated with droughts in many parts of the globe, notably Indonesia, southern Africa, Australia, and north-eastern Brazil.

Drought is also caused by the shifting of normal cyclones (low-pressure storm system) tract across a region, leaving some areas in the region without their normal precipitation for protracted periods. The affected areas have the tendency to be dominated by high pressure system in which the air sinks and its warmed by

compression preventing condensation and precipitation. Another recognised cause of drought is abnormally low sea-surface temperatures. Low-sea-surface temperatures of the coast stabilizes the atmosphere so that the vertical air currents needed to produce appreciable precipitation are suppressed.

EFFECTS OF DROUGHT

Droughts result in the depletion and exhaustion of soil and shallow groundwater, and they may be capable of disrupting, even if temporarily, low resilience equilibrium in the natural ecosystem in the region. Drought administers shocks to the ecological system. During such extended dry periods, the land is under increased stress from both man and his livestock and this may be severe enough to causes damage to the environment. The precarious equilibrium of the plant communities is upset. This unprotected soils would yield greater immediate runoff and result in strong fluvial erosion with the return of the torrential rain storms. There is also high instability of landuse potential.

Nations experience considerable distress during drought occurrences. Mass starvation famine and cessation of economic activities particularly within the developing world where economies are mainly tied to agriculture - are some of the advertisements of drought. Disasters caused by drought are also strongly affected by such diverse factors as poor agricultural practice, increase in population density and the country inability to provide alternative supplies of food, water and employment.

CONTROL MEASURES

In order to ameliorate drought impacts, it is necessary to adopt appropriate landuse and management as well as by various socio-economic means. Such measures include short term solutions (eg. emergency relief) and long term aspects such as appropriate landuse and particular management practice as well as socio economic and political factors. Another major way of controlling drought is through long-term

climatological forecasting of rainfall situation. A prior knowledge of an impending drought situation is a useful tool for providing standby irrigation measures.

4.1.4. SOIL EROSION

Soil Erosion is a process whereby the surface layer of weathered rock is loosened and carried away by running water wind, ice or natural agent and lower horizon in the soil is exposed. Soil erosion occurs in several parts of Nigeria under different geologic, climatic and soil conditions. But the degree of occurrence varies considerably from one part of the country to the other.

TYPES AND CAUSES OF SOIL EROSION

Basically there are three types of erosion by water. They include:

Surface Flow Erosion: Which occurs when soils is removed with surface run of during heavy rain.

Splash Erosion:- Occurs when rain drop strike bare soil causing it to splash as mud, to flow into spaces in the soil and to turn the upper layer of soil into a structureless compacted mass that dries with a had impermeable crust.

Channelized Flow Erosion:- Takes place when a mixture of water and soil cut a channel which is then deepened by further scouring.

These types of erosion manifest in several different forms namely raindrop erosion, sheet erosion, rill erosion and gully erosion.

Rain Drop or Splash Erosion:- This occurs from the impact of waterdrops directly on soil particles or on thin water surfaces. Raindrops strike bare soil with considerable impact and detach soil into the air. On level ground, the particles are redistributed more or less uniformly in all directions, but on a slope is a net transport downslope.

Sheet Erosion:- This is the relatively uniform removal of soil in a thin layers (laminar flow). Sheet erosion is difficult to detect except as the soil surface is lowered below old soil mark on fences posts, tree roots and exposed or small pillars of soil capped by stones remain.

Rill Erosion:- This is the removal of soil by water from small but well defined channels or streamlets when there is a concentration of overland flow. it occurs conventionally when these channels have become sufficiently large and stable to be readily seen. Tillage operation can easily remove rill erosion.

Gully Erosion:- At some point on the slope, sufficient overland flow may accumulate to cause a small riverlet. Its turbulence in the flow is strong enough to dislodge particles from the bed and banks of the channels, gully erosion occurs (Channelized flow). Gullies cannot be obliterated by tillage. This is an advanced stage of a rill erosion as rill erosion is an advanced stage of sheet erosion.

Soil erosion is caused by physical or human factors or a combination of both.

Physical factors that leads to soil erosion include the followings:

- Nature and composition of the soil.
- The topography; slope of low land determine the soil erosion.
- Climate; desert - wind, South - water erosion.
- Absence of vegetation cover Drought, Desertification, Deforestation weakened & reliable to ensure.

Human Factors are:

- Overcropping/excessive farming
- Mining activities
- Constructional works
- Clearance of vegetation/deforestations
- Bush Burning.

Consequences of soil Erosion:

In almost all cases, and no matter the type of soil erosion in any given area, the consequences in term of what is relevant to soil conservation are two fold; general decrease in soil fertility (as a result of the action of sheet and/or wind erosion); and diminution of cultivable land as a result of the occurrence and expansion of gullies. The latter consequence has wider implications which include displacement crops (leads to migration and food shortage) changes in the topography and hydrology of affected areas and disruption of roads (leads to water pollution) All these are serious social consequences of soil erosion which can be categorised under the following types:

- Loss of soil fertility
- Diminution of cultivable land
- Loss of property - home and farm crops
- Disruption of communication routes-roads, buildings, 6mm poles.
- Water scarcity and situation of Dams.
- Loss in finances.

MEASURES OF SOIL EROSION CONTROL

The need to arrest the wasteful trend in soil loss has been widely recognised and various soil conservation measures have been taken at various levels to deal with the problem. Two broad measures of control discussed are curative measures and preventive measure.

On the curative side, the lines of action depends on whether the type of erosion involved is gullying, sheet or wind erosion. On gullies the attempt has always been to prevent as much runoff as possible from reaching the gullies, as well as stabilised the slope. A combination of afforestation, ridging, contour ploughing, buncing, the construction of side - drains to soak-away pits and usually been applied. On sheet erosion the emphasis is on reducing the extent of baresoils in any area and by planting

such areas to grasses, such as bahama grass and shrubs such as *Acioa barteri* as well as other local varieties. In the case of wind erosion emphasis is again on limiting the extent of bare soils and providing wind breaks (trees, shrubs etc) to check the process.

On the preventive side, where the incidence of erosion is either not known or not yet serious, a number of measures are taken in addition to the above simple curative devices to check the inception of soil erosion. These other measures include limitation of the extent of forest degradation by evolving a system of cultivation which will always ensure that the ground surface is under effective cover of vegetation, controlling the extent and timing of bush burning, adaptation of contour ploughing, introduction of inter and multiple cropping and effective use of cover crops, zoning and controlling the use of pastures. Other control measure are enlightenment programme and environmental education.

4.2. POLLUTION

Environmental Pollution:- Water, Air and Land Pollution increasingly caused deterioration of environment, that it lacks the capacity to sustain some development processes. Industrial activities relating to production of chemicals, fertilizers, deliberate dumping of toxic wastes, land clearing, stream and river dredging, petroleum exploitation and a host of other activities carried out by man aimed at solving his economic and social problems, pollute the environment. Environmental Pollution is therefore defined as impairment of the suitability of the environment for any of its beneficial uses, actual or potential by man's activities such as land utilization, building of industries, mineral mining, oil exploration and exploitation.

The major types of environmental pollution include air pollution, water pollution and land pollution.

4.2.1. AIR POLLUTION

Air Pollution is the presence in the atmosphere of substances to such an amount as detriment to human health, safety or welfare or as to interference with full use and enjoyment of his property. Although, every form of human activity tend to produce pollution, the primary sources of air pollution emission are the combustion of fuels and various manufacturing processes, each of which include a wide range of activities. Natural processes also result in air pollution such as pollination, volcanic eruption, dust-storms, and forest fires.

The air pollutants are either suspended particulate made up of small particles or the dustfall or settleable dust made up of large particles.

The major air pollutants are sulphur oxides, carbon monoxide, nitrogen oxides, hydrocarbons and photochemical oxidant. Sulphur dioxide causes respiratory diseases and destruction of forest through its damage to chlorophyll. The destruction of forest has a serious effects. Studies in Nigeria have shown that desertification induced dust pollution which used to be restricted to the drought prone northern parts is now a nation wide health hazard during the months of November to March.

Globally, the high concentration of green house gases continue to increase with yearly emission of 6 million tons of CO₂ threatening climate change. The emissions of chlorofluorocarbons (CFCs) continues to deplete the protective ozone layer at an alarming proportion. Flaring (burning) of untapped gas in the oil producing areas of Nigeria also releases among others, CO₂ into the atmosphere. This constitutes air pollution but ultimately resurfaces as terrestrial and aquatic pollutants termed acid rain. Buildings, vegetation, livestock and crops are damaged by acid rain. It also causes loss of sources of livelihood and human illness.

Carbon monoxide is a colourless, odourless and lethal gas produced by the incomplete combustion of carbonaceous material, especially petrol-powered motor vehicles which emit about 80% of the total gas production. Industrial processes such

as paper and iron manufacture also contribute carbon monoxide is breathed in for several hours, the oxygen carrying capacity of the human body is decreased.

In summary the causes of air pollution include:

- Industrial waste and fumes
- Exhaust fumes from vehicles aeroplanes
- Fumes from mineral works
- Poor refuse disposal
- Nuclear waste
- Fumes from explosion of bombs and other dangerous war weapons
- Artificial cloud seedling
- Emission of smoke to the atmosphere
- Dust storms from desert/harmattan
- Volcanic eruptions.
- Emission from power station
- Use of pesticides/chemical
- Emission from burning-gas
- Flaring, bush burning, smoking etc.
- Emission from decaying materials

The effect of air pollution are:

- Increase or decrease in temperature
- Climatic variation
- Destruction of the ozone layer
- Effect on the carbon cycle
- Health hazard/ lung disease, skin cancer, eye irritation etc.
- Cause smog
- Acid rain effect
- Accidents as a result of poor visibility

- Affect plant growth and aquatic life
 - Affect the economy
- Ways of controlling air pollution include:
- Government legislative/enforcement
 - Education on waste disposal
 - Monitoring of air pollution
 - International cooperation and control
 - Improved technology eg. waste recycling.

WATER POLLUTION:

Water pollution is any impairment of water which lessens its usefulness for beneficial purposes, or anything the public does not like or that which is getting worse. Water is polluted if it is not of sufficiently high quality to be suitable for the highest uses people wish to make of it at present or in the future.

Causes of Water Pollution

- Synthetic organic compounds in the form of industrial household and agricultural chemicals, as well as water treatment chemicals added deliberately and the product formed by the reaction of these with other contaminants.
- Oxygen-demanding wastes (organic compounds contained in sewage and some industrial effluent) whose biological and chemical degradation depletes dissolved oxygen.
- Inorganic compounds and mineral substances, including acids, minerals fibres such as asbestos and heavy metals discharged directly into water by certain mining and industrial operations.
- Thermal discharges from power plants and certain industrial facilities.
- Plant nutrients, such as nitrogen and phosphorus, from sewage and agricultural runoff.
- Radio-active substances from toxic waste dump and industrial operations.

Disease-causing organisms such as parasites, bacteria and viruses added to water bodies through raw or partially treated sewage and faecal matter.

sediment from erosion caused by agriculture, construction and natural disasters.

Oil spills through sabotage, oil well blow out, corrosion and rupture of oil pipelines and hose failure.

Utilisation of same water source by man and beast.

Discharge of effluent from ship at harbours.

The effects of water pollution are that impure contaminated water has been a leading cause of fatal diseases in human. Water borne diseases such as cholera, typhoid fever, dysentery and infections, hepatitis are common. Polluted water has direct impact on health in the form of bacterial or viral diseases, production of cancer, genetic defects and birth defects, varieties of acute and chronic toxicity in humans. Water pollution affects ecosystems through which an impact on human beings may subsequently be felt. Household detergents that contain phosphates may flowing to oligotrophic lakes and lead to eutrophication of the water bodies. Consequently, there will be an overgrowth of algae and a rapid deterioration of water quality. Sediments resulting from farming, construction and mining operations interfere with spawning of fish by covering gravel beds and cause direct damage to gill structures.

The acute effects of oil on birds, fish and micro-organisms are reasonably well catalogued. The formation of a film of oil in water bodies effectively prevent natural aeration, leading to the death of organisms strapped below. Fish may ingest spilled oil directly or indirectly, becoming unpalatable or even poisonous. Other than the direct effect of toxic materials such as heavy metals and refractory organic (man-made) organic materials such as pesticides, DDT, which decomposed very slowly in the environment) the most serious effect of pollution is the depletion of dissolved free oxygen. All higher forms of aquatic life exist only in the presence of oxygen. Under anaerobic conditions, aquatic organisms die and aerobic microbiological processes are retarded, if at all they occur, other effects of water pollution are lack of fresh water

for domestic use, inadequate water for industrial use, loss of man hour in search for water unemployment among fishermen and possible migration.

Control of water pollution includes among others:

- Legislation
- Enlightenment on dangers of water pollution
- Discourage the use of chemicals for fishing
- Monitoring of shipping, pipelines and chemicals
- Chemical discharge control
- Building of public utilities for the public
- Erosion control
- Pipe borne water
- Treatment of industrial wastes.

POLLUTION PREVENTION STRATEGIES AND CONTROL MEASURES:

1) Environmental Education and Awareness:- Can be utilised as an effective means of creating an awareness of pollution and its accompanying evils. This awareness is through the education of our children from primary school to tertiary level. The public should be informed of the danger of the continuous pollution of the environment. This could be through the news media and public enlightenment agencies. Environmental Education should be incorporated in the mass-literacy campaign programmes of the government.

2) Enforcement of National Guidelines and Standards:- Although the Federal Environmental Protection Agency (FEPA) has attempted to formulate national guidelines and standards on environmental pollution and natural resources conservation; the problem seems to be that of inadequate monitoring and strict enforcement. Besides the provision of appropriate national guidelines and standards on environmental pollution, policies aimed at addressing the issue of environmental and economic development must consider such issues as:

- Effective resources pricing instrument for resource conservation and nature protection.
- Appropriate instruments and techniques for environmental damage costing especially one that considers damage to the value of natural sceneries and ecosystems.
- Economic incentives and disincentives for natural resources conservation and environmental management.
- National resources accounting and auditing especially one that consider damage done to the environment.

3) Environmental impact assessment (EIA): An EIA is a process or study in which the potential physical, biological, economic and social impact of a proposed development on the immediate or more distant environment are identified, analysed and predicted. EIA aims at studying the effects of a proposed action on the quality which would emanate from the proposed action, finding ways of minimizing unacceptable impacts and providing options in design, siting and operation of the proposed development.

4) Waste Management:- Waste minimisation approach or waste treatment are practicable option to the ideal zero-waste option. Industries should assess their processes in order to minimise or eliminate waste and should undertake proper waste analysis at the design state. Waste recycling, treatment through chemical or biological degradation, incineration, landfill and composting also help in waste minimisation for effective waste management, the domestic householder should be encouraged to sort waste at source Garbage disposal should be paid for and the charges should depend on the amount of waste to be disposed.

5) Biotechnology treatment of industrial waste water: Waste water treatment systems are designed to alleviate adverse effects on the environment by removing organic matter to reduce the biochemical oxygen demand (COD); both suspended

matter and toxic materials should be removed. Conventional biological system such as trickling filters and activated sludge system have been applied to the biotreatment of toxic industrial waste effluent. Bacteria have been genetically manipulated to possess enhanced ability in degrading pollutant.

LAND POLLUTION:

Land pollution is caused mainly by solid wastes and chemicals dumped on land. Solid waste comprise of domestic refuse, commercial and industrial waste. The components of refuse are garbage, the food waste, rubbish, which include glass, tin, paper and everthing else that people no longer want. Construction rubble, street sweepings and abandoned vehicles are also wastes that polluted land.

The junked car problem and indiscriminate disposal of used polytene bags deserve special comment and sympathy for municipal authorities in Nigeria. Wastes from nitrogen fertiliser factories because alteration in the dynamic equilibrium of the soil, leading to changes in the composition of macro and micro-organisms and soil biochemistry. Damage can occur to the vegetation and to the water able if there is extensive percolation.

Textile and oil industries also contribute heavy metals to the environment. Pollution of land by the oil industry is attributable to oil spills emanating mainly from oil well blow out,rupture of oil pipelines and sabotage. Deliberate disposal of oil waste and used lubricating oil on land also pollute land. During exploration for oil, the landscape is very considerably disturbed through path construction, trampling and vehicular movement. Oil spills and the use of explosives during seismic survey in oil exploration is a serious environmental hazard. Fish and some other forms of aquatic life on which many riverrine and coastal villagers depend are sometimes exterminated.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

From the foregoing, it has been established from my research work, that bush-burning is a global environmental problem through that rate varies, from regions and major causes of bush-burning in Ibeto can be mostly attributed to local hunting, lack of environmental conservation awareness. Lack of proper education of the populace, the citizenry burning per-se is not bad that it is the appropriate timing, which is needed to achieve ecological balance.

At this juncture, I wish to re-emphasize the forest policy, which has its main thrust, to achieve self-sufficiency in all aspects of forestry through sustainable development programmes. Also one of the policy objectives is to conserve and protect the environment from indiscriminate fires, overgrazing, hunting, logging and illegal encroachment. Therefore it is apparent that the forest policy took cognisance of the seriousness and the adverse implications of uncontrolled bush-burning. As laudable as the policy is, strategies for achieving the policy objectives have never been implemented and this no doubt has contributed to the mirage at our environmental problem.

Specifically speaking, uncontrolled bush burning has given rise to the following environmental consequences.

- Loss of lives, properties and settlements particularly the rural areas.
- Loss of biodiversity (Flora and Fauna) and the ecosystem, their value to our lives as medicine, food, protein source e.t.c.
- Reduces soil fertility for agricultural output as it burns the soil, litters humus layers and the microbes.
- Leads to soil erosion, deforestation, desertification, drought and pollution, wild fires and uncontrolled bush-burning leave soil bare and exposed to agents of erosion.

- Aggravate global warming through the emission of carbon-dioxide and the "green-house-effects" phenomenon.
- Loss in the rate of evapo-transpiration.

If one looks back through the memory line, especially during the Colonial era, one find-out that forest reserves were created with strict regulation for access and provisions to prosecute offenders, during the Colonial era, one recalls vividly that people who indiscriminately set bush on fire were prosecuted and this was avoided. Today, the story is different. Would one be fair to say therefore that the colonist had greater love for nation than the present generation? we need to exhibit some higher responsibility to provide a health and conducive living environment to it's citizenry, the populace has a greater responsibility in ensuring that our environment is properly managed. Government effort in the past, in checking bush burning has failed because there are:-

- no legal instrument to back this even if available, enforcement was non-existent.
- lack of concern from top government official or its agents.

Bush-burning is known to be an environmental degradation as earlier discussed in the previous chapters, therefore, for the problem to be brought under better management, the following measures has to be observed to check future uncontrolled and / or regulated bush burning.

- Public enlightenment:- All tiers of government, traditional and religious leaders would be encouraged to sensitize their subjects on the consequences of bush burning. Bush burning of necessity would be encouraged to be under taken immediately (pre-determine period) at the end of rainy season. In addition, wards and village heads will be charged with the responsibility to apprehend late bush-burning offenders.

- Reward System:- As a means to encourage conservation consciousness throughout the country; consideration is been made for financial incentives to communities and or Local Governments that are declared bush fire free every year especially those areas.

- Identified as bush fire prone.
- Community fire committees: the Federal and States Ministry of Environment would be encourage through the Local Government formation of Community Fire Committees for Fire prevention and control. In addition, government will identify active community based organisations (CBO's) and non-governmental organisations (NGO's) to be partners in the fight against this ecological problem, joint government and community efforts would be encouraged.
- Bush-Burning Legislation:- Many States has no laws against indiscriminate bush burning, where the laws exist, enforcement is somewhat difficult. The forestry Act 1958 and forestry law 1978 of Oyo State for example are still relevant. Government will encourage States to revisits those laws and invoke it's full penalty on offenders.
- Training:- In recognition of the need to sensitize the public on bush burning, effort would be made to provide at Local Government and Community level on bush fire prevention and control. State Government are urged to establish units for education and awareness in their Ministries of Environments.
- Warning System:- It is also important that in development of fire prevention and control strategies, adequate information would need to be collected. Towards this end, the authority concern, has to put in place an early warning system to determine threat of fires well in advance. This would provide bases to put in place effective control measures. In additions as part of effort to be made towards preventing and controlling bush fires, proper records will henceforth be maintained on the frequency, timing, extent of damage and location of bush fires through out the country. This would guide in strategically locating fire-fighting facilities.

It is my fervent and candid hope that the realistic solution proffered and pradticable recommendations will be given a trial for an achievable, sustainable development and proper harnessing of the natural resources of Ibeto and it's environs for the future and present generations.

REFERENCES

- ABDULMALIK HASSAN:- Assessment Land Degradation in the tropical Savannah - Remote Sensing Tech.
- AYUBA KHALILU: Lecture Notes on Environmental Problem to Geography Department 2000/2001 academic season's.
- BABA J.M. 1988: Sustainable Development and Nigerian Environment-Presidential Address at the 35th Annual General Conference of the Nigerian Geographical Association held at Usman Danfodio University Sokoto.
- CLARK, W.C. and HOLLING. C.S. 1985: Sustainable Development of the Biosphere Human activities and Global change in T.M. Malone and J.G. Roederer (eds), Global change, Cambridge University Press, Cambridge pp 474-490.
- CRYSTAL INTERNATIONAL MAGAZINE; JANUARY & MARCH 2000 editions.
- MYERS N. 1989: Deforestation Rate in tropical forest areas and their Climate Implications.
- NATIYAL, J.C. 1979: Afforestation Programme in Arid - Zone of Nigeria. NIR/ 75013 Field Document IFAO.
- OLUWALUYI, AJIBOLA OLUGBENRO:- Impact Assessment of Deforestation in Federal Capital City, Abuja.
- PETERS, S.W. EKPOR, IJ and BISONG, F. E. 1994: Environmental Education - Published by Nigerian Conservation Foundation.
- PREECE & WOY: 1982: Foundations of Geography.
- PARTDAIRU, M.P. 1986: Strategic Environmental Assessment - Key Issues emerging from recent practice Environmental Impact Assessment Rev.

SMART N. UCHEGBU 1998: Environmental Management and Protection.

S.BARROW C.J. (1991); Land Degradation, Development and Breakdown of terrestrial
environmentals, cambridge press, cambridge.

WOOD, W.B. 1990: Tropical Deforestation: Balancing Regional Development
Demands and Global Environmental Concerns-Global
Environmental Change, Vol. 1 No. 1 pp23 - 11.

APPENDIX

IMPACT ASSESMENT OF BUSH-BURNING ON THE ENVIRONMENT (A CASE STUDY OF IBETO IN MAGAMA LOCAL GOVERNMENT AREA)

Instruction:- Be honest and sincer in answering the questions and I assure you that anyimformation given to me will be used for the simple purpose of thisproject. Also your personal information will be treated confidently.

PERSONAL DATA

1. Name-----+-----
2. Occupation-----
3. Age-----
4. Sex-----

RESEARCH QUESTIONS

1. Do you engage yourself in any agricultural activity?
(a) Yes () (b) No ()
2. What clearing method doyou use?
(a) Mechanical (b) Manual (c) Bush-Burning
3. Do you clear forestland for farming
(a) Yes () (b) No ()
4. How many hectres of land do you cultivate or put into use?
(a) Less than three (b) More than three but lessthan five
(c) More than five but less than ten.

5. What grazing method are you using for feeding your animals?
(a) Zero grazing (b) Free Grazing (c) Semi grazing
6. Do you normally burn the bush for one reason or the other?
(a) Yes () (b) No ()
7. What is your source of domestic energy at home?
(a) Gas (b) Fuelwood (c) Kerosine (d) Electricity
8. Do you buy fuel-wood?
(a) Yes () (b) No ()
9. Are you aware that your activities on Bush-Burning on land have negative consequences?
(a) Yes () (b) No ()
10. Does your community have any affestation project?
(a) Yes () (b) No ()
11. How many trees do you plant monthly?
(a) One (b) Two (c) Nill
12. Do you burn down trees with preference?
(a) Yes () (b) No ()
13. Are you aware of any campaign against indiscriminate burning of bush?
(a) Yes () (b) No ()

14. Do you set-fire in the bush so as to extract honey and for medicinal purposes?

(a) Yes () (b) No ()

15. Were you taught environmental education in your school?

(a) Yes () (b) No ()

16. Do you know Bush-Burning can lead to desertification and soil infertility.

(a) Yes () (b) No ()

17. Do you apply any management practice in order to replenish soil fertility?

(a) Yes () (b) No ()

18. What type of agricultural activity do you engage yourself in?

(a) Yes () (b) No ()

19. What type of crops do you cultivate?

(a) Arable Crops (b) Personal Crops (c) Orchards

20. What can you say about the cause of erosion in Ibeto?

(a) Nature (b) Deforestation (c) Heavy Machinery's