COMPUTARIZED RAINFALL RECORDS IN NIGER STATE.

A CASE STUDY OF GBAKO LOCAL GOVERNMENT

BY

ABDULLAHI HUSSEINI ABDUL
PGD/MCS/447/97

A PROJECT SUMTTIED TO THE DEPARTMENT OF MATHEMATICS /COMPUTER SCIENCE, SCHOOL OF SCIENCE AND SCIENCE EDUCATION, FEDERAL UNIVERSITY OF TECHNOLOGY MINNA.
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APPROVAL PAGE

This project has been read and approved as meeting the requirement of the Department of Mathematics /Computer Science, Federal University of Technology, Minna Niger State.

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SUPERVISOR

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(HEAD OF DEPARTMENT)

..... Date:.....

EXTERNAL EXAMINER

DEDICATION

This piece of work is dedicated to my beloved wives and Children

ACKNOWLEDGEMENT

I wish to express profound gratitude to ALLAH for this favour upon me, which include the deposition to write this project. I presumptuously pray into Him to make it of immense benefit to we and other readers.

My sincere gratitude goes to Mallam Isah Audu, who supervise this project, by reading the manuscripts and swing a lot of includable suggestions corrections and brighter and brighter ideas.

My appreciation also goes to the coordinator of thrs Badmus for his moral support and to Head of Department of Mathematics and Computer Science Dr. S.A. Reju I also acknowledge and appreciate the untiring commitment of lectures in the department to the success of this programme may Allah reward then all, Amen.

My profound gratitude is hereby expressed to the record keeper Mr. Ranu Yisa of National Research institute Badeggi for me rainfall data.

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My kind regards to all men and women who have helped me in one way or the other to make this studies a success. No-table among than are Sheik Gimba Alhass Chief Accountant S.S.G.'s Office Niger State, Mallam Suraju of Federal Polytechnic Bida who guided me through, may Almighty Allah rewards them all.

And lasting but not the least is member of my family house for their patience during the course of this work. I pray God almighty to grant us the good fruit of these endeavours here on earth and in the hereafter, Amen.

ABSTRACT

This project looks at the rainfall record of Gbako local government. Rainfall is the only major source of agricultural activities for both plants and livestock. It also determines the amount of fresh water available and controls the population of a region. It researches the various process and procedures involved in the record keeping of the local government, the computation of the rainfall record for 10 years of meteorological station, the various lapses within the system and finally tries to seek a computer approach to facilitate the whole system by developing a computer programme in QBASIC.

The work will be very useful to researchers and many other interested persons in determination of month and the year of the highest rainfall with the local government.

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CHAPER ONE

INTRODUCTION

1.1 Background of the study

This project is on computerization of rainfall record of Niger State, a case study of Gbako Local Government.

Rain is an important element to all plants and animals including man. Rain is the source of all waters and without it life cannot exist on the earth. Water is one of the important elements that differentiate earth from the other planets.

All agriculture and some industries depend on the availability of water. Man also depends on the water for his domestic activities he performs on the earth surface.

The only source of water is the rainfall. Rainfall is one of the basic factors that determine the type of vegetational cover over the earth surface.

To study rainfall, proper record has to be taken and kept. These will ease the work of researchers when they come to study the rainfall of Gbako Local Government. However, over years the metrological station Badeggi has been with problem of computation and record keeping of rainfall data. Among these problems is lack of proper record of rainfall. And the use of modern instrument for record keeping that is computer. As such this project is undertaken to address these issues and to examine the possibility of adopting the mechanical approach of the modern time (i.e. computer approach) which has been judged as most speedy and accurate in computation and most efficient in the handling and preservation of data and its management.

1.2 Objective of the study

Rainfall of an area continues to change from time to time like any other weather elements. For example, the statistics shows that the rainfall was inadequate in 1998 while in 1999 the rainfall was in excess. This statistics gives clearer guidance to accurate and easy computations of rainfall each year. For dynamic manner, a computerized form foe easy reference and possible modification by meteorologist at any time.

Since the rainfall statistics is carried out annually during rainy season, computerizing it, removes a great deal of works and ensures an easy early and accurate computations, similarly that achievable from a computerized statistical system.

Computers are used to store large amount of data/ information most efficiently and effectively. It is therefore hoped that the project will go along way in the preservation of the rainfall records in respect of each month for at least 10 years and will allow for easy retrieval of the same years at any time.

Compare this with the present system where rainfall record for just immediately proceeding year have been missed, destroyed by fire or stolen.

Still again addition or deletion from records can be easily carried out at any time and the results of computation can be compared on year by year. It is therefore seen to be a great tool for the agriculture planner as far as it concerns computations and storage of information about rainfall record will be statistical for a job well done and the work made easier and better appreciated.

Finally the project aims of reducing the cost of stationeries and /or personal in the computation of rainfall record at any given time.

1.3 Rainfall and its causes

Rainfall, according to Trewartha and others in their book "Element of Geography" is defined, as water derived from precipitation originating in atmosphere humidity is the great solvent in which most of the vital processes of living matter take place. They further explained that rain originates from atmosphere and forms clouds. "All precipitation originates in clouds most clouds do not yield precipitation." The reason is that the cloud particles are so tiny that their buoyancy prevents them from falling to earth. For precipitation to take place, the multitudes of almost microscopic cloud droplets must combine into layer units capable of falling to the earth. For example good-sized raindrop may contain as much water as 8 million cloud particles and it falls 200 times as fast.

The combining of droplets to form raindrops in the result of two processes. One is the ascent of the cloudy air above freeing level, where some of the liquid droplets have changed to ice. These ice particles then become very active nuclei around which the clouds water particles gather to form larger raindrops. In the second mechanism, the cloud droplets collide and coalesce as they fall at different velocities on the ground. (Trewartha and others 1967)

However, some of the earth's rain was originally ice and snow particles which were formed at temperature below 32°C but which melted as they fell by the forces of gravity through the warmer atmosphere closer to the earth's surface and falls back as rain these depend on stability non buoyant aim or instability/buoyant air is forced upwards over a terrain obstacle, the resulting clouds are more of the status type with less vertical thickness, so that the resulting rainfall may be fairly light. But in unstable or buoyant air, cloud

forms are likely to be cumulus types with great vertical thickness and the resulting showery rainfall will ordinarily be heavier (H.R. Tarrett 1969).

There are three types of rainfall, convectional, relief /aerographic and depression.

The one commonly occurs in the local government is convectional type. Trewarths and others defined convectional rainfall as "rainfall originates from adiabatic cooling of buoyant air currents whose ascent is both rapid and truly vertical".

According Foundation of Geography, he defines convectional rainfall as "when hot air naturally tends to rise. As it rises, it is cooled and rain fall even though there are no mountain area.

Since the sun makes its apparent north and south journey during the year, the winds change in some way also. When the sun is in the northern hemisphere, the wind, which comes into replace the rising hot air has to pass over part of the Atlantic Ocean. While crossing this very big area of water, the air takes up a great deal of water vapour. This water vapour in time falls as rain.

This movement of the air over the Atlantic ocean is known as inter tropical convergence (I.T.D) which start at 30o North. Where air originates is known as inter tropical divergence (J.T.D) which start at 30o South (foundiation 1970).

The inter tropical convergence (J.T.C) is recognized in Nigeria as south West trade wind or monsoon wind. The wind starts it movement as from March to November, every year.

The Local Government receives 7 months of rainfall starting from April – October, while the highest month of rainfall is July (207.42ml) and August (254.86ml).

Agriculture is the main staid of the local government economy. The people are directly involved in agriculture production crops groom in local government are yams, rice, maize, cassava guinea-corn, millet, groundnut, melon, sugar-cane and other like vegetable.

When rain starts, all the farm activities begin. Short duration crops are planted first e.g yams, groundnuts etc then follow by long duration crops like guinea-corn millet, etc. rice is planted during the months highest rainfall.

1.4 Importance of rainfall to agriculture production

Rainfall is very important to agriculture production of the world, Nigeria, Niger State and Gbako local government in particular.

Rainfall is an important element to all plants and animals including man. Rain is a source of and the waters and without it life cannot exist on the earth. Water is one of the element that differentiate the earth from the other planets.

All agriculture and some industries depend on the availability of water. Man also depend on the water for his domestic activities, he performs on the surface.

The only source of water is the rainfall. Rainfall determines the type of vegetation cover of the earth surface. During the dry season Fulani's migrate to settle at the back of Niger Valley to enjoy the green pasture.

There are two major rivers in the local government. River Kaduna is found in Western part of the local government. this river forms a boundary between Lavun is fond in Eastern part of local government. The river is called river Gbako. It forms a boundary between Katcha and Gbako in the

Southern part is River Mussa, which found a boundary between Gbako, and Bida and Lavun.

The volume of these rivers increases during the raining season.

Fishing transportation, dry season farming are possible throughout the year especially Gbako as river Kaduna.

Rainfall determines the type of heavest. If the rainfall is adequate bomper heaviest is recorded.

There are small rivers with dry valleys. The valleys are wet dry during the raining season.

Rainfall is the great solvent in which most of the vital processes of living matters take place. Absorption of food by plants and animals cannot occur unless it is dissolved in water. "The fires of life burn only in water" (peattle). Water also functions as the earth thermostat in preventing great extremes of heart and cold.

Base on the above mentioned points, it is very important to keep a good and proper record of rainfall. This can be done by the use of modern record keeping that is computer.

1.5 Computer system at a glance

Computer is an electronic device capable of receiving data informs of instruction processing it, and providing result on information.

Small computer, such as personal computers (PCS)belong to a class of computer known as micro-computers A PC is made up of many parts called hardware. This definitely includes the devices such as the printers, keyboard monitor etc, altogether known as peripherals.

COMPUTER ARE CLASSIFIED AS FOLLOWS:

1. Personal computer
2. Supper micro-computer
3. Large computers
4. Super computers.

Personal computer can be further classified as micro and super microcomputer. A personal microcomputer is at the lower and of the range of computer class. It has 640 megabytes of main memory capacity with one or two disk drive (s) of 360 kilobytes each.

Super microcomputer uses 32 bit micro processor. It has multiple input-output devices and our meant for multipurpose. It is used for commercial data processing and managerial applications.

Large computer has a larger amount of main memory capacity and a large amount of secondary memory. It is used of larger commercial data processing and management applications.

Super computer is the larges computer available today with a 4 megabytes of main memory capacity. It is expected to be used for defense needs and meteorological applications.

A computer can also be classified as a DIGITAL AND ANALOG computer.

A digital computer is divided into the following fundamental units.

- Input unit such as the keyboard diskettes etc.
- Arithmetic and logic unit
- Primary storage unit
- Control unit and
- Output unit, such as monitor, printer, tape diskette etc.

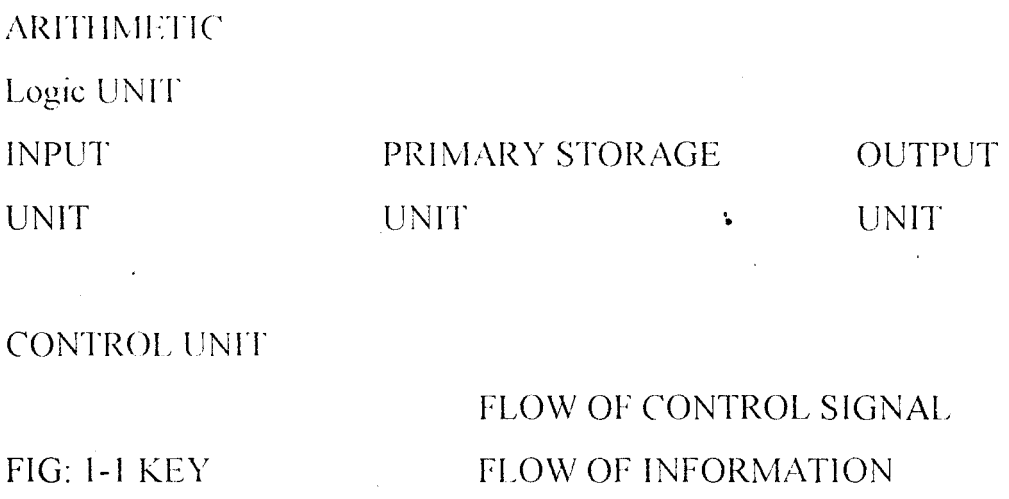


FIG: 1-1 KEY

The input device is used to send instruction into computer. The device includes the keyboard, the magnetic tape and other secondary storage such as diskettes.

The memory of primary storage consists of the devices used during computation. It is also used to hold both intermediate and final result as computer proceeds through a program-run. The common devices are the integrated circuit memorial, magnetic tapes and magnetic disks.

The Arithmetic and logic unit is the parts which perform the operation of arithmetic addition, subtraction division and multiplication as well as some logical operations of yes or No.

The output device/unit is used to record the result of processing already performed by the computer e.g the printed result or one displayed on screen/monitor. Common output devices include magnetic tapes, printers, microfilms etc.

1.6 Definition of terms

Let define some terms in process

Clouds:-	When water rise up inform of water vapor, above a certain temperature, it comes together or condense.
Condense:-	When water vapor rises up and loose some heat and cool as result of change in temperature.
Collide:-	Water vapor com together to form bigger ones.
Coalesce:-	Water vapor coming together to unit into one substance.
Convergence:-	The combined effects of pressure gradient force coriolis force, and friction causes the circulation in a cyclone to be convergence, with the surface winds flowing obliquely across the isobars toward the center.
Tropic:-	Line of latitude 23o, 27o North of cancer or south of Capricorn of the equator.
Inter tropical Convergence:-	Between the converging surface trades in the visiting of the equatorial trough of low pressure lies an area of weak and variable wind.
Coriolis force:-	The force which effects only the direction of earth rotation.

Monsoon:-	Monsoon winds are winds which approximately reverse their direction between writer and summer.
Humidity:-	Water in gas form, or water vapor in the atmosphere.
Relative humility:-	When the air holds 100 percent of the moisture it is capable of holding.
Condensation:-	If air is cooled below the dew point, the its excess of water vapor is given off in the form of minutes particles of water (if above 32o) or sometimes ices (below 32o)
Inter-tropical divergence:-	Is the opposite of (J.T.C).
Isohyets:-	Lines drown joining all places with the same rainfall.

1.8 Organizational charts

DIRECTOR OF METEOLOGICAL DEPARTMENT

STAFF OFFER	CHIEF	RECORDER
PROGRAMMER	SYSTEM	RECORD KEEPER
	ANALYST	STAFF

COMPUTER OPERATORS

1.9 Analysis of the Procedures:- Statement of Problem.

The process or procedure is not all that easy. It takes 12 months before completion of rainfall starting from when the month of which rain begins.

The rainfall is recorded whenever it falls. The daily records are added for the year and the result is the total rainfall for one particular year. As that year may have been exceptional wet or dry the totals for thirty to forty years are taken and the average obtained. This final result is the mean Annual Rainfall of a given place. The result can be incanted on maps, and lines are drawn joining all places with the same rainfall. Such lines are called isohyets.

The mean monthly record can be kept. This by adding all daily rainfall of a month together divided by number of days in that month.

Before climate of a place can be determined and inserted on maps it takes longer period at list 30 years. Some records may get lost; some staffers handling the record may be transferred or died. In the process of recording, some figures are wrongly entered and errors in calculation of those figures. These give a poor result of records. Some times heavy rain may fall leading to the filling of rain ganger. The rain gauge supposes to be 10 km apart or in diameter for effective weather keeper. Improper record keeping, because records for at least 10 years are kept in the ordinary file floating on the top without tag.

In summary, problems with event with the present system include.

a) Problem of lack of good record keeping. In the meteorological station record of at least 10 year is kept in the ordinary file without file tag.

b) Long keeping of record for at least 10 years may leads to the missing to some records.

c) Time consumption. The record is manually prepared which takes a lot of time.

d) Errors associated with manual works which include incorrect figures.

e) Inadequate securities which leads to missing of record.

f) Incorrect recording if the glass bottle and copper container is filled up by heavy rain.

g) If it stands on a land surface perhaps of concrete, there is a great it from the ground and reading will always be the high.

h) Incorrect reading if it is not sunk firmly in to the ground.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction:-

This chapter reviews the previous works; it looks at the present system of record keeping of rainfall and the procedure of processing record rainfall.

It reviews the main station and how the rain gauge is placed on installation, how the rain gauge works and its measurement. It also takes account of feasibility (significance and importance) of rainfall in the local government. it also reviews the statistics analysis of rainfall record, based on charts and graphs, e.g pie chart and central tendency in the relation to the rainfall of the Gbako local government. It reviews probability in relation to the data collected to see whether it can be used to predict or determine future rainfall.

2.2. Metrological station

Metrological station Badeggi situated in Lavun local government is the weather station where rainfall record is kept always. Although Badeggi is not under Gbako local government, the record obtained from the station can still be used for data collection.

Badeggi metrological weather station is in the same rainfall best with Gbako local government. The data kept for 10 years is collected in the station.

One of the methods used collecting data is by writing down the record kept for 10 years. This is known as documentary method. Another method is by construction and administrating of questionnaire.

Documentary method is the means of extracting information from other works or records kept sometimes have to be amended for proper use. In this

case the information about the rainfall studies researched is available in weather file documents, it is now left to the researcher to extract reasonable data from the available records.

The data was extracted from record file maintained by National cereal research institute. Badeggi (NCRI) department of metrological station.

However, high degree of reliability can be attached to this data since they were recorded by qualified and experience staff of the institute, for if is the duty of metrological department to collect analysis and keeps information about the rain that falls throughout the year in the rainfall belt.

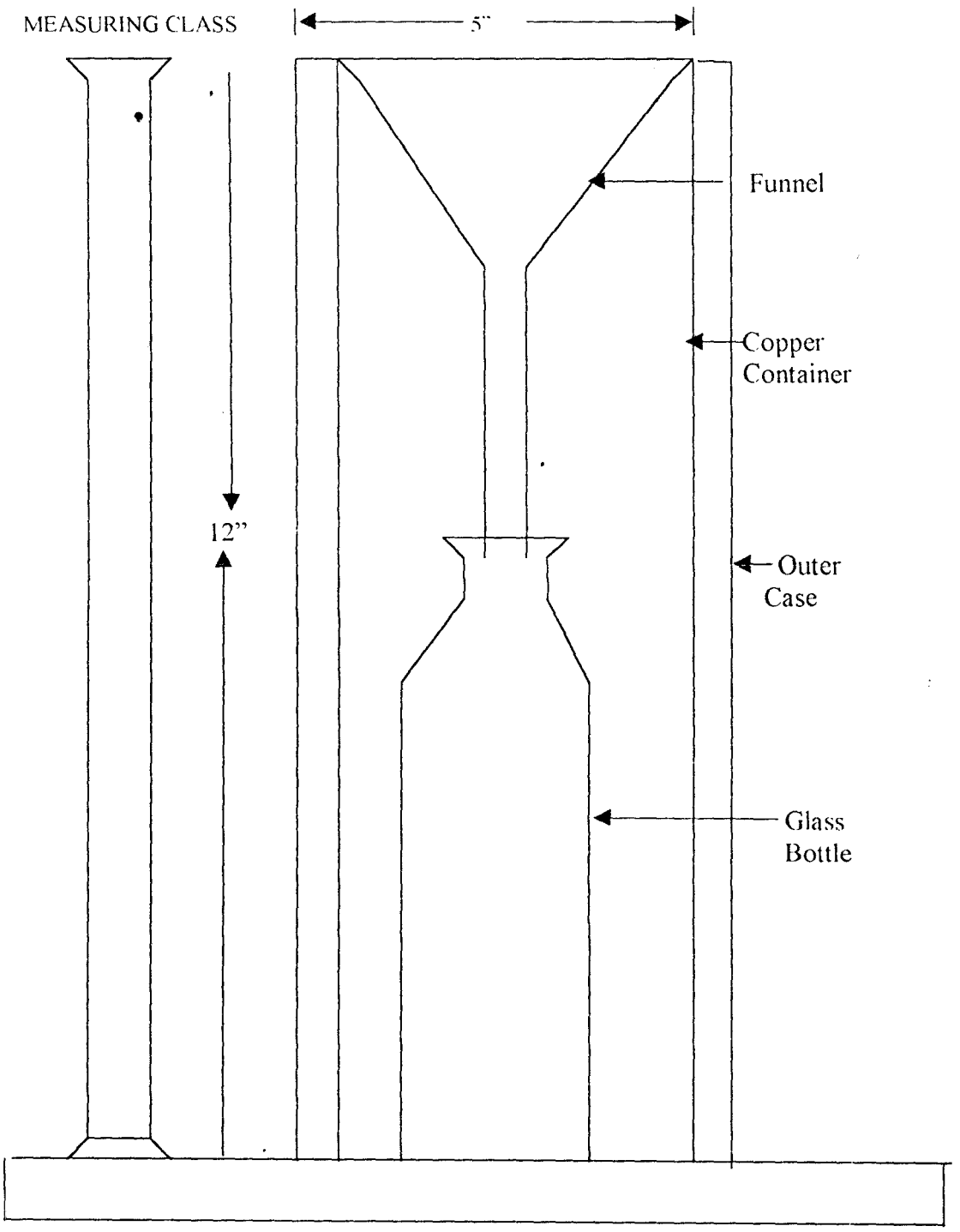
2.3. Present system

The present system on record keeping of rainfall is the sole responsibility of metrological station. It keeps the record of the weather elements from the beginning of the up till the end.

The present system can briefly be described as fairly good in nature but suffers a great deal of problems. Fairly good is used here, because, the data headed for all the ears are obtained but in manual form.

2.4 Procedures/processing records of rainfall

The instrument used measuring rainfall is called rain gauge (H.R Jarrett 1968). The consists of a round vessel. The top of the vessel is funned shaped, so that rain is directed into the bottle. There is measuring glass attached to the rain gauge. This is where the reading takes place.


MEASURING CLASS
5"
Funnel
Copper
Container
12"
Outer
Case
Glass
Bottle

A RAIN GAUGE

This rainfall is measured by a standard rain gauge. The tip of the gauge should be 30 cm from the ground while the diameter of the circular top is 5-cm. Rainwater falling on to the top of the gauge is directed by a funnel into a bottle. There is measuring glass for it. It would be very difficult to measure the amount of rainfall in the bottle. Thus, the measuring (i.e the bottle) glass is made very much narrower than the reservoir. (H.R. Jarrelt 1968)

2.5 How the rain gauge works

Suppose that the opening into the funnel in the rain gauge measures 20 squares in a real it is about this with a diameter of the measuring glass is only 2 squares cm. How, imagine that 1 cm of rainfall. The amount falling over the area of the funnel (20 amount cm), which will fall into the bottle with, be 20 cubic meters. This is now poured into the measuring glass area of cross-section 2 square meters. Will rise 10 cm up the glass, so that 1 cm of rain is magnified 10 times. It is simple to read off fall with the help of the measuring glass (H.R. Jarrett 1998).

The measurement is usually assumed to reflect the annual rainfall; in the surrounding areas up to 20 square 1 cm.

2.6 Rain-gauge installation

When erecting a rain gauge, it should stand on a loose surface of grass or sand. If it stands on a land surface, perhaps of concrete, there is the possibility that water will splash up into it from the ground, the gauge should stand well a very from building and trees.

2.7 The measurement of rainfall

The rainfall is measured with the help of a rain gauge. Each morning the bottle is removed and the contents emptied into a special measuring jar or glass, so marked that reads as "one cm" the amount of rain it would take to cover the area of the top of the rain gauge to the depth of 1 cm. Because, the measuring glass or jar long a led, it's possible to read the rainfall correctly to 0.01 cm (H.R. Jarrelt 1968).

Reading is taken at a fixed time each day, and at the end of the month, you can add together the daily readings to get the total rainfall for that month. The mean average rainfall can be obtained by adding the result of days on the month. Or daily records are added for the year, and the result is the total rainfall for one particular year. In studies of climate the mean monthly rainfall is used generally, which is obtained by taking the reading for a particular month, perhaps August, over a period of 35 years, and then taking the average. If readings are not available for 35 years, then we take as long a period as we can. Rainfall totals can then be shown on a map and can then get a good idea of the way in which rainfall varies from place to place, or we can draw a diagram where for a particular place the mean monthly totals are represented as rectangles which vary in height according to the monthly figure. For example

Mean monthly rainfall record of the year 1999.

Graph of the record 1999 average rainfall.

2.8 Feasibility (significant and importance) of rainfall in the local government.

The significant and importance of rainfall is for agricultural production, animal husbanding, relief of extensive heat, fishing and to keep record for researchers.

Before the rain starts farmers, are seen preparing the land for the beginning of rain. The starting of rain marks the beginning of farming activities in the local government, first variety of crops and planted. For example yams, mellow etc. Another important thing is the preparation of nursing bed for pepper. The young peppers are transplanted whenever they are matured. The young plants take two to three months to mature. During the raining season a lot of people are engaged in agricultural activities. Therefore agriculture employs more than 85% of the people.

The harvest depends on the amount of rainfall, if the mean rainfall is 1000 cm, it means the rain is too much and poor harvest of some crops will be recorded. Another effect of much rainfall is the flood. This destroys many crops along the barks of River Kaduna and River Gbako. In 1999 flood affected many people's farms along the barks of the two rives mentioned. The areas affected by flood recorded poor harvest e.g Rice maize, etc.

From 1000-1100cm mean averages the amount of rainfall is catogorised to be moderate. Any amount of rainfall under 1000cm is catogorised to be below average. Some crops yield much production while others are low.

The rainfall also determines the vegetational cover of the local government. The local government is found with the guinea savannah regions of Niger State.

When the rain starts grasses begin to grow making the environment ever green. This allows the Fulani's to move in large number in to the local

government with their cattle's for grazing. During this season, the milk content of the female cattle's increases, because of the availability of fresh and abundance of grasses and water those herds of cattle's enjoy. The farmers make use of animal manual as local fertilizer. Over grazing is recorded in some parts of the local government. This is as a result of concentration of cattle's in these areas.

Another significance and importance of rainfall is excess relief of heat. During the dry season, high temperature is felt in our bodies towards the starting of rainfall, is immediately after hamatan. Many people sleep outside during this period, because they do not enjoy the weather, because of the hot sunshine during the day and high temperature both in the day and night, especially when the sun is over-head around 12-noon. This is as a result of short waves radiation, which heats the ground in the day. While in the night, this heat escapes into the air warming the atmosphere. The heat that escapes into the atmosphere is called long waves radiation (Jarrentt 1968).

Before the rain starts, there is always cloud cover. There are some clouds that bring rain, while some do not. If there is a complete cloud cover during the day, this cloud prevents the sunshine to have direct access to the ground reducing the heat quantities. When the cloud cover is in the night this cloud serves as blanket over the atmosphere warming the environment. That is why, if cloud formation is either in daytime or in the night brings rainfall, it is always accompanied by high temperature.

When rain starts, cloud cover prevents excessive sunshine on the surface reducing the high temperature. Although, when rain is about to start, it is followed by a high temperature, the water cools the environment. (Trewarhta, al et).

The rainfall is one of the basic factors that determine the socio-economic development of the local government. Therefore, it is better to have a very good correct and accurate record of rainfall. This beings the case and since manual system wastes a lot of time, it shows that, it will never be inappropriate to introduce computer based computation system, at least going by the technological advancement of our times.

The following points are taken into consideration.

1. Computations will be very accurate and timely.
2. Rainfall records that seldom get missing form or destroyed can be better preserved in a well-protected diskette and can be retrieved easily on demand.
3. Ability of computer to hold large amount of data for a long time until necessarily gotten rid off. Not only that computer allows for data efficiency and data integration thereby reducing data redundancy for instance at a time using master file, the record of rainfall in the metrological department can retrieve information about the rainfall record at any time according to demand of researchers or individual needs.
4. The new system will enhance the effectiveness and efficiency of the rainfall record as above indicated.

CHAPTER THREE

SYSTEM ANALYSIS, DESIGN AND PROGRAM METHODOLOGY

3.1 Introduction

In this chapter, focus will be on the analysis .of both present and the proposed systems. We have already pointed out in chapter two, some of the problems inherent in the manual system of computation, which is currently in use. Therefore, our main focus now, will be on the new system computer approach description and its cost benefit analysis.

3.2 The proposed system

After check and crosschecking of all the rainfall the computation begins. The following documents are in use in the computer.

1. The data and year of recording
2. The month
3. Annual data.

The following are not found in the computer but in the research project.

1. Average annual total
2. Total of each month
3. Average of each month
4. Placement of the record
5. Some aspect of measurement of central tendencies.
6. Probability.

The record contains 12 columns. Ten (10) of the columns has years 1990 – 1999 while the last two contain the total of each month and average total of month respectively.

The statistical analysis of the data is also used. This contains measurement of central tendencies e.g average mean, median, mode etc of the rainfall. Going by the above, it becomes apparent that this system could be boring as many computations and calculations are done and transferred from one year to another, thereby causing delays, miscalculations as well as wastage or over-consumption of time, and papers. It is in this that other approaches such as mechanical as well as automated one that will reduce the number of paper used but will ensure a quicker, more accurate and efficient result is desirable.

We only make a program on how to store the data of rainfall for 10 years i.e 1990 – 1999 for this project. This record can be viewed or printed year by year.

3.3.1 Cost and benefit analysis

This cost benefit analysis can be considered. This also gives comparison with the old method used to the present new one. The cost benefit, if compared with that of present system despite its numerous problems as shown above will dearly shows the efficiency of the proposed system.

Presently, we have about 10 years of rainfall data. It means that our data is calculated daily, monthly, than yearly for 10 years. In the process this can cost mistakes easily and makes the calculation to be wrong. Although a single staff can be engaged to carryout the recording, a statistician can also be engaged to carryout the statistical calculation of the rainfall. These splitting job are done by manual method.

The new system, although demands a huge amount of initial outlay provides a lesser and more elective cost analysis in the long-run. This can be seen as follow.

The cost units in the new system and their cost values/figure, are estimated as below:-

a) Establishment/set-up or development cost.

i. System programmer

ii. Hardware requirement

- Pentium II 500 MHz
- 32MB RAM
- 10 GB Hard Disk and
- SVGA-LCD MONITOR

(Cost of two sets ₦300000.00 EACH AT ₦ 150000.00)

iii. Computer printers

1No, laser jet printer

(laser 4p) ₦ 80000.00

iv. 2 No Air-conditional (₦ 190000.00)

v. 2No. stabilizer

350 Vo its [(cost ₦ 40000.00) (₦ 80000.00)]

vi 1 N0. UPS ₦ 80000.00

Sub total ₦ 845000.00

b. SYSTEM OPERATION COST

i. Program maintenance per annual (₦ 50000.00)

ii. Equipment (Hardware) maintenance per annual including the diskettes (₦ 100000.00)

iii. Supplies of stationeries per annual (₦ 100,000.00)

iv. Labour System program/analysis (₦ 80,000.00)

	2 Nos computer operators	[(₦ 24,000 each) = (₦ 48,000.00)]
v.	Miscellaneous	(₦ 30,000.00)
	Sub total =	(₦ 328,000.00)
	GRAND TOTAL for (a and b)	₦ 1223000.00

3.3.2 Benefit of the proposed system

Compare the cost of the new system; you will discover that, new system is costly than old one under the proposed system. But more over, the problem associated with present system will be greatly reduced, if not eliminate. For example as earlier stated, the new system will.

1. Enhance the efficient operation of the department.
2. Ensure a speedy efficient and accurate computation of department.
3. Ensure accurate and appropriate computation, remove and add data thereby enhancing the institute.
4. Reducing misplacement of data.
5. Provides adequate security for storage and easy retrieval of data.

3.4 Input specification

Input specification has refers to method of transferring or entering data into the computer. It describes the manners in which data is inputted in the proposed system. There is a need to identify the data items in order to design and normalize files and to design data structure.

Having identified the data items, we defined our data models. A data model is a structure of files and defines the data need of an organization. The model helps to segregate data into separate files and or assists to integrate data structure.

Specifically, our models in the proposed system include (a) Rainfall data structure.

Rainfall data structure is expected to provide information about.

- Number of year the data is collected
- Month of the year.
- Record of each month for each year.

While in the input mode the QBASIC structure will be used, QBASIC structure contains description of each field (item) in data records. Theses include.

- Field:- Number of record containing filed. (e.g measurement in mm)
- Field Name:- Name or identification of data filed. (eg name of months)
- Field width: dimensions of the data field, (e.g is it 10 year less or not?)

Note that field type could either be numeric, Character or logic.

For example, for every year (.i.e record) we expect to have some thing as.

Field name	Type	Width	Decision
Name	Character	Number of size	Logic
Months	Numbers	How may letter or figures	
Total amount of rainfall	Measurement in mm and year.		

But we do not include decision in this project.

The method of input is however directly from the keyboard.

3.5. Output specification

Output refers to and results if a computer operator it is the information it has processed. Hence output depends largely on what was imputed and how it was required to be generated. An output could be displayed on the screen, or transferred into something else or finally out on paper.

Output, specification here refers to the design of expected and shows the need of the organization. The output of the proposed system is expected to generate the following types of information.

1. Rainfall record for the each duration of 10 years.
2. Rainfall record for each year.
3. Rainfall record for each month

These 3 items are not computerized in the computer.

4. Average rainfall for the duration of 10 years.
5. Average rainfall for each year
6. Average rainfall for each month

These 3 items are found in appendix 111

7. Statistical calculation for each year is found in chapter 4 of this project.

3.5Program methodology

This gives the method adopted in the programming of record in this project.

The program is made up of 3 files QBASIC. EXE, RAINFALL: BAT and RAINFALL FIL, all of which are in subdirectory named ABDUL and necessary for the running of the program.

3.6:1 Q BASIC. EXE

This is software designed by Microsoft Corporation. It is the brain 'behind the operation' with bytes QBASIC. Language is a simply easy to learn, easy – to – use computer programming language with English like statement and mathematical notations. One can write both simple and complex programes and also be able to modify existing software that is written in QBASIC.

The programmer selects QBASIC which is one of the many versions of

BASIC programming language and an interpreter program and not PASCAL, COBAL, or FOPRTRAN that needs a compiler program before being run done to the following reasons.

1. Interpreter are often more convenient to use than compiler because with an interpreter the program is executed in one step where as with computer, we need two steps translation and execution.
2. Interpreter are very useful to debugging purposes but a computer the whole program must be error free before it can be executed to obtain any result.
3. Computer requires that both source program and object programs be stored only the source program has to be stored. This features often makes interpreters preferable to computer for very small computer.

3.6.2. Rainfall BAT

This is a batch file, which loads QBASIC programs into the computer memory and then run the RAINFALL. Fill file, which contains programs written in QBASIC. It has 72 bytes of space and can easily be viewed by

typing the Dos command. TYPE RAINFALL (Regard less of Capital or small letters).

The following output is seen on the screen, if the command is issued at the ABDUL sundirectory.2\

@ ECHO OF

CLS.

ECHO please wait.....

QBASIC/B/RUN RAINFALL. FIL

3.6.3. Rainfall. file

This is QBASIC program file carefully written by the programmer. It contains 8150 bytes of space.

CHAPTER FOUR

STATISTICAL ANALYSIS AND RUNNIG THE PROGRAM WITH COIMPUTER

4.1 Introduction

This chapter present the process by which rainfall record are shown, and also how the program are run.

Data presentation is the process by which data are shown in a pattern to make it attractive. Data presentation can be inform of tabular, charts diagrammatical and graphical but for the purpose of this project, the presentation will be inform of charts on graphics.

There are two tables.

Table 1 presents the total annual rainfall for each year. While table 2, shows the total monthly rainfall for 10 years.

Having collected the raw data on rainfall, its now becomes necessary to present extracts of the data in the form of charts for visual understanding and interpretation.

4.2.Presentation on charts and graphs

The data is presented on simple bar chart, graphs and pie charts.

4.2.1 Simple bar Chart

In a simple bar chart data are represented by series of bars, the height (or length) of each bar indicates the size of the figure represented.

Table 1

Year	Total average rainfall for each year (mm)
1990	98.9
1991	112.8

1992	69.8
1993	114.6
1994	99.3
1995	92.2
1996	91.8
1997	113.6
1998	84.8
1999	97.3

Table 2

Month	Total average monthly rainfall in (mm)
January	0.0
February	2.8
March	13.8
April	61.0
May	162.6
June	187.7
July	202.4
August	254.8
September	18.4
October	100.3
November	2.0
December	0.0

4.2.2 Graphs

Graph is a line that joins two or more points together.

In this project graph s are combined together with the simple bar charts. The rising of the line indicates whether the rainfall is high or low.

4.2.3 Pie chart

A pie chart is a circle divided by radial lines into sector, so that the rate of each sector is proportional to the size of the number represented.

Table 3 shows the year with the degrees. This is used to construct pie chart.

Year	Rainfall	Degrees
1990	98.9	36
1991	112.8	41
1992	69.8	26
1993	114.6	42
1994	99.3	36
1995	92.2	34
1996	91.8	36
1997	113.6	42
1998	84.8	31
1999	97.3	36

4.3 Analysis of the Program

This analysis shows how the record is viewed and printed.

4.3.1 Running the program with computer

After booting the computer, we then type CD/ABDUL and press enter key to change to ABDUL subdirectory. If we are using drive C)Hard disk) or slot in the disk which contains the program into its appropriate drive and then change to ABDUL subdirectory. Type "ABDUL" (All command typed are regardless of upper or lower case letters) and press enter key for the

program to be loaded into the computer memory. " Please wait ....." appears at the top left side of the screen and after some seconds the screen clears and another output is seen on the screen.

THROUGH OUT THIS OPERATION

PRESS F5 KEY FOR MAIN MENU

F10 KEY TO END RAINFALL RECORDS

F5 is pressed whenever we want to get to the main menu, similarly pressing F10 key at anytime when the exercise ends and we are taken back to RAINFALL subdirectory where we have to type rainfall and press enter key before we can view the record again.

We are given two options to select.)i.e number 1 or 2) or press F10 key to end the exercise. We select 1, if we ready to view the record or 2 if we want to print, while F10 is pressed to end viewing and printing.

If we select 1 (i.e by pressing 1, then press enter key) cursor will be blinking, type the year between (1990 – 1999) which we want to view. For example, we want tto view the record of 1999, we type 1999 and press enter key. The record of 1999 appears on the screen.

The letter "A" is pressed to view another year again. Whenever we want to view for all the 10 years just press "A" and type the year. Fr example, we want to view 1992 from 1999, press "A" and type 1992, then enter key, the data of 1992 will be viewed.

Output of each years data is shown on Appendix 2.

Option 2 is obtained by pressing 2 from the main menu (i.e. if we want to print). If we press 2 then enter key cursor will be blinking, then type the year set the printer and press printer to print out the year.

The data of one or more years can be printed on a single page at the same time.

After press 2, then enter key type the year, then enter key again the type the year, then press print two years' data will be printed on the a single page.

Two-two years data are printed on a single page at appendix 3.

CHAPTER FIVE

SUMMARY, LIMITATIONS, RECOMMENDATION AND CONCLUSION

5.0 Introduction

This chapter compresses of summary of all the chapters, limitations, recommendations and conclusion.

5.1. Summary

All the chapters are summarized to give clear conclusion of the project. This project is undertaken in order to computerize the rainfall record and to ease some calculations involve.

The metrological station places a great importance on the weather station and recording, and deems it as a social security that must be jealously guided.

In chapter one, definition of rainfall and its importance to agriculture production. It takes computer system at a glance and defines some terms that comes across in the project. It illustrates organization chart of metrological department Badegi where the data is obtained.

In chapter two, some of literatures were reviewed. It reviewed the metrological station the instrument used to collect record the data. It also compared the present system with the old system. Feasibility (significant and importance of rainfall in the local government are reviewed and the significant of storing the data by the use of modern method (i.e computer).

Chapter 3 talked about system analysis, design, program methodology, proposed system cost and benefit analysis, input and output specification it talked about QBASIC. EXE, Rainfall. BAT and Rainfall. FIL, Chapter 4

talked about the statistical analysis and running the program with computer. Data are presented as charts and graphs. The arithmetic means are used to plot graph and construct charts. Probability are used to predict the month of which rainfall may likely starts on stops. Details of how the computer runs the programs are stated in the chapter.

5.2 Limitation

This project is limited to only rainfall record of 10 years (i.e from 1990 – 1999). This was due to limited resources that can be used to carryout researches on the other weather elements and exceed 10 years.

There is only one metrological research station in the local government. The project is limited to only this station as a source of data collection.

5.3 Recommendation

The researcher commends the effort of research institute for the establishment. He also commended the effort of the weather keeper for proper manual keeping of weather record.

The researcher recommends the research at Badegi should introduce computer center where in the meteorological station where modern record should be kept and proper record keeping, easy retrieval and printing of record. Finally there will be need the weather keeper and other personnel who are involve in weather record keeping in the institute.

5.5 Conclusion

In conclusion this project, is on 10 years research of Gbako local government rainfall. It could therefore be used for further research work in weather forecasting and prediction of rainfall of other years.

The project is also programmed to store the data of rainfall of 10 years and can be printed out year by year, depend on the need of the user.

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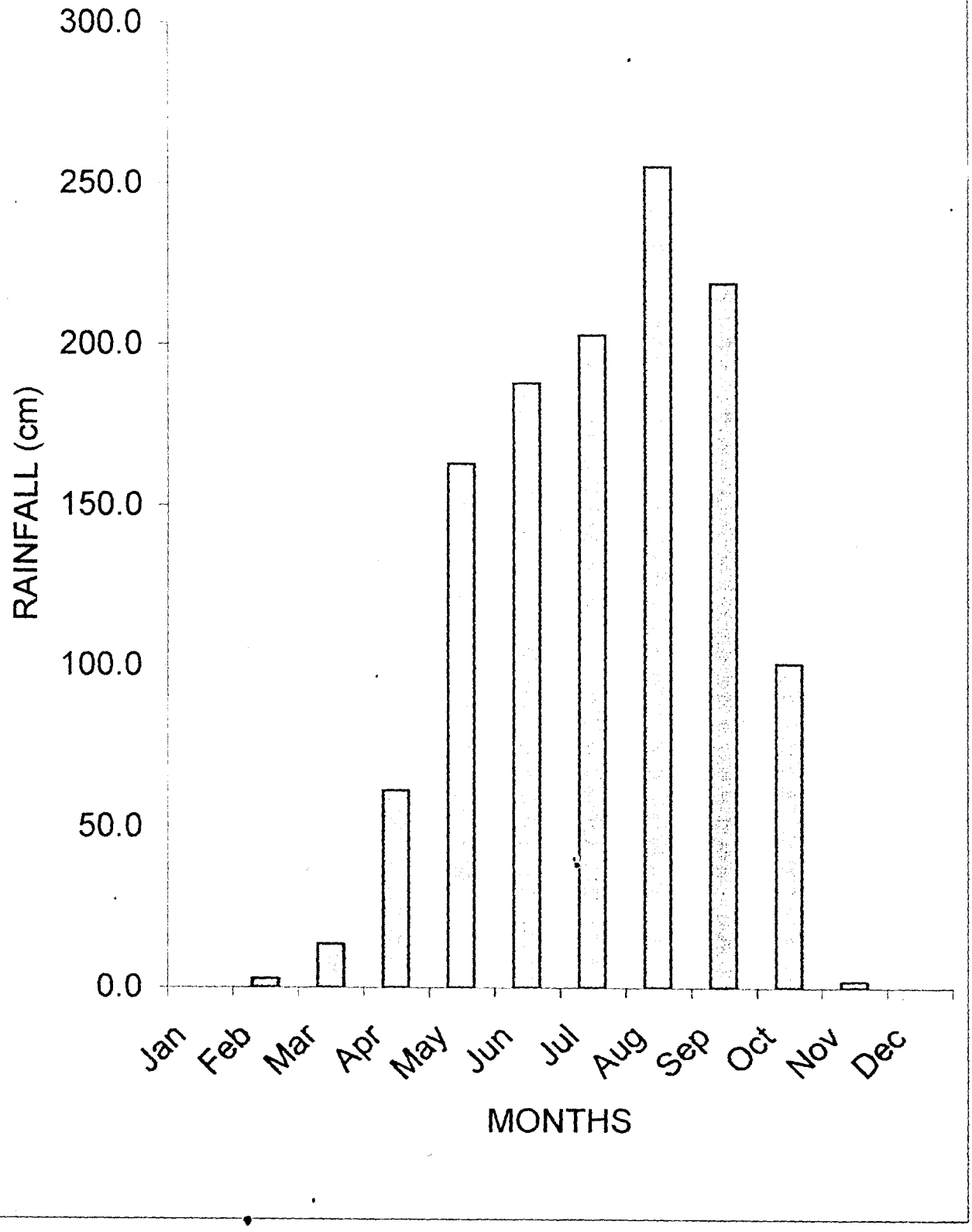
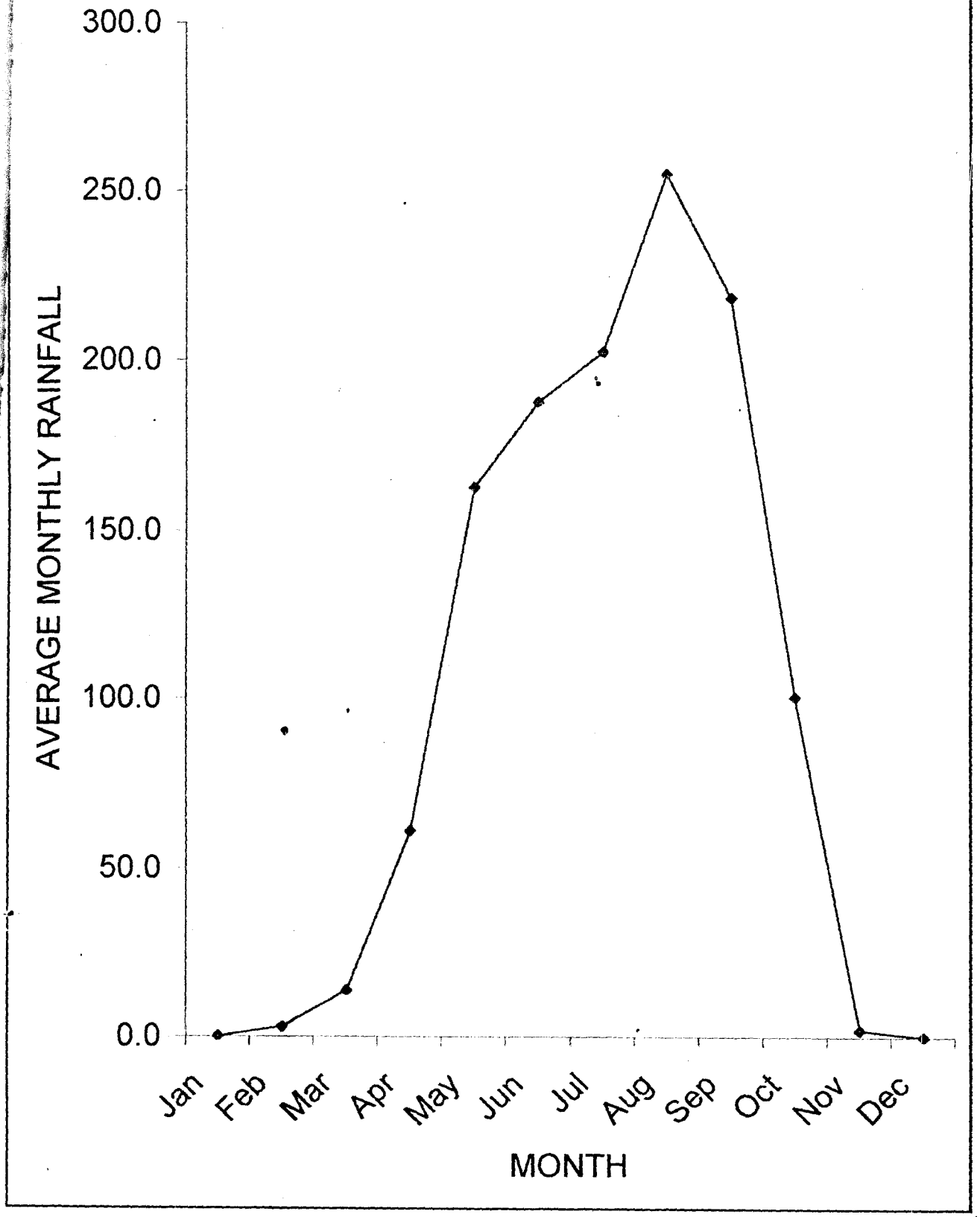
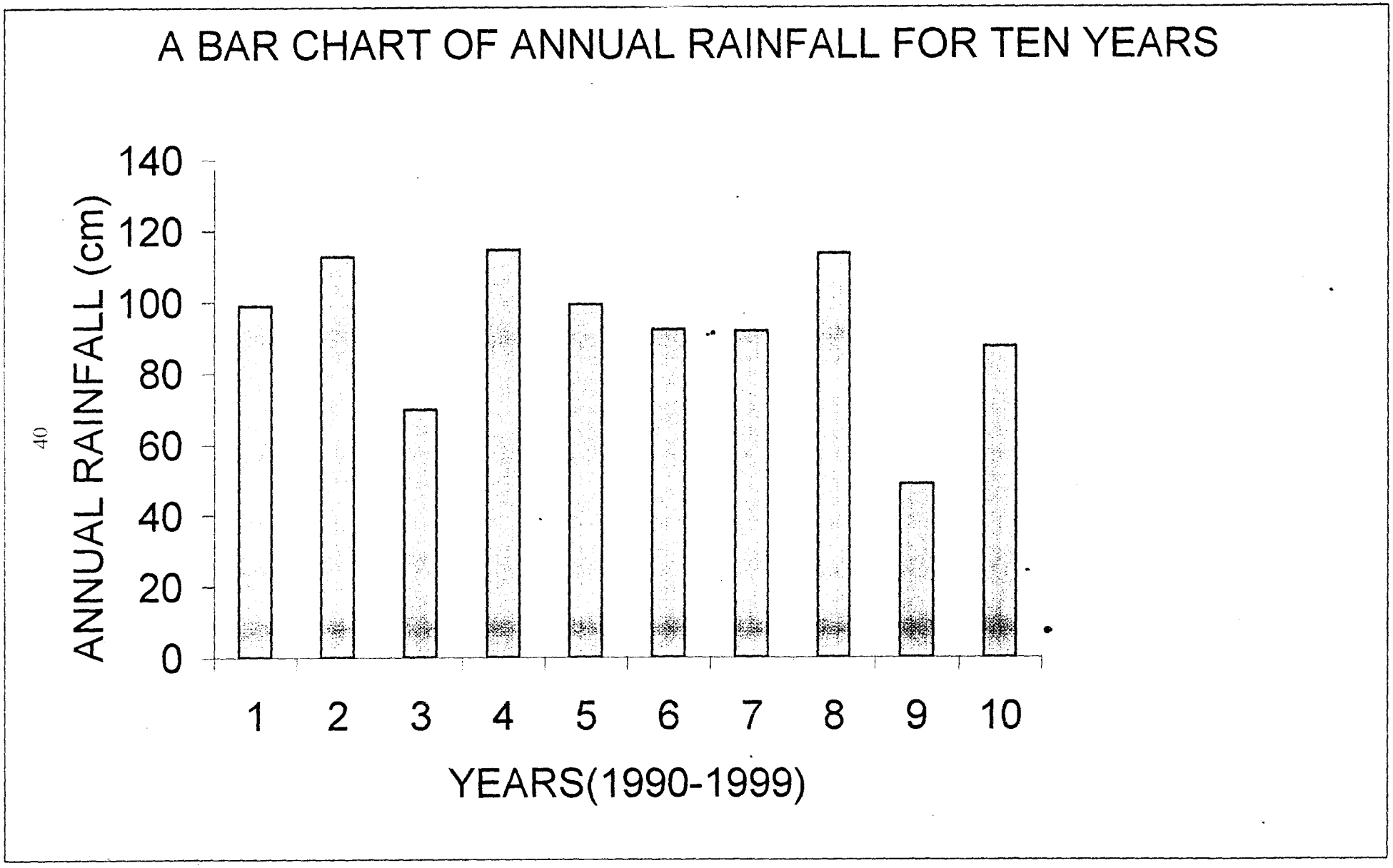
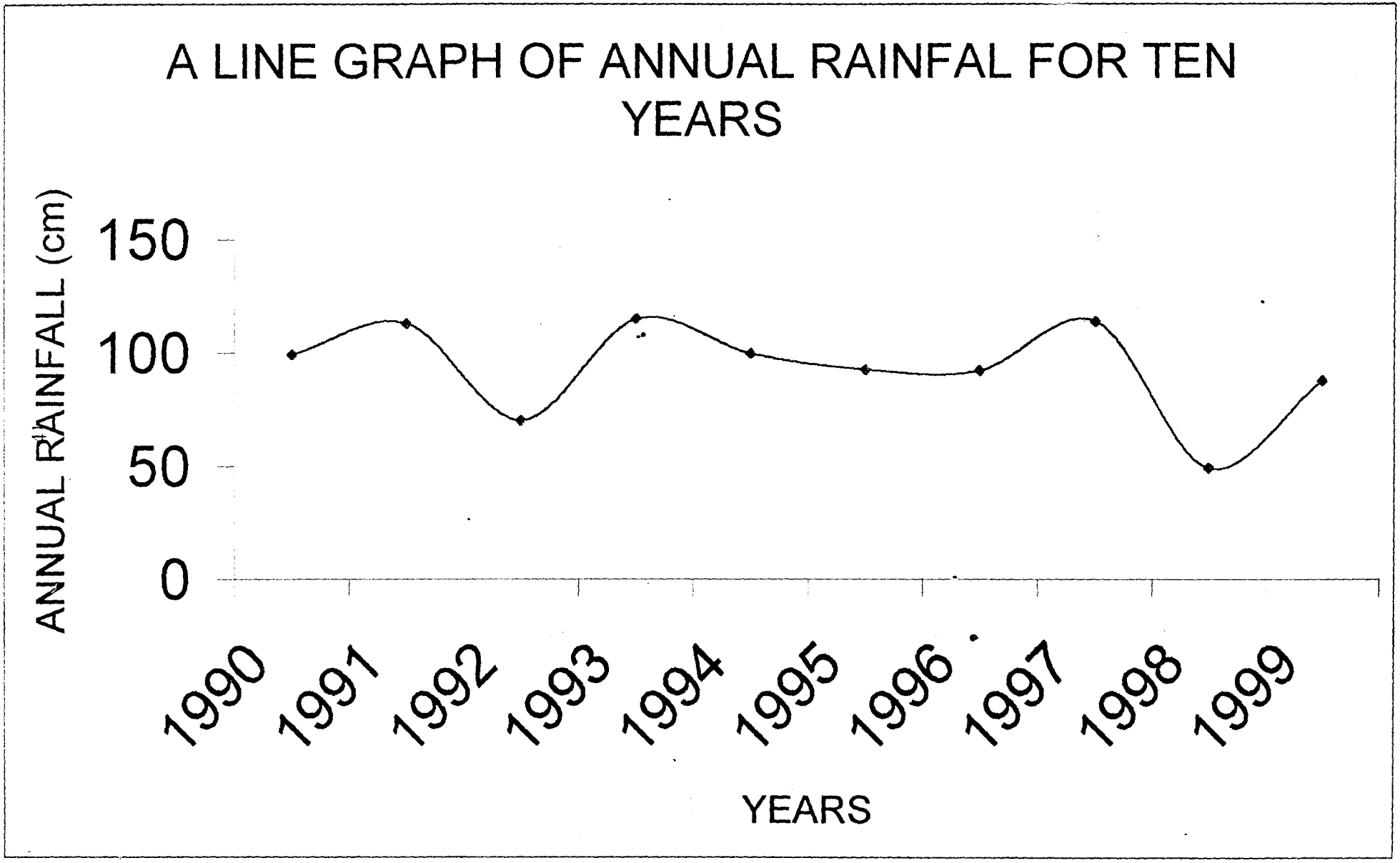
A BAR CHART OF AVERAGE MONTHLY RAINFALL FOR TEN YEAR



A LINE GRAPH OF AVERAGE MONTHLY RAINFALL FOR A PERIOD OF TEN YEARS




A BAR CHART OF ANNUAL RAINFALL FOR TEN YEARS
ANNUAL RAINFALL (cm)
140
120
100
80
60
40
20
0
1
2
3
4
5
6
7
8
9
10
YEARS(1990-1999)


A LINE GRAPH OF ANNUAL RAINFAL FOR TEN YEARS
ANNUAL RAINFALL (cm)
150
100
50
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEARS

```
10 REM ***************COMPUTERIZED RAINFALL RECORD ********************
20 REM *                                        *
30 REM *                OF                      *
40 REM *                              42        *
50 REM *              NIGER STATE                        *
60 REM *                                        *
70 REM *     [A CASE STUDY OF GBAKO LOCAL GOVERNMENT]             *
80 REM *                                        *
90 REM *          DESIGN AND PROGRAM                    *
100 REM *                                       *
110 REM *                BY                      *
120 REM *                                       *
130 REM *         ABDULLAHI HUSSEINI ABDUL                *
140 REM *                                       *
150 REM ************************JUNE,2001*********************************
160 KEY OFF: CLS : RESET: CLEAR : CL = 12
170 DIM MONTH$(CL), RF(CL)
180 GOSUB 200
190 GOTO 1220
200 ON KEY(5) GOSUB 1215
210 ON KEY(10) GOSUB 1190
220 KEY(5) ON
230 KEY(10) ON
240 RETURN
250 REM ***************************SETTINGS*******************************
260 MM = 0: GOTO 410
270 CLS : SA$ = CHR$(21)
280 COLOR 12: FOR I = 6 TO 75: LOCATE 2, I: PRINT SA$: NEXT I
290 FOR I = 3 TO 23: LOCATE I, 6: PRINT SA$; SA$: NEXT I
300 FOR I = 3 TO 23: LOCATE I, 74: PRINT SA$; SA$: NEXT I.
310 COLOR 6: LOCATE 4, 63: PRINT DATE$
320 COLOR 25: LOCATE 6, 25: PRINT "COMPUTERIZED RAINFALL RECORD"
330 COLOR 14: LOCATE 8, 32: PRINT "OF NIGER STATE"
350 COLOR 14: LOCATE 10, 20: PRINT "(A CASE STUDY OF GBAKO LOCAL GOVERNMENT)"
360 IF MM THEN 400 ELSE 370
370 COLOR 12: FOR I = 6 TO 19: LOCATE 23, I: PRINT SA$: NEXT I: COLOR 5
380 LOCATE 23, 22: PRINT "COPYRIGHT ABDULLAHI HUSSEINI ABDUL (JUNE,2001)"
390 COLOR 12: FOR I = 68 TO 75: LOCATE 23, I: PRINT SA$: NEXT I
400 RETURN
410 REM***********************OPENING SCREEN*****************************
420 MM = 1: GOSUB 270
430 MM = 0: LOCATE 12, 30: PRINT "DESIGN AND PROGRAMM"
440 LOCATE 14, 38: PRINT "BY"
450 COLOR 18: LOCATE 16, 29: PRINT "ABDULLAHI HUSSEIN ABDUL"
460 COLOR 4: LOCATE 18, 36: PRINT "JUNE,2001"
470 COLOR 12: FOR I = 6 TO 75: LOCATE 23, I: PRINT SA$: NEXT I
480 COLOR 21: LOCATE 21, 10: PRINT "Press C to Continue OR F10 Key to Quit"
490 SOUND 100, 1: A$ = INKEY$
500 IF A$ = "C" OR A$ = "c" THEN 510 ELSE 480
510 REM ************************MAIN MENU*********************************
520 GOSUB 270
530 COLOR 12: LOCATE 12, 35: PRINT "MAIN MENU"
540 COLOR 18: LOCATE 14, 30: PRINT 1; : COLOR 6: PRINT "VIEW RECORDS"
550 COLOR 18: LOCATE 16, 30: PRINT 2; : COLOR 6: PRINT "PRINT OUT RECORDS"
570 COLOR 21: LOCATE 21, 22: PRINT "Select a Number OR Press F10 Key to Quit"
580 COLOR 6: PLAY "MB"
590 LOCATE 4, 9: PRINT TIME$
600 SOUND 100, 1
610 A$ = INKEY$: BA = VAL(A$)
620 IF BA = 1 THEN 650
630 IF BA = 2 THEN 880 ELSE 590
650 REM ******************VIEW RAINFALL RECORDS*************************
660 GOSUB 270
670 COLOR 18: LOCATE 12, 30: PRINT "VIEW RAINFALL RECORDS"
680 COLOR 8: LOCATE 15, 20: INPUT "Which Year...(Between 1990 to 1999)"; YR
720 IF 1989 < YR AND YR < 2000 THEN 730 ELSE PLAY "AG": GOTO 680
730 GOSUB 1280
740 GOSUB 270
```

```
650 COLOR 25: LOCATE 12, 25: PRINT YR; "RAINFALL RECORD"
660 FOR I = 1 TO 4: COLOR 18: LOCATE 12 + (2 * I), 10: PRINT MONTH$(I);
670 COLOR 6: PRINT RF(I): NEXT I
680 FOR I = 1 TO 4: COLOR 18: LOCATE 12 + (2 * I), 30: PRINT MONTH$(I + 4);
690 COLOR 6: PRINT RF(I + 4): NEXT I
800 FOR I = 1 TO 4: COLOR 18: LOCATE 12 + (2 * I), 50: PRINT MONTH$(I + 8);
810 COLOR 6: PRINT RF(I + 8): NEXT I: COLOR 8
820 LOCATE 22, 15: PRINT "Press A for Another Year OR F5 Key to Restart..!"
830 COLOR 6: PLAY "MB"
840 LOCATE 4, 9: PRINT TIME$
850 SOUND 100, 1
860 A$ = INKEY$
870 IF A$ = "A" OR A$ = "a" THEN 650 ELSE 840
880 REM **************PRINTING (HARDCOPY) RAINFALL RECORDS***************
890 CLS : LOCATE 10, 20: PRINT "Have You Set Your Printer (Y/N) ? ...."
910 P$ = INPUT$(1)
920 IF P$ = "Y" OR P$ = "y" THEN 960 ELSE 930
930 IF P$ = "N" OR P$ = "n" THEN 940 ELSE PLAY "AG": GOTO 910
940 CLS : LOCATE 15, 25: COLOR 29: PRINT "Please Reset Your Printer !": COLOR 6
950 FOR X = 1 TO 22222: Y = SIN(X): NEXT X: GOTO 890
960 PLAY "AG": CLS : GOSUB 270
970 COLOR 12: LOCATE 12, 25: PRINT "PRINT (HARDCOPY) RAINFALL RECORDS"
980 COLOR 8: LOCATE 18, 20: INPUT "Which Year ...(Between 1990 to 1999)"; YR
1020 IF 1989 < YR AND YR < 2000 THEN 1030 ELSE PLAY "AG": GOTO 980
1030 GOSUB 1280
1040 GOSUB 270
1050 COLOR 12: LOCATE 12, 25: PRINT "PRINT (HARDCOPY) RAINFALL RECORDS"
1060 COLOR 18: LOCATE 20, 15: PRINT "Printing ...!"
1070 LPRINT TAB(15); YR; "RAINFALL RECORDS"
1080 LPRINT TAB(13); "OF GBAKO LOCAL GOVERNMENT AREA"
1090 LPRINT TAB(18); "OF NIGER STATE - NIGERIA"
1095 LPRINT TAB(14); "MONTH"; TAB(20); "(MM)"
1100 FOR I = 1 TO 12
1110 LPRINT TAB(15); MONTH$(I); TAB(20); RF(I)
1120 NEXT I: COLOR 8: LOCATE 21, 10
1130 PRINT "Press A for Another Year OR F5 Key for Main Menu...!"
1140 COLOR 6: PLAY "MB"
1150 LOCATE 4, 9: PRINT TIME$
1160 SOUND 100, 1
1170 A$ = INKEY$
1180 IF A$ = "A" OR A$ = "a" THEN 880 ELSE 1150
1190 REM ********************* F10 KEY - ABANDON PROGRAM ***************
1200 CLS : COLOR 6: LOCATE 12, 10: PRINT "Bye now from Rainfall Records ...!"
1210 RESET: SYSTEM
1215 REM ********************F5 KEY - RESTART PROGRAM*******************
1216 RETURN 10
1220 REM ***********************MONTHS SPECIFICATION************************
1230 FOR I = 1 TO 12
1240 READ MONTH$(I)
1250 NEXT I
1260 DATA JAN.,FEB.,MAR.,APR.,MAY.,JUN.,JUL.,AUG.,SEP.,OCT.,NOV.,DEC.
1270 GOTO 250
1280 REM ***********************YEAR SPECIFICATION*************************
1290 YRA = YR - 1989
1300 ON YRA GOSUB 1310, 1340, 1370, 1400, 1430, 1460, 1490, 1520, 1550, 1580
1305 RETURN
1310 RF(1) = 0!: RF(2) = 4.3: RF(3) = 0!: F(4) = 81.8: RF(5) = 287.3
1315 RF(6) = 117.7: RF(7) = 264.7: RF(8) = 180.6: RF(9) = 160!
1316 RF(10) = 109.9: RF(11) = 0!: RF(12) = 0!
1330 RETURN
1340 RF(1) = 0!: RF(2) = .5: RF(3) = 68.3: RF(4) = 50.8: RF(5) = 205.9
1350 RF(6) = 331.5: RF(7) = 237!: RF(8) = 244.7: RF(9) = 149.6: RF(10) = 75.7
1355 RF(11) = 0!: RF(12) = 0!
1360 RETURN
1370 RF(1) = 0!: RF(2) = 0!: RF(3) = .7: RF(4) = 141.7: RF(5) = 136.6
1375 RF(6) = 133.9: RF(7) = 128.6: RF(8) = 148.4: RF(9) = 216!
1376 RF(10) = 31.5: RF(11) = 0!: RF(12) = 0!
```

```
1400 RF(1) = 0!: RF(2) = 0!: RF(3) = 61.6: RF(4) = 8.9: RF(5) = 154.7: RF(6) = 241.8
1410 RF(7) = 206.9: RF(8) = 309.4: RF(9) = 240.4
1415 RF(10) = 152.8: RF(11) = 0!: RF(12) = 0!
1420 RETURN
1430 RF(1) = 0!: RF(2) = 0!: RF(3) = 0!: RF(4) = 38.9: RF(5) = 171.9
1435 RF(6) = 151.4: RF(7) = 75.8: RF(8) = 425.7: RF(9) = 194!
1436 RF(10) = 102.1: RF(11) = 0!: RF(12) = 0!
1450 RETURN
1460 RF(1) = 0!: RF(2) = 0!: RF(3) = 22.9: RF(4) = 43.8: RF(5) = 92.3
1465 RF(6) = 128.7: RF(7) = 236.7: RF(8) = 309.5: RF(9) = 152.2
1466 RF(10) = 105.6: RF(11) = 12.3: RF(12) = 0!
1480 RETURN
1490 RF(1) = 0!: RF(2) = 18.9: RF(3) = 0!: RF(4) = 12.6: RF(5) = 199.9
1495 RF(6) = 190.7: RF(7) = 201.8: RF(8) = 326.1: RF(9) = 170.5
1496 RF(10) = 41.3: RF(11) = 0!: RF(12) = 0!
1510 RETURN
1520 RF(1) = 0!: RF(2) = 0!: RF(3) = 64.9: RF(4) = 53.9: RF(5) = 129.3
1525 RF(6) = 279.2: RF(7) = 219!: RF(8) = 227.2: RF(9) = 147.5
1526 RF(10) = 135.4: RF(11) = 7.2: RF(12) = 0!
1540 RETURN
1550 RF(1) = 0!: RF(2) = 1.2: RF(3) = 0!: RF(4) = 67.1: RF(5) = 213.2
1555 RF(6) = 75.5: RF(7) = 239.7: RF(8) = 145.5: RF(9) = 153.7
1556 RF(10) = 103!: RF(11) = 0!: RF(12) = 0!
1570 RETURN
1580 RF(1) = 0!: RF(2) = 2.8: RF(3) = .8: RF(4) = 112.1: RF(5) = 135.4
1585 RF(6) = 196.8: RF(7) = 264.1: RF(8) = 194.5: RF(9) = 153.7
1586 RF(10) = 98!: RF(11) = 0!: RF(12) = 0!
1600 RETURN
```

1990 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	4.3
MAR.	0
APR.	0
MAY.	287.3
JUN.	117.7
JUL.	264.7
AUG.	180.6
SEP.	160
OCT.	109.9
NOV.	0
DEC.	0

1991 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	.5
MAR.	68.3
APR.	50.8
MAY.	205.9
JUN.	331.5
JUL.	237
AUG.	244.7
SEP.	149.6
OCT.	75.7
NOV.	0
DEC.	0

1992 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	0
MAR.	.7
APR.	141.7
MAY.	136.6
JUN.	133.9
JUL.	128.6
AUG.	148.4
SEP.	216
OCT.	31.5
NOV.	0
DEC.	0

1993 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	0
MAR.	61.6
APR.	8.9
MAY.	154.7
JUN.	241.8
JUL.	206.9
AUG.	308.4
SEP.	240.4
OCT.	152.8
NOV.	0
DEC.	0

1994 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	0
MAR.	0
APR.	38.9
MAY.	171.9
JUN.	151.4
JUL.	75.8
AUG.	425.7
SEP.	194
OCT.	102.1
NOV.	0
DEC.	0

1995 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	0
MAR.	22.9
APR.	43.8
MAY.	92.3
JUN.	128.7
JUL.	236.7
AUG.	309.5
SEP.	152.2
OCT.	105.6
NOV.	12.3
DEC.	0

1996 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	18.9
MAR.	0
APR.	12.6
MAY.	199.9
JUN.	190.7
JUL.	201.8
AUG.	326.1
SEP.	170.5
OCT.	41.3
NOV.	0
DEC.	0

1997 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	0
MAR.	64.9
APR.	53.9
MAY.	129.3
JUN.	279.2
JUL.	219
AUG.	227.2
SEP.	147.5
OCT.	135.4
NOV.	7.2
DEC.	0

1998 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	1.2
MAR.	0
APR.	67.1
MAY.	213.2
JUN.	75.5
JUL.	239.7
AUG.	145.5
SEP.	153.7
OCT.	103
NOV.	0
DEC.	0

1999 RAINFALL RECORDS
OF GBAKO LOCAL GOVERNMENT AREA
OF NIGER STATE - NIGERIA

MONTH (MM)	
JAN.	0
FEB.	2.8
MAR.	.8
APR.	112.1
MAY.	135.4
JUN.	196.8
JUL.	264.1
AUG.	194.5
SEP.	153.7
OCT.	98
NOV.	0
DEC.	0