THE ROLE OF CARTOGRAPHY IN AGRICULTURAL DEVELOPMENT

A CASE STUDY OF DOKO LOCAL GOVERNMENT AREA OF NIGER STATE.

BY

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MARCH, 2002

DECLARATION.

I, Muhammad Baba Chado hereby declared that this project Role of cartography in Agricultural Development in Doko Local Government was conducted by me as a requirement for the Award of Post-Graduate Diploma Certificate.

This project work has never been presented at any University known to me. The project Supervisor Dr. G.N. Nsofor contributed immensely to its success. All information, maps and data been acknowledged accordingly in the field and references.

..... 8/4/2002

Student Date.

CERTIFICATION

This is to certify that I, Muhammad Baba Chado carried out this project as well its presentation, for the Department of Geography, School of Sciences and Science Education (SSSE) Post Graduate School Federal University of Technology Minna, Niger State.

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Prof. J. A. Abalaka
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Date

DEDICATION

For my Late Mother Mallama Fatimatu Kashi Chado, My late son Muhammad Siratullahi Muhammad and the entire family of Alhaji Muhammad Chado Doko.

ACKNOWLEDGEMENT.

All thanks go to almighty Allah (SWT) for his guidance and protection throughout the programme and may His blessings be upon His beloved prophet Muhammad (SAW).

I wish to express my profound gratitude to Dr. G.N. Nsofor, my project supervisor for his invaluable suggestions and counsel and also for the pain he took to scrutinize my script.

My thanks also go to Dr. M.T. Usman of Geography Department, Alh. Aliyu Muhammad Niger State Surveyor General, Alh. A.Y. Mahmood Permanent Secretary, Lands and Survey, for their encouragement to undergo this study and the lecturers of Geography Department for their efforts in given me that required knowledge on the programme and my colleagues for their constructive criticism on ~~on~~ this project.

Finally, it is a pleasure to acknowledge the assistance I have received from my parents and I am indebted to my wives and children for the help and for bearance.

ABSTRACT

Cartography is concerned with the graphical representation of part or whole of the earth surface be it for Agricultural, Mineral extraction, Water supply, communications, legal purposes or for topography e.t.c

This project attempts to highlights many possibilities cartography can offer to Agricultural Development in Doko Local Government Area.

Cartography as a parameter for Agricultural development in general and Functions of Cartography to Agricultural development in the Local Government Area, Types of Cartographic information applicable to Agricultural Development and this project briefly touches some Agricultural Problems in relations to cartography.

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CHAPTER ONE

1.0 INTRODUCTION

The application of cartography has an immense role to play not only in agricultural sector but has embraced all sphere of Human endeavour in development and planning. Cartography is an essential and necessary tool for development and planning at all levels of government as it helps in food and Agriculture, Rural Industrialization, Rural infrastructures, Engineering Services, Natural Resources, and Rural Technology Identification/Development, Commercialization and utilization.

Infact it also helps in considering the course of the past, present and future events.

The world's earlist maps drawn on paper medium (Triup Papyrus) were produced in Egypt and showed elements of land use. These maps dates back to around 1320B, when King Ranus II lauched the first land use mapping project. Faced with the growing Agricultural productivity of the Nile valley and the need to start abstracting part of this surplus for Urban development and the beginning of economic growth, the Egyptian evolved the system of survey and mapping not only to depict the amount of the land reached and fertilized by the annul Nile flood but the actual fields of individual farmers. Such cadastral maps were critical for enabling the Egyptian authority to know how many farmers there were and to estimate and control the amount of tax that they can collect from them each year (1) It has claimed that these exercise in field measurements were important for the development of Geometry as a field of human intellectual endeavour.

From the perspective of it characteristics map confines properly in the selection of data, choice of symbols, choice of media for presenting graphic information, the design of the map, the constructions of the map including drafting, scribing and display of spatial condition and the structure of phenomena on the earth surface-Constitute the attributes of cartography.

The above view harmonizes with the International cartographic Associations

(ICA) definition of cartography as the art and science of making maps. The totality of scientific, technical and artistic activities aiming at the production of maps and the related presentation as the basis of data (Field measurement, Aerial photography, satellite mapping, statistical materials etc)

Robinson (1978) further attested to the value of cartography in possessing positional by identifying six vital attribution of the discipline (cartography)

As presentational form of communication,

That no map marks can fixed meaning,

That the marks have location,

That the marks are opaque rather than transparent,

That the marks have quality image and

That the marks have quality of structure

From these together with the interview conducted with professionals in other discipline and public, it can be deduced the role cartography is playing in Agricultural development and planning viz, rural Agricultural development in Doko local government area with specific emphasis to fadama system of Agriculture and irrigation as aim of this study.

In order to obtain cartographical information considering the present trend of fadama agricultural development, this project highlights on the fadama areas in Doko local government area and will be given with the corresponding analysis as it affects agricultural development and planning. These can be seen as a catalyst in the Agricultural land use maps or resources evolution and land use maps, soil survey maps, forest land use maps, Urban land use maps just to mention few.

1.1 STATEMENT OF THE PROBLEM.

In Doko local Gov,t area (Study area)Agricultural activities constitute the mainstay of the economy in the grassroots communities as at today. Population pressure in Agricultural activities have resulted in degradation of the environment in this area. Largely degradation is due to tree and shrub removal for fuel wood and clearing of land for

Agriculture. Many of these have shallow soils that do not resist erosion well.

Places around south western of the local Gov,t seems to be in the process of desertification occurrence, as a result of the Agricultural lands are being exposed to deforestation. Large areas of gully erosion are clearly visible and denuded areas can be seen in many Agricultural; areas.

As population increases and occurrences of degradation, desertification, deforestation, and yearly flooding, Agricultural production is relatively low and consequently faced with more people having to leave with limited food supplies.

If cartography is properly employed to agricultural activities at the grassroots level, there will be assurance of food security in the local government area.

1.2 AIMS AND OBJECTIVES.

The main aim and objectives of this project are to find out level of awareness in Doko local government area of the relevance of cartography in agriculture.

However the project will go deeper to find out if they employ maps in their various agricultural development projects.

It will further suggest the usefulness of cartography for managing agricultural resources and monitoring agricultural development projects.

1.3 JUSTIFICATION OF STUDY

The look the environment around us wears today is the result of gradual modifications by man since the beginning of life. Man has continuously modified his habitat either unconsciously or a purpose. Globally, it is now understood that the environment exists only in relation to man problems.

Peasant, farmers destroy their own future livelihood by indiscriminate tree felling, but do so only because they have no immediate alternative. Improve Agricultural activities are exacerbating problems.

Environmentally, such as deforestation, desertification, soil erosion and water pollution, which in turn, are causing further immiserisation. The excessive depletion of

environmental resources due to improper land use attracts justified concern for future. Hence adequate incorporation of cartography (maps) as a tool will serve for identifying and managing Agricultural resources.

Also proper utilization of cartography as a monitoring tool will assist in Agricultural development projects.

1.4 SCOPE AND LIMITATION

This project will be limited to Doko Local Government area with emphasis on the role of cartography (Map making) in Agricultural development project i.e. cultivation of crops, Irrigation farming, forestry, Animal domestication and fisheries. Mapping our Natural resources is very important to enhance their values for agricultural purposes e.g.

(a) Soil classification map-can show the following important information of the area of study for agricultural development.

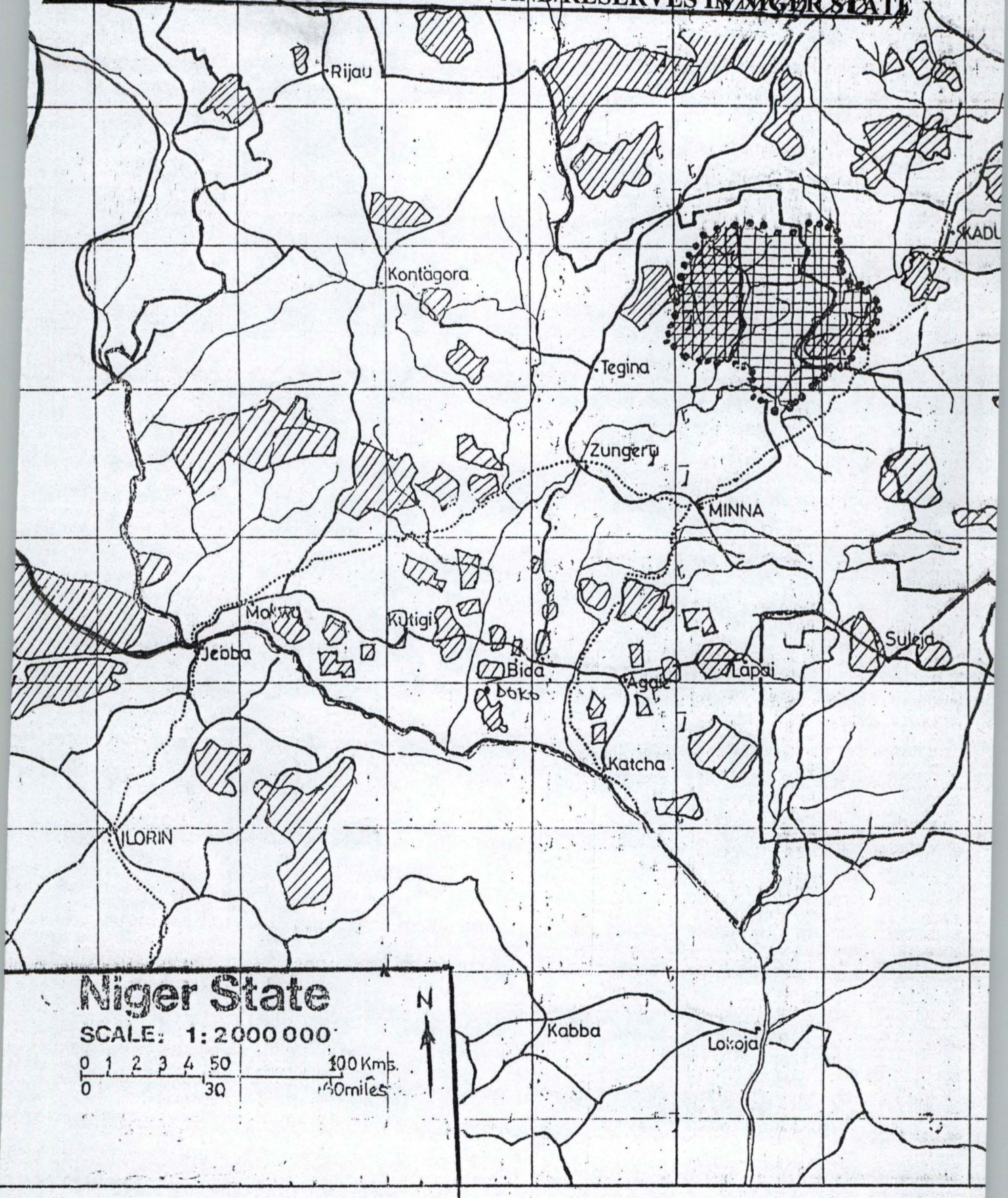
i. Raw mineral soils
ii. Weakly developed soils
iii. Basement complex soils
iv. Quartzite
v. Basic Instructive Rocks
vi. Nupe sandstone soils
vii. Soil of River Alluvium e.t.c

(b) Veterinary officer can study climatic and meteorological maps to improve the conditions of animal Domestication in the Local Government Area.

(c) Forestry officer can use maps for water shed management, the planting of trees along highways for aesthetic and protection of soil erosion in the area of study. (see map 1.1)

The study will not be completed without mentioning the importance of topographic maps at the table of irrigation officers and fishery officers. With maps they can plan, develop and manage Agricultural development projects.

MAP 1.1 FORESTRY PLANTATION AND RESERVES IN NIGER STATE



Forestry Plantations and Reserves

Proposed Shiroro National Park

Source: Max lock Group Nige

Forest Reserves and Plantations.

CHAPTER TWO

2.0 LOCATION

Doko Local Government Area is one of the new breed of the Local Government Areas in the State. It was created in the year 2002 when the number of the Local Government was increased from Twenty five to Forty two by the division of Lavun Local Government area.

The Local Government lies between latitude 8^0 36' and 9' 10' North and longitude 5^0 50' to 10' East with the estimated total land area of 1,210sqm km. It shares common boundary with Bida and Gbako Local Government areas to the North, Katcha Local Government area to the East and Muregi Local Government area both to the south and west (see map 2.1)

2.1 TOPOGRAPHY

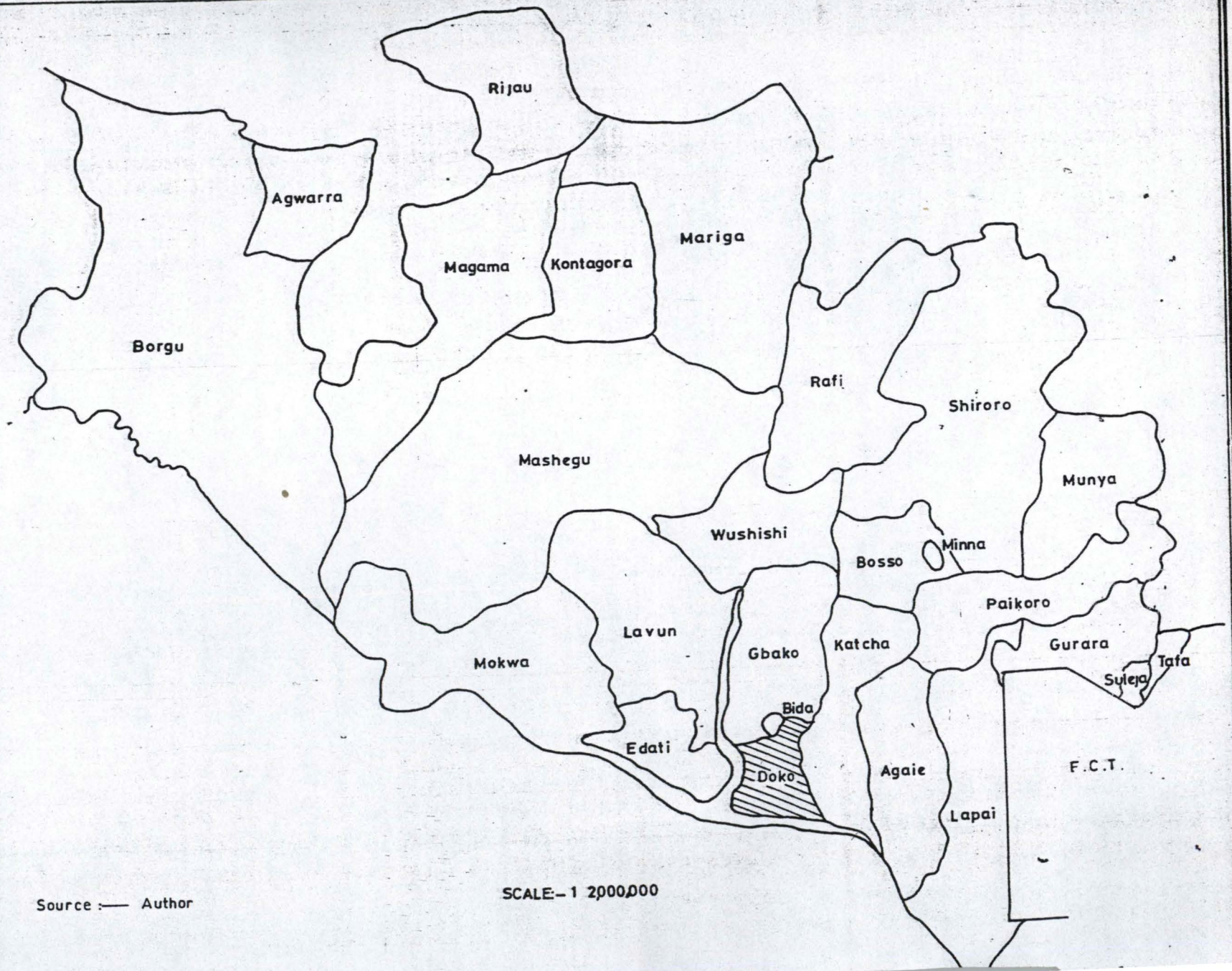
The behaviour and pattern of the rivers area largely influenced by the geography of the river course. In this Local Government area most of the rivers eventually flow in to river Niger, which runs along the southern boundaries of the local government area. On the basement complex geology, the drainage varies in pattern from dentritic to trellised depending on the degree of fracture control. The drainage pattern of the very permeable soils and the underlying Nupe sandstones is more widely spaced and dentritic. The networks are generally dense and tributes to the main stream are better developed (Fadama Area) on the sand stones. Areas developed on River Alluvium, although complex in nature, are amongst the best and have special potential for agriculture both rainfed and irrigated. (See map 2.2)

2.2 SOILS

Various soils are represented in this area of study which vary from the selected soils found around rock outcrops of the Basement complex and mesas of the Nupe sandstones to deep (Cover 150cm) soil of valley fadama.

MAP 2.1

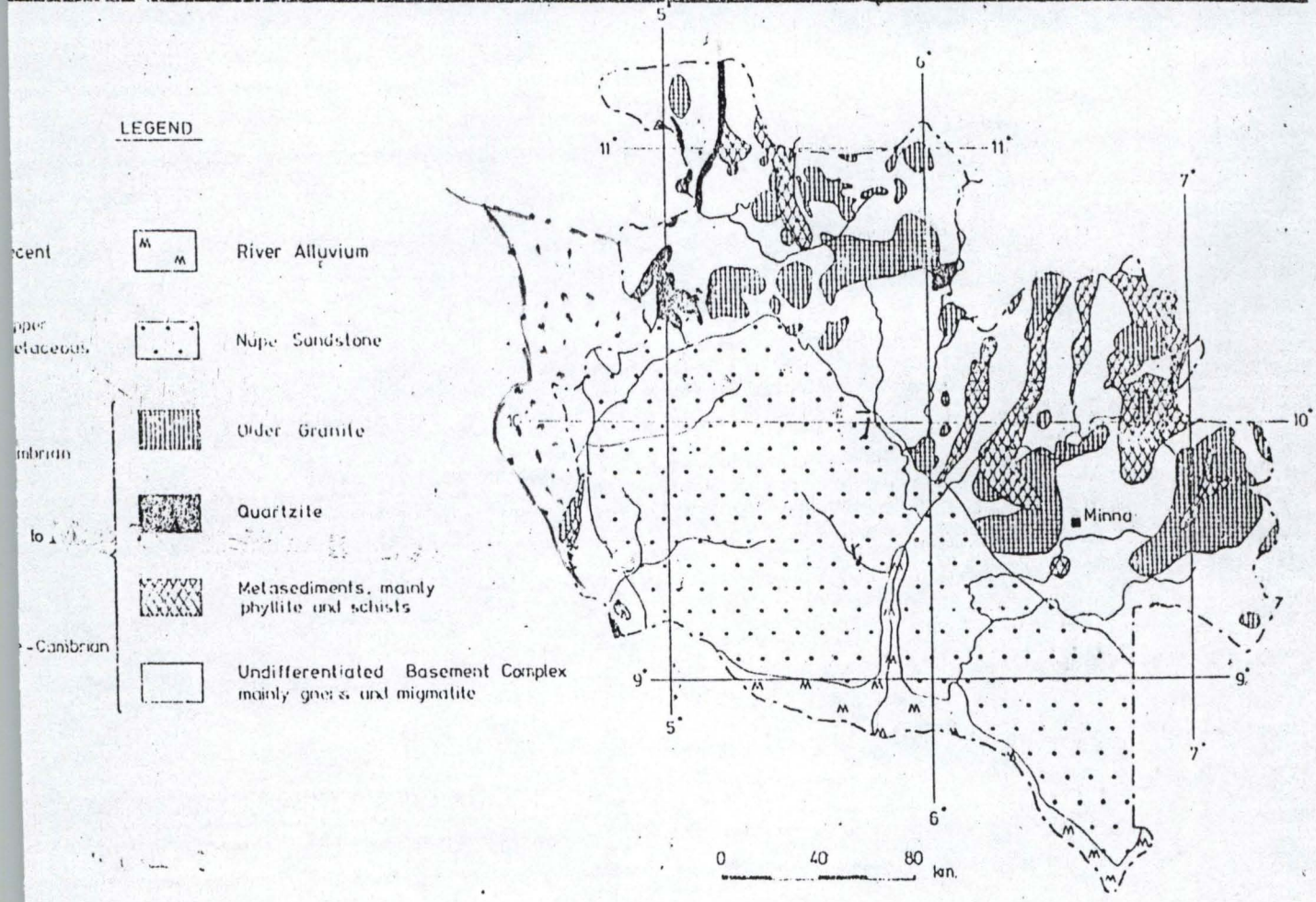
LOCATION OF DOKO L.G.A. IN NIGER STATE



Source :— Author

SCALE:– 1 2000,000

Map 2.2 The Geology of Niger State



Source: Max lock Group Nigeria

A land capability map of Niger State has been produced based on the five class. The five units are designated class number 1 to V class. (max Lock Group Nigeria Limited) class 1 land is with minor or no limitations to mechanical cultivation while at the other extreme, class V land is extremely poor, with a servere erosion hazard suitable only for forestry, controlled grazing or recreation at best (See map 2.3)

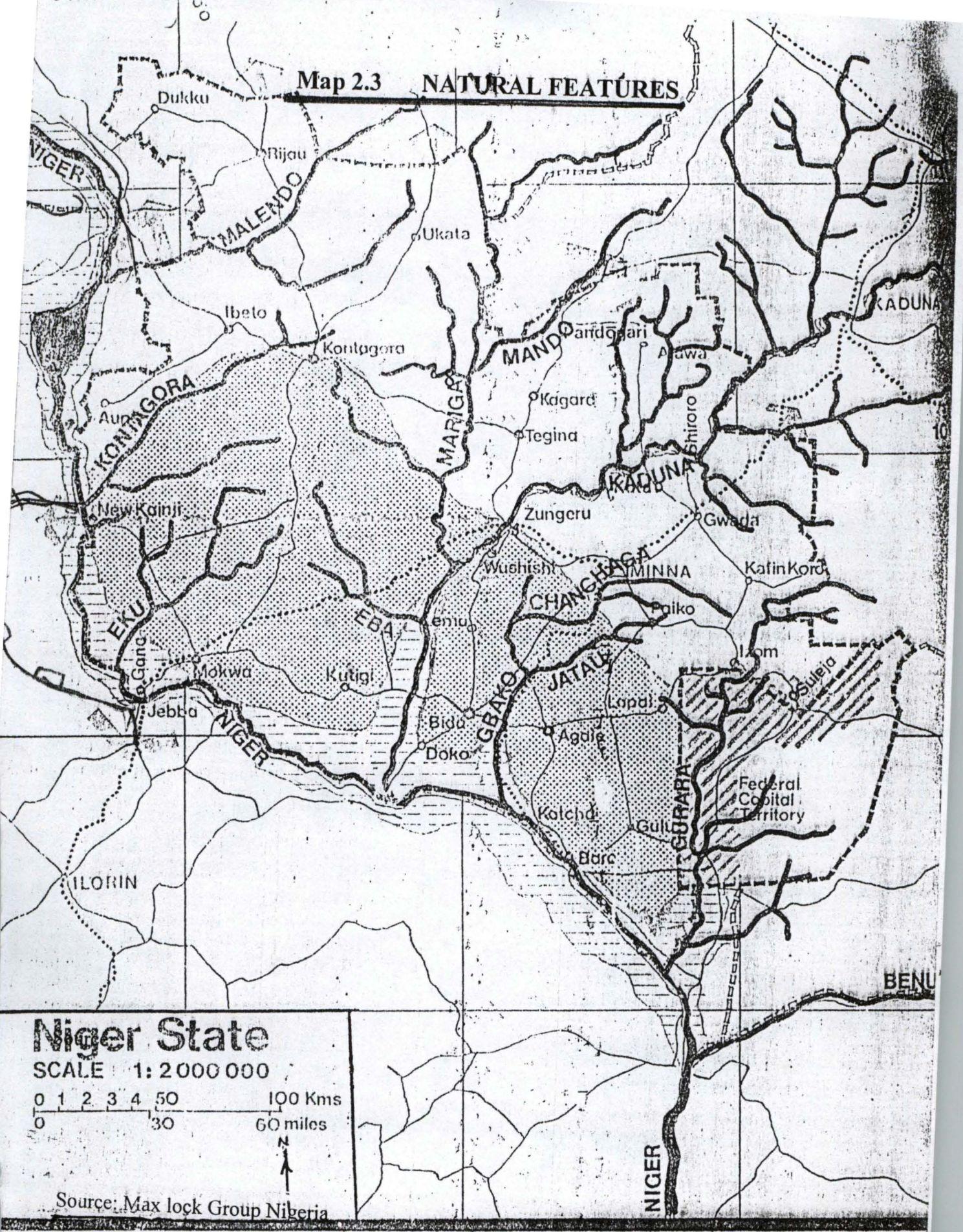
The best land falls in to class II (See map 2.5) and is found only on parts of the Nupe sandstones, never on the Basement complex. Doko Local Government area fall within class II unit and this area is the best for agricultural development projects i.e. there are large fertile available for cultivation. There is extensive alluvium deposit on the banks of the two major within this class unit (Rivers Niger and Kaduna). And this is the reason why there is significant potential for irrigation in the valley and fadama areas in this area particularly where these rivers flow off the Basement complex and on to the Nupe sandstones. The fadama and valley land which is usually most appropriate for irrigation falls within this class II unit.

The soils especially on the Nupe sandstones are sufficiently fertile to support moderate high yields on the farm. Substantial river line areas with ample supply especially within the basins of River Niger and its tributaries offer potentials for the intensive irrigation of extensive areas and production of different crops throughout the year. Infact Doko Local Government area can play a very important role in the recent campaign of "producing more to ensure food security".

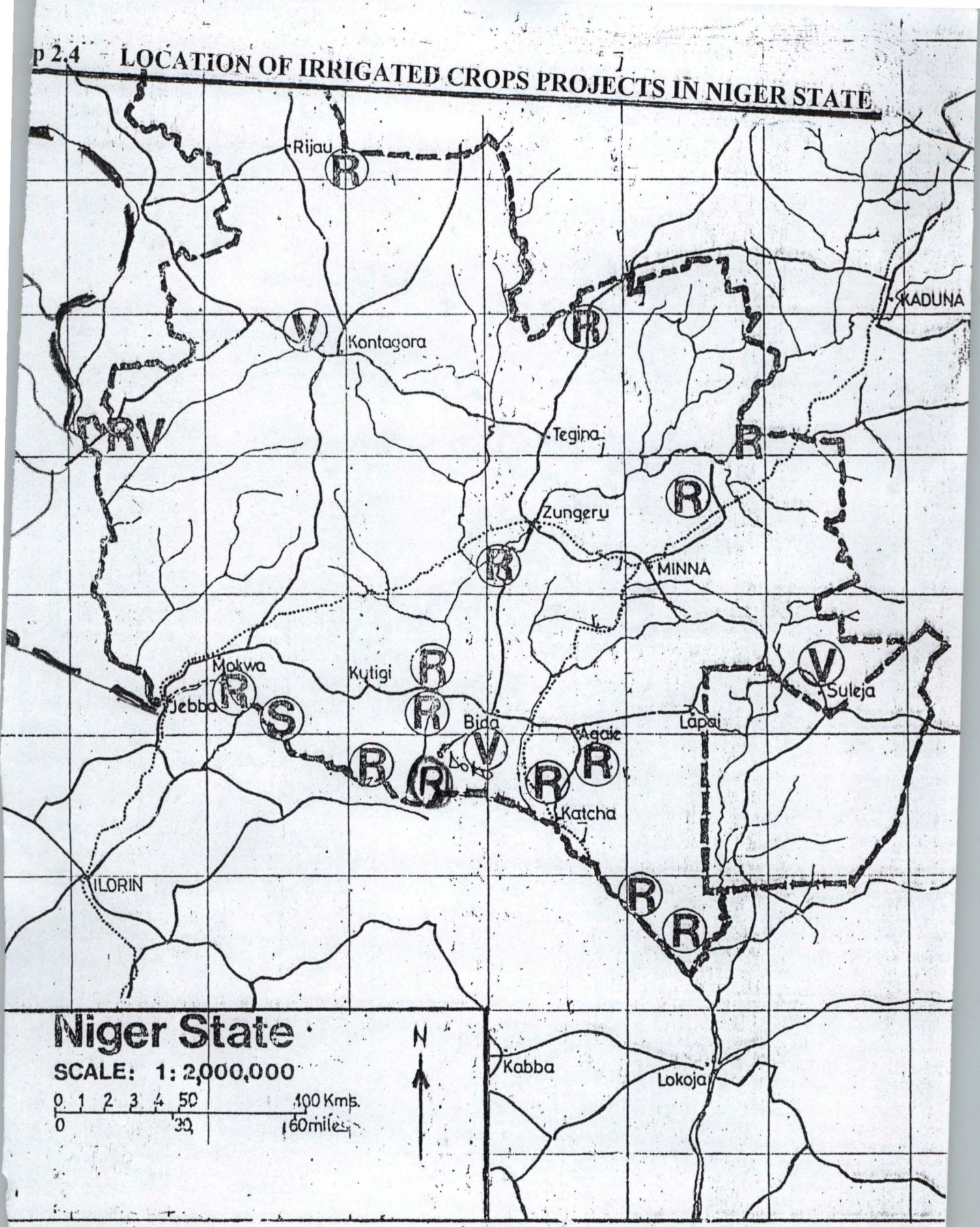
2.3 VEGETATION AND LAND USE

This area of study (Doko Local Government Area) consist mostly of grass land savanna tree at varying densities and remnant of high forest in the south.

The practice of shifting cultivation poses a real threat to forest reserves and capability of land in the local government area. Land left fallow for long periods, after clearing and cultivation can erode making it unsuitable for agricultural purposes. More fertile forest areas are thus encroached upon. The cultivated area (over 80%) within the local government area is in the hands of local farmers. The farms are usually sub-divided into


Map 2.3 NATURAL FEATURES
Dukku
Rijau
NIGER
MALEMDO
Ukata
Ibeto
Kontagora
MANDO
Kagara
Tegina
MARIGA
KONTAGORA
Aua
New Kainji
KADUNA
Zungeru
Gwada
Wushishi
MINNA
KafinKoro
CHANGHAGA
Paiko
EKU
EBA
Mokwa
Kutigi
Jebba
NIGER
Bida
GBAKO
JATAU
Lapai
Agaie
Doko
Ilorin
Kotcha
Gulu
Bare
GURARA
Federal Capital Territory
BENU
NIGER
Niger State
SCALE 1: 2 000 000
0 1 2 3 4 50 100 Kms
0 30 60 miles
N
Source: Max lock Group Nigeria
Natural Features
Topography:
Major River Basins within Niger State
10
Land Capability:
(River Alluvium) Class II & III -
(Nupe Sandstone) Class II, III & IV
(Basement Complex)
Inter-State Accessibility:
Major Access Points
Border

p 2.4 LOCATION OF IRRIGATED CROPS PROJECTS IN NIGER STATE



Location of Irrigated Crop Projects

R — Rice

S — Sugar

V — Vegetables

Existing or Under Construction

Source: Max lock Group Nigeria

small plots on which different combinations of crops are grown. The land is cultivated using simple tools such as hoes and cutlass and few of them are using the government operated tractors hire scheme. (See map 2.4 page 11).

The major grain crops produced in the local governments area are guinea-corn, millet and Rice. Guinea-corn, millet and maize are usually intercropped and grown mainly for home consumption. On the other hand rice is grown for cash income in the lowland areas along the River Niger and River Kaduna and tributaries. Yam and cassava are main root crops produced. The other major crops are groundnuts, cowpea, sheanuts and vegetables. (See map 2.5).

2.4 CLIMATE

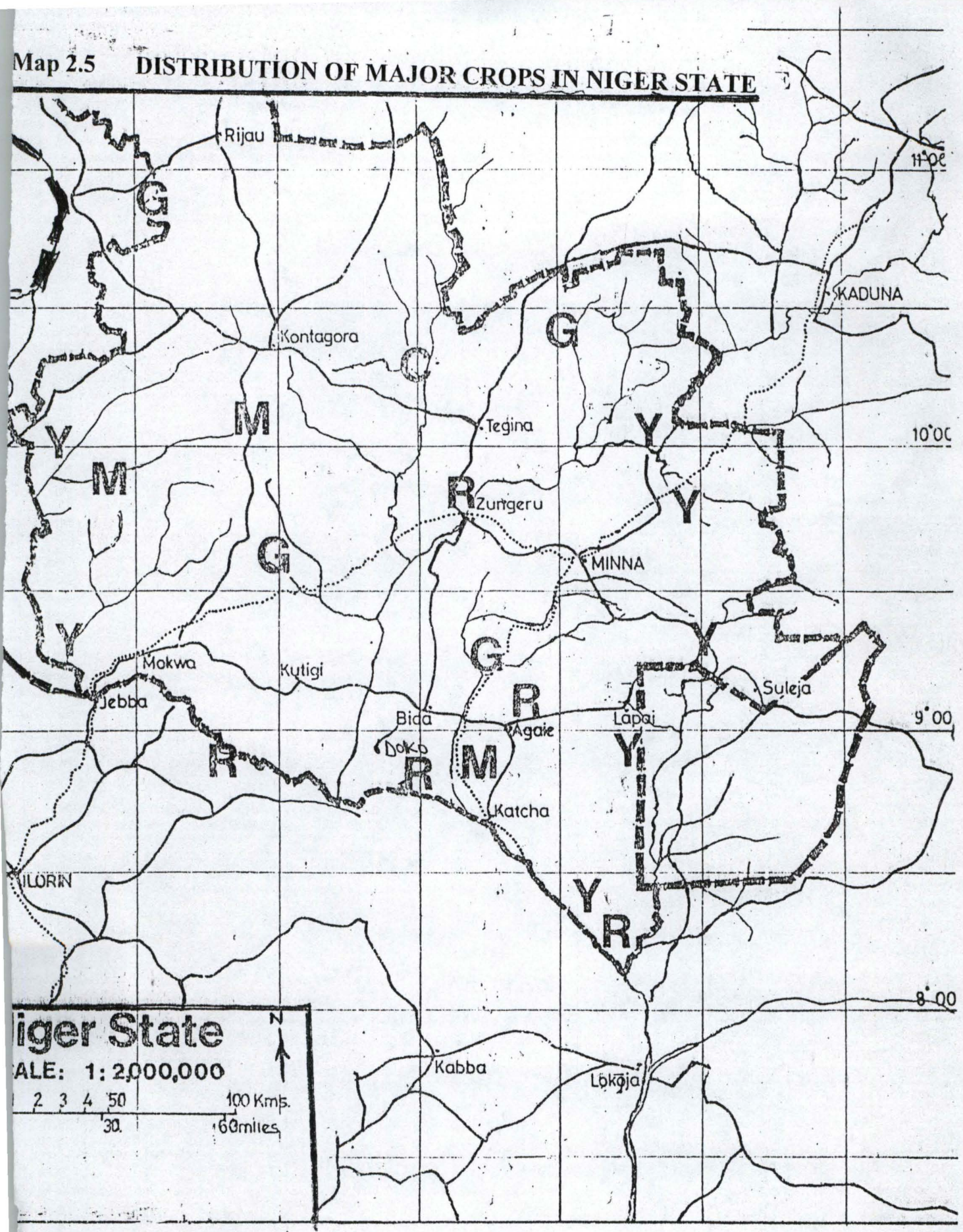
Doko Local Government area experiences distinct dry and wet seasons, the wet season decreasing in the length and amount of rain from south to North. The mean annual rainfall varies from around 1100mm in the north to more than 1600mm in the east, and the duration of the wet season varies from 150 to 210 days north to south. (See map 2.6)

The climatic condition prevailing is explained to be due to the North easternly air stream from the sahara harmattan leading to low relative humidity, high day time temperature and virtually no rainfall. From April to October, there is an influence of the dominance of the cool, moisture laden south westernly air masses. The consequence of this is reduction of temperatures increasing relative humidity and the annual rainfall distribution. The rainfall duration in shorter in the Northern part and longer in the southern part of the local government area. (See map 2.6).

The growing season for crops extends beyond the end of rains because of residual soil moisture, which takes some time to be consumed. The length of the growing season depends on the soil type as well as climate but has estimated to extend 30 to 60 days beyond the end of the rainy season. (See map 2.6)

Various climate factors limit agricultural productivity in the Local Government. These are unreliability of rainfall in both timing and amount, at the beginning of the west season. The risk of high tables locally leading to water logging of soil later in the west season, the subaptimal range of temperatures in the wet season as far as so called hot season crops are concerned, and the risk of premature cessation of rains.

Map 2.5 DISTRIBUTION OF MAJOR CROPS IN NIGER STATE



Distribution of Major Crops in Niger State

Guinea Corn

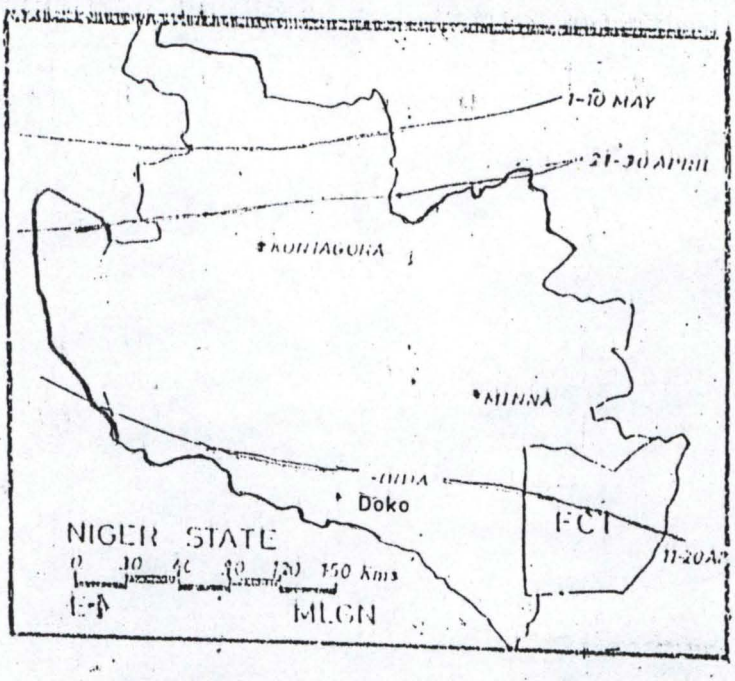
Yam

R — Rice

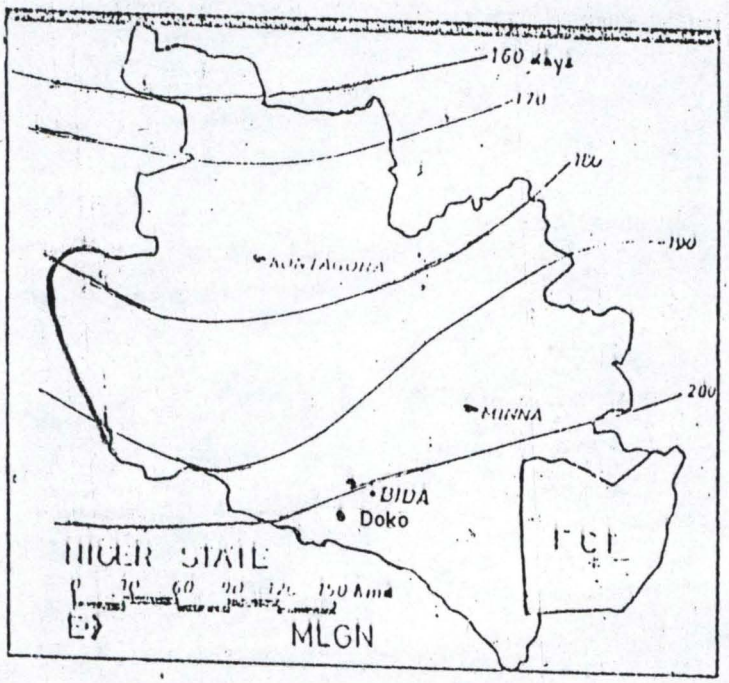
M — Millet

Source: Max lock Group Nige

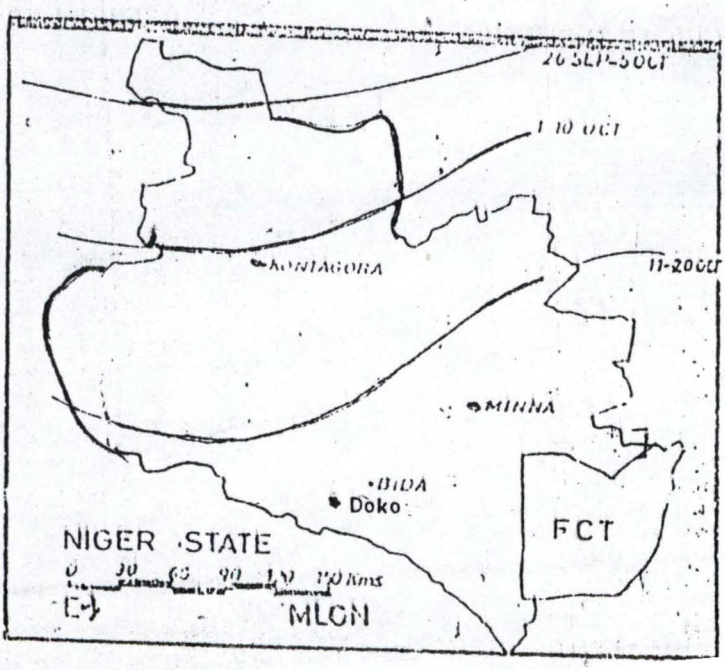
Map 2.6 CLIMATIC MAPS OF NIGER STATE



Niger State
(Starts of Rains)



Niger State
(Duration of Rainy season)



Niger State
(End of rains)

rce: Max lock Group
Nigeria

2.5. POPULATION.

Doko local Governments population like any other local government areas in the state is growing at an alarming rate. A successive demographic surveys conducted has shown the total estimate to be 155,000 (1991 estimates). The main areas of population concentration are in Doko, Gaba and Jima towns.

The main ethnic groups are the Nupes who constitute about 99% of the total population in the local government area while about 1% of the total urban population in the local government are Gwaris, Hausas, Ibos, and Yorubas respectively

CHAPTER THREE

3.0 METHODOLOGY

Cartographic methods in Agriculture are to collect and analyse using appropriate statistical methodologies and measurement of various patterns of the earths surface and to represent them graphically on such a reduced scale that the element of this pattern can be made clearly visible on the basis of data collected from field observation and measurement, aerial photographs,, satellite imagery and statistical materials e.t.c. This has made cartography to occupy an important position in mapping of our environment for regional planning and agriculture.

The data for this study were obtained from different sources i.e. primary(field survey) and secondary sources. The secondary comprises of both published and unpublished data. The field survey involved administering questionnaire to the people in the study area and also through direct interview. The questionnaire were made up of questions that are pertinent to the problems in application of map in agricultural development. Two sets of questionnaires were administered, one set went to professionals in the both field (Agriculture and Cartography) and allied fields. The second set went to peasant farmers/fishermen/Animal husbandry and modern technology farmer(both retired civil servant and Army officers). Integrated land surveys and mapping for rural agricultural development is another aspect (as the title of the project carried) where the cartographer is a strong member of the team but from the interview, there are very few cartographer in Agriculture dept. both in the state /local government level.

These cartographers and the irrigation officers were served with questionnaires on the utilization of maps in their agricultural projects.

The Head of Agriculture, veterinary officers, forestry officers in the local Gov,t Headquarters were also served and only 75 were responded out of the total of 100 copies that were administered.

CHAPTER FOUR

4.0 LITERATURE REVIEW

4.1 CARTOGRAPHY AND AGRICULTURAL DEVELOPMENT

"Cartography has crucial role to play in Agricultural development and planning process as well as an integral part of land use map or Agricultural evolution resources (Land use maps). Land use is therefore a broad terms. Here it is used to cover the land resources which is relevant to the way in which land is used presently, has been used in the past or be used in the near future for Agricultural development and planning purpose". EZRA AND FYADA (1994). Land, therefore, can be viewed in totality from the sub-surface to the atmosphere. This concept is essential to any assessment of land in planning agricultural development. More so, in order to assess and evaluate properly, efficiently and correctly agricultural productivity, distribution of crop types, land condition, forest, pasture, waste-land, drainage, basin, etc; cartography is inevitable. Much work has been done on the relevance, and various way maps and mapping can play as vital instrument for resources inventories.

Balogun, (1984) pointed out that " map is embodiment of pieces of information from the aerial (vertical) photography, terrestrial photograph, land surveying and efforts of field workers. It is capable of emphasizing the elements needed by planner and suppressing the ones that are not necessary". He further observed that "map serves as a looking glass through what the planner can see beyond the horizon and through barriers of intervisibility and observes his planning areas. Since planning is a science of space and the map is graphical methods showing distribution of the elements in space, there is hardly any planning project which does not require the use of map".

The needs for map therefore, act across all aspects of locals, state and national affairs particularly in agriculture, which is the central pillar of this subject host.

Thackwell (1969), identifies six areas of indispensable map use "Administration, defence, Communication, Education land use planning, development of Natural and Human resources". Map especially base map enables us familiarize ourselves with the terrain on which development takes places.

From the foregoing discussions, Agriculture is placed as one of the most fundamental form of human activity and includes not only cultivation of crops but also the domestication of animals and fish farming. Agricultural land is thus the most basic of worlds vast and varied resources, and from it the human masses are fed, clothed and sheltered. Generally it concerns Human exploitation of earths natural resources, the production of commodities, whether raw materials food stuffs or manufacturing goods, and their transportation, distribution and consumption. It is still not known when Agriculture started or actually originated. Primitive men must have began as food gathers, eating whatever fruits, leave and roots they could obtain. Nature must have been bountiful in those days when human numbers were so small and plants grew, everywhere. As human population increased. Fish and hunting became increasingly important in supplementary what was in the field and endless search for food ensued. It was soon realized that some form of food production were necessary, if men were to live long and secured. Animals were tamed first for the purpose of meat, milk and skin, later for use as draught animals. Seeds were sown in ploughed fields, carefully tended and harvested when the time comes. Men were then able to live in settlements or settled communities. Because they were no longer continuously moving, they had time to develop the various arts, craft and skill, that form the basis of modern industries.

Infact a measurable degree of civilization cannot be possible without a settled agriculture. Naturally people become more advanced in technology and therefore made more demand upon productivity of the land. Canals were dug to bring more water, better seeds and improved methods of tillage helped to increase annual harvest. With the effort of Agricultural extension workers, and Agricultural Researchers, tremendous success.

have been realized in every aspect of crop production. Present mechanized farming method does not only raise productivity per acre but also brought about land expansion in total area formed.

"Economic geography is concerned with spatial distributions and interrelation of various forms of economic activity, which involves primarily the study of production distribution and consumption of commodities in their regional setting. The geographical relationship of the distributions, forms and patterns, thus involved land themselves to a wide range of cartographical representation." (EZRA AND FYADA 1994) .Many of the methods use must have conform to certain cartographic conventions.

Statistics of Agricultural areas, yield and value are compiled, tabulated and published by the Ministry of Agriculture, fisheries and food or the equivalent government departments for most countries. The raw material for these summaries consists of the collated census forms completed by each farmer in the local community-ward or similar administrative units. Summaries are published on local government basis of the area of arable land, number and categories by animals, details about farm-labour.

The total of each local government are also tabulated, so that densities can be calculated. In most cases we need more detailed figures that these on a local government basis. Therefore it is necessary to extract the information for each ward from the files of the Ministry of Agriculture. The method demonstrated above, is an indication of mappable agricultural details in terms of area and elements of attributes-cartography.

From the Agricultural resources available agricultural census figures can be used to prepare materials for an agricultural atlas. Each proportion of tillage increases, density of livestock, livestock units, ration between crops and livestock etc can be computed and can be presented in a map form.

This method, however can also be applied in all the fadama unit areas in the Doko local government area since the land coverage in terms of village location, size(Hectare) suitable method expansion, Developed fadama area (Hectare), are visibly identified in the Study area. (see Table 5.2.1 page 37)

Uyanga (1989), in his argument for the necessities of maps, said, "it is now realized in any comprehensive regional planning programme that there is need for regional soil suitability study which maps the distribution of various kinds soil, analyze their properties and interprets it for land use and public facilities planning purposes".
Ujanuga (1981) highlighted need for mapping Nigeria's soil resources that " There is presently a dire need for a national soil map which can be used for the integrated planning of the utilization of soil resources of Nigeria, especially for agricultural development" He further lamented that "The poor performances in the development of agriculture in this country can be attributed to the little attention paid to soil resources studies and the lack of a national soil map for planning purposes".

In considering the soil factors in relation to development of the environment and planning benefits, it is imperative that one considers not only the soil itself but also such closely related aspects as climate, geology, topography plants/animal life and man. One needs to interpret technical soil data in the light of these and other environmental factors and translate them into forms which can easily be understood and applied by various land users.

Therefore it can be pointed out that the various ways in which soil affect mans activities and more specific knowledge of local environment are shown by the availability of the soil map related information. He high (1994) produced a map showing area coverage of land evaluation studies in Nigeria. Most of these studies are based on soil social related factors. They are the result of work done by various notably, soil surfaces section of the then western region, Ministry of Agriculture and Natural resources (MANR), the Institute of Agricultural Research (IAR) Samaru, Zaria (e.g. Vallet and Higgins, 1967), the food and agricultural organization (FAO, 1966) and the land Research Division (LRD) of the British overseas development Administration (e.g. Bowden and Tuley, 1966). For the larger part of the country (Nigeria) there are now soil Association or land system maps.

From the review so far, there are evidences that map and mapping are inevitable tools in the facet of development of all aspects of human life. Cartography therefore should not be ignored or kept aside by all allied disciplines in terms of its perspective development as other people used to conceive that cartography is a mere aesthetic display of graphic symbol paper.

CHAPTER FIVE

5.0 ANALYSIS AND RESULTS

5.1 ANALYSIS

"MAPPING of socio-economic information in to base maps enables us to identify areas of greatest need for social services since we would be able to see the distribution of these social services at a glance against background of the maps information" p.7 (Adalemo 1982) We can apply this principle to our local government agricultural development projects. The maps can serve as tools which decision makers like Chairman/Head of Department can evaluate the possibilities and limitations of further spatial development They (law makers) can decide on how undesirable trends of land exploitation can be restricted or how forms of land use should be adjusted to land capabilities. Infact, the maps should be ready for use at any planning stages be it agricultural development project or any socio-economic developments project.

Agriculture is the mainstay of the local government economy and this community is predominantly farmers; by occupation. The local government is bounded at the Southern part by the River Niger and this gave it the advantage of having so many river tributaries within the terrain. (See maps 5.1 and 5.2).

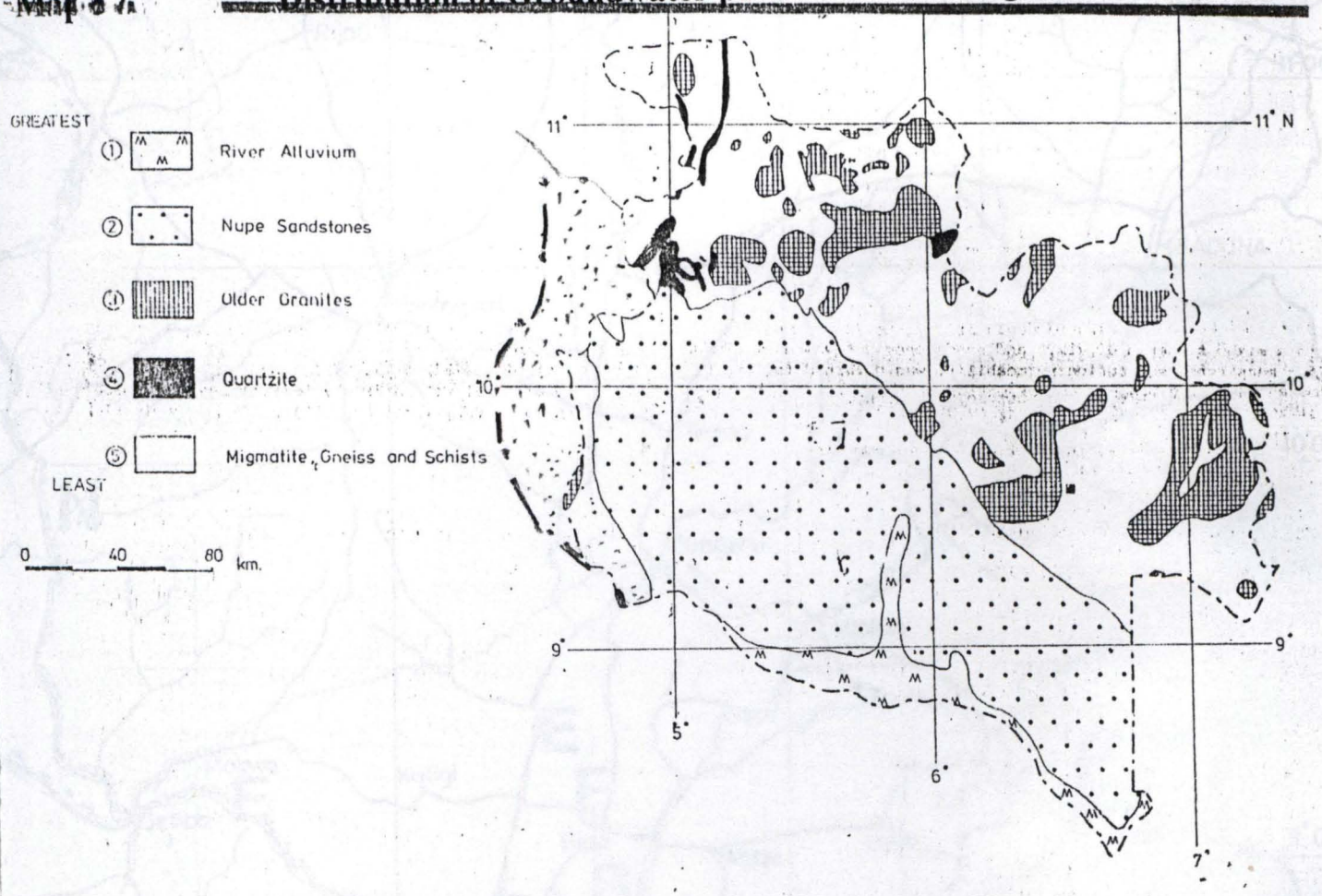
The farmers are involved in seasonal farming and fishing activities. The agricultural sector practiced in the local govt. includes food production for subsistence purposes and some cash crops sale.

Major production of food crops includes Guinea corn, millet, yam, Bambara nut, and potatoes. And the cash crops production includes Rice, Mellon, Groundnut and cassava (See map 2.5 Page 13).

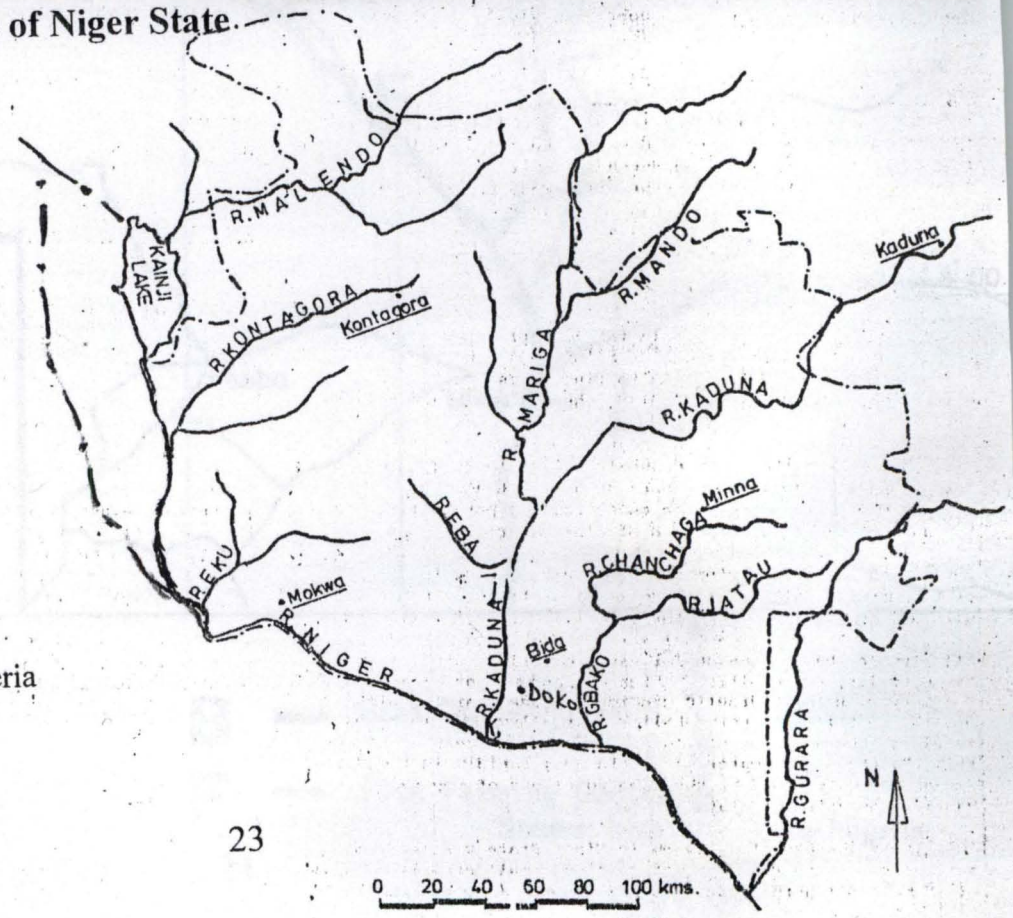
Animal husbandry which was neglected is now a thing of past since it was discovered to be an assurance in case of crop failure as a result of natural disaster such as seasonal drought, pest, floods. Some of these disasters include human handwork such as intentional bush burning, animal's left for graze over the crops that were ready for harvest.

Animal husbandry also serves as another cheaper means of manure (local fertilizer) with the disposal of animal feces. These feces also are more nutrition and

Map 5.1 Distribution of Groundwater potential unit in Niger State



Map 5.1[A] Major Rivers of Niger State



Source: Max lock Group Nigeria

crops and soil improvement in terms of structure and texture thus decreasing soil erosion.

Animals engaged in this husbandry includes Goats, Cattle, Sheep, Poultry, Pigeon, animals are sold occasionally to solve immediate problems i.e. settlement of medical Bills, augment farming labour and festivities. A few of these farmers in the local government are engaged in tree crop production such as Kola nut tree, Palm tree, Mango, Cashew, Guava, Banana and Sheeanut tree.

Let us look at functions of Agricultural Mechineries in Doko Local Government area and the state in general.

5.1.1 AGRICULTURAL MACHINERIES IN DOKO LOCAL GOVT. AREA

It is realized that with a settled Agriculture, a measurable degree of development will be possible. With the spread of Agriculture tremendous success is made in aspect of variety of better seeds production, crop production, and trees crop production.

It has been established that population growth in Nigeria is very high when comparing the result of the current 1991 census (88.5 million people) with that of 1963 head counts.

Unfortunately, food production has not been increasing with corresponding rate i.e. Agricultural production is relatively low. To safe guard this situation, and in appreciation of the consequence of the implications of more people having to live with limited food supplies, the Federal Government. Therefore introduces politics, programmes, and regulations for farmers to enhance Agricultural productivity and increase income for the farmers. Some of these measures includes Agricultural Credits, Agricultural Education, subsidies, research and plant quarantine services, establishment of farm settlement schemes, supply of vaccines and institution of irrigation development and management. The Federal Government further established River Basin Development Authorities all over the Country to enhance food production. See map 2.4 (map 3 p.11). This the government did through a number of Decrees No. 33 of 1973, No. 25 of 1976, No. 87 of 1979 and Decree No. 35 of 1987.

The second emphasis and subsequent sinking of government resources in Agricultural sector is the establishment of Agricultural development projects (ADP) all over the country. Others Agricultural development projects under military/civilian administration are:-

Operation feed the nation (OFN) of 1977 (Obasanjo Regime)

Operation Green revolution (OGR) of 1979 (Shagari regime)

Directorate for Food, Road and Rural infrastructure(DFFRI) of 1986 (Babangida Regime).

5.1.2 **FUNCTIONS:**

(A) RIVER BASIN DEVELOPMENT AUTHORITY (RBDA)

The River Basin Development Authorities were initially established in 1973 with very broad development responsibilities. In effect they constitute the operational arms of the Federal Ministry of Water Resources in respect of Directly funded federal Government irrigation development. They maintain a resident management team at each major irrigation project to ensure satisfactory operation and management.

River Basin development Authorities (RBDA) were established to perform the following functions:- To undertake comprehensive development of both surface and underground water resources for multi-purpose use with particular emphasis on the provision of irrigation infrastructures and to control water schemes for the control of floods and water-shed management.

To construct and maintain dams dykes,polders, well, borehole, irrigation and drainage systems and other works necessary for the achievement of the Authorities functions and to control pollution in the river and lakes (Natural and man-made) in each Authorities area of jurisdiction in accordance with laid down standards. And to operate water legislative and control measures etc.

Today we are faced with several policy issues on how best to expand and sustain our national capacity for irrigation development and management. Consequently, irrigation management task will have to put greater attention to social needs in our local

communities, sustained efficiently of resource use and creation of further incentives for economic success and improvement in irrigation i.e. the role of Gov,t agencies should shift toward one of the stimulation rather active participation. Furthermore, provisions of water services are influenced significantly by some environmental, demographic, social and economic forces.

Finally, there is no substitute for water in sustainable agriculture, therefore we must manage water wisely for prosperity and to do this, there should be effective, efficient and sustainable participatory irrigation management. This will serve to respond to societal needs. For proper agricultural planning and development should improve economic returns to farmers as a result of greater crop coverage and improved yield.

(B) AGRICULTURAL DEVELOPMENT PROJECT (ADP)

The establishment of Agricultural development projects (ADP) was done as a result of the short comings of the RBDA especially in the area of extension services. Under the ADP programmes greater emphasis was placed in the development of fadama (Alluvial Areas). Such are low lying flood plains composed as fluvial deposits and contain ing extensive exploitable aquifers. Agricultural development in fadama lands are traditionally been dependent on rainfall in wet season and in the dry season or residual moisture after flood recession. Some portions of this fadama land is irrigated by traditional water lifting devices called shadoof and water pump for small scale irrigation.

The major objectives of the fadama programme is to increase food and vegetable productions through small scale irrigation/ farmer managed schemes.

Agricultural Development projects are also charged among other responsibilities to construct shallow tube wells in fadama lands, for small scale irrigation and distribution of fadama infrastructures such as diversion structure, access roads, culverts etc, It is also charged to organize fadama farmers for irrigation management , cost recovery and better access to credit and inputs such as fertilizers, chemicals and expansion services to train field workers stationed to provide ready assistance to all small holders throughout the state.

In summary, A.D.P.s are to produce a system approach by Agricultural planners to all aspects of this sector , namely, land utilization, cultivation, livestock, fisheries, forestry, Agricultural inputs, marketing, irrigation, infrastructure, education and Agro-industries and provide preventive maintenance of all physical structures to ensure their effective use and climate delays and wastage funds. They are to implement an effective programme of bringing farm credit within the reach of all small holders by activating and expanding the co-operative movement and ensuring the availability of adequate funds development of a system of procurement and distribution that will ensure availability of adequate supplies of improved seed, fertilizer and chemical as and when needed by the farmers and keeping accurate records of activities and finding to permit monitoring of results and appropriate action are all part of responsibilities given to ADPs.

(C) DIRECTORATE FOR FOOD, ROADS AND INFRASTRUCTURAL FACILITIES (DFRRI)

DFRRI which was established in 1986, is by and large an original idea of the Babagida Administration by which he hoped to transform the rural sector of the economy. We all believed that Agricultural activities constitute the mainstay of most grassroots communities. Yet very few communities, if any, deliberately and consciously plan for the development of this life-line. In most agricultural communities, not much has changed; fragmented farmlands holding, rudimentary agricultural skills and techniques, methods and processes, the ubiquitous hoe and cutlass etc, still constitute the order of the day. DFRRI looked at this issue as a matter of aiming to achieve food, self-sufficiency for the nation. KOINYAN (1991) argued that " the central issue (Food and Agriculture), here is how to deliberately and consciously plan to use food and agricultural activities to enhance the rapid growth and developmnent of each grassroots community" . This he further lamented, "has to do with improved nutrition and food security for the people of the community, the creation of greater employment opportunities for them".

DFRRI has it that, the full range and scope of possible food and agricultural activities in each community must be explored and planned for. Depending on the ecological zone and the specific edaphic conditions of each grassroots community, the range of possible food and agriculture activities could include:-

(a) Arable crops (rice, wheat, millet etc)

(b) Horticulture (Citrus, mango, paw paw, banana etc)

(c) Oil seeds (groundnuts, oil palm, sunflower etc)

(d) Livestock (cattle, sheep and goat, poultry, rabbitry etc)

(e) Fishery (Aquaculture and capture fishery)

(f) Agro-forestry (all fields, as edaphic conditions permit)

Since on the range and scope of possible food and agriculture activities in the grassroot community level (e.g. area of study-Doko Local Govt. Area) this time should no longer be limited to production and production-related efforts alone but should now include, in a serious and determined way, storage and preservation as well as processing and transformation. People at the grassroots community level should also be involved, in marketing and distribution.

Accordingly, DFRRI's aim of all of above is to plan to exploit for the maximum benefit for the people of our grassroots communities all the possible grains of commercial food and agricultural activities; the creation of all-year-round employment opportunities, the creation of wealth for the people, vast improvement in their nutrition and food security.

DFRRI activities also planned to take more critical look at the factors of production in relation to food and agriculture development. Land, Water, labour, technology, credit among others, are critical. More lands need to be brought under cultivation and those (land) under cultivation itself needs to be consolidated. The yield per unit of land under cultivation needs to be drastically improved. Labour has to be made available and effectively harnessed skills, technique, methods; processes etc, in use have to be

improved. Research findings to be adopted and new technologies have to be adopted.

Credit has to be made available as and when required. The organization and management of agricultural activities have been improved. Infrastructure facilities needed to be provided. Agribusiness had to be given much greater and move serious attention at the grassroots community.

Without doubt, to move food and agricultural activities away from peasants and subsistence farming to a commercial economic activity at the grassroots level (i.e. area of study Doko L.G.A.)will require a lot of planning efforts by community members. Without doubt also, since agriculture is currently the mainstay of Doko Local Government Area, the quicker this transformation is effected in our grassroots home communities, the better it will be for the development of the Agricultural sector and for development of the study area (Doko Local Govt. Area). Indeed some of the very best and most able people of each of our grassroots communities should please move into grassroots commercial agricultural activities immediately to help expedite this transformation.

D. ASSESSMENT OF ADP, RBDA AND DFRRI

If one can paraphrase the conclusions reached in most evaluations on performance of ADP, RBDA and DFFRI it is that, in terms of the extent of their effective impact, the size of the target population reached, level of productivity attained and the quantity and quality of the infrastructures developed, these institutions' achievement are impressive when set against the cost of the projects they have executed.

The reasons which have been advanced for the poor performance of these agricultural development institutions vary in accordance with the interest represented by particular individuals. From the point of view, the officials connected with the institutions, under achievement is to be blamed on inadequate funding, lack of skilled personnel and interference from higher quarters which often resulted in project distortions.

5.2 RESULTS

5.2.1 ROLE AND FUNCTIONS OF CARTOGRAPHY IN AGRICULTURAL DEVELOPMENT

Cartography deals with maps and mapping physical environment. In essence, Cartographic works are to collect and analysis using appropriate statistical methodologies and measurements of various patterns of earth's surface and to represent them graphically on such a reduced scale. The elements of this pattern can be made clearly visible on the basis of data collected from field observation and measurements, aerial photographs, satellite imagery and statistical material etc.

so, apart from serving as an inventory of our natural resources, the map shows their locations and the planner can be observe their spatial distribution and determine whether they are complementary or obstacle to the project.

In agricultural research and development, cartographers take part in the analysis of drainage morthometry for the construction of Hydro-electric power and irrigation schemes. The cartographer makes use of the topographical maps and aerial photographic interpretation. Stream by their nature, when classified by their ranking order in a hierarchical network, a whole range of systematic relationship among various sets of properties emerge.

The analysis is based on the numerical and objective fashion of drainage basis geometry as opposed to its layout and also on the internal orderliness of the drainage basin properties which can be expressed mathematically as well as shown graphically. The most important of these basin property which the cartographer can research and

map for agricultural development from most topographical maps are stream order, stream length, bifurcation ratio, stream frequency, drainage density and intensity. The study of these parameters provides a clue on whether a basin found in a particular regional setting has the greatest potential for irrigation schemes for agricultural development.

As earlier pointed out most projects are greatly affected by land forms and drainage condition are better first planned on maps. For example, in the planning of hydro electric power project. Since the map also shows the human and natural features around the proposed dam site, the effects of the resulting artificial lake can be anticipated.

In geological map compilation for agricultural researcher and development the cartographer uses maps in the identification, description, classification, mapping geological formations over large areas or regions for agriculture and other related development strategies. Using maps and photographs, the cartographer will be able to place together and evaluate clues provided by the landscape pattern, particularly the lineaments (referring to any linear features on the landscape) which are structurally controlled such as joints, veins, faults drainage lines etc. From these clues both the structural features which deal with the identification and interpretation of rock structural features and lithology are studied to enable the cartographer compile a composite map of both landform and soil types for agricultural use.

Integrated land surveys and mapping for rural agricultural development is another aspect where the cartographer is a strong member of the team. This type of

survey deals with analysis, classification and mapping of the general terrain into recognize units. The environmental factors in such an area are considerably uniform. This is done with the notion that the elements of the landscape are interrelated and the character of the landscape in any geographical area is the result, not of a single element but of all elements combined.

The land use classes delimitation through integrated study have a high predictive value for a wider range of land attribute because it embodies the totality of the environmental conditions. The integrated land surveys using maps, and collateral information for agricultural and varieties of purpose include, land evaluation, soil survey, ecological, agro-ecological land use surveys, soil erosion risk and general environmental impact assessments, crop disease monitoring and weather for casting for short and long term high yielding crops.

5.2.2 CARTOGRAPHY AS A TOOL FOR MANAGING AGRICULTURAL RESOURCES AND MONITORING AGRICULTURAL DEVELOPMENT PROJECTS.

The use of cartography allows agencies to identify possible agricultural resources which can strength the poor food production level in the Doko Local Govt. area and the state as a whole. For example, in the Local Govt. (under case study) in Niger State i.e. Doko Local Govt. area lack of this identification due to non incorporation of cartography can spell failure for some of the following identified potential fadama.

(1) Karadingi Doko Fadama Project under River Basin Development Authority (RBDA).

(II) Angbasa high aquifer field for suitable Tube well irrigation.

(III) Bokd Yabata high aquifer field suitable for Tube-well expansion (Doko District).

(IV) Leje high aquifer field suitable for Tube well expansion (Gaba District) under Niger State Agricultural Development Project (NSADP)

(V) Sachi high aquifer field suitable for Tube well expansion (Jima District)

(VI) Danko Emiworo high aquifer field suitable for Tube well expansion (Jima District)

(VII) Gaba high aquifer field suitable for Tube well expansion (Gaba District).

(VIII) Tafyan high aquifer field suitable for Tube well expansion (Jima District)

(IX) Mamber high aquifer field suitable for wash bore expansion (Doko District)

(X) Kusotachi I & II high aquifer field suitable for tube well expansion (Gaba District), Information gathered from the Niger State Agricultural Development Project (NSADP) highlighted that some of these identified potential Fadama in Doko Local Govt. are left undeveloped.

In most developed countries of the world, cartography has been employed in the management of agricultural resources so as to improve the food production capabilities of the individual countries. There is no reason why this can not be done here in Doko Local Govt. and the country as a whole (Nigeria).

It can be used to extend services to rural farmers (as the case study of Doko Local Govt. Area of Niger State) through point to point contracts. The proposed

project to NSADP and RBDA in Doko Local Govt. area and the State as whole suffered a lot set back due to non utilization of cartographic information (qualitative and quantitative cartography information):-

(i) Maps of water resources

(ii) Maps of different types of soil

(iii) Maps showing different soil capabilities/classification

(iv) Maps of different types of crops and the corresponding areas where the maximum production is possible.

(v) Maps of different development areas

(vi) Statistical maps indicating farming population of different areas/crop yields,

(vii) Maps indicating cropping intention etc.

From table 5.2.1 Page 37 it may be seen that there are different projects either at planning stage or have already taken off. The unfortunate thing discovered in the course of this research is the non complete utilization of cartographic information that has hampered the successful take off or completion of variable projects in which the state and Local Government have invested millions of naira.

The fadama areas being meddled now have been best used under adequate cartographic information interms of identifying the number of fadamas with the existing numerous drainages in the state.

These depressions and tributaries are highly fertile for types of agricultural development to boast the state local govt. economy in terms of agricultural development. But lack of serious involvement by State Ministry of lands, survey and

Town Planning (particularly cartographic sections) the mapping identification and monitoring of these viable areas are however, ignored which resulted in the collapse or near collapse of agricultural advancement resulting the rapid rate of population growths in the state (Niger State).

The above previews have sufficiently indicated the importance and usefulness of map. In agricultural development in terms of monitoring, therefore, maps again come to be a major segment of monitoring process. As rightly pointed out about maps by Ologe (1982) "As a data bank, the map is capable of storing vast quantities of information, put it into cartographic code, compile the map and have it drawn and produced. A good map stores information in a form in which it can be retrieved and quite readily, provided the map user has the relevant training and experience." Once retrieved, such information can often serve as tool to monitor agricultural resources to yield new information of direct relevance to Agricultural development project.

This is because the prime function of the cartographer, as can be seen from the foregoing, is to help to manage agricultural resources, making it available in a conveniently compact but retrievable form through agricultural maps.

This can also be achieved through map up dating/maps revision. In advanced countries we observed with keen interest the up dating of maps using the method of satellite imagery and scanning systems etc. By these methods, maps are up dated within 42 hours or less than one week using micro chips and other sophisticated methods.

We are not calling for sophisticated and expensive means and methods but an attention be given to most available/or available methods of cartographic techniques to enable us identify and know the changes in a system of agricultural.

TABLE 5.2.1 LIST OF IDENTIFIED POTENTIAL FADAMA IN DOKO LOCAL GOVERNMENT AREA.

S/N	NAME	SIZE(Ha)	LOCATION	DISTRICT	TYPES OF AQUIFER FIELD	SUITABLE METHOD OF EXPANSION	DEVELO AREA (Ha)	REMARKS
1.	Karadingi Doko	28,000	Doko	Doko	High	W/B	1,500	Left aside
2.	Angbasa	50	Angbasa	Gaba	High	T/W	50	Left aside
3.	Boku Yabata	50	Boku	Doko	High	W/B	10	Left pumping
4.	Mambe	2000	Mambe	Doko	High	T/W	1300	Left pumping
5.	Tafyan	2000	Tafyan	Jima	High	T/W	100	Left pumping
6.	Leje	20	Leje	Gaba	High	T/W	10	NSADP
7.	Kusotachi I	20	Kusotachi I	Gaba	High	T/W	10	Left aside
8.	Kusotachi II	10	Kusotachi II	Gaba	High	T/W	5	Left aside
9.	Sachi	50	sachi	Jima	High	T/W	10	Left aside
10	Danko Emiworo	50	Danko	Jima	High	T/W	20	Left aside
11	Gaba	500	Gaba	Gaba	High	T/W	250	Left aside

T/W = Tube Well

W/B = well bore

Source; Project field survey

5.2.3 CARTOGRAPHY IN AGRICULTURAL RESEARCH AND DEVELOPMENT.

Agricultural research is concerned with studing spatial distributions and Interrelationships of various forms of economic activities. The geographic relationships of the agricultural distributions, forms, and patterns thus land themselves to a wide range of cartographical representations. No other social scientists other than an Agricultrual geographer insists upon so rich a symbolization of its facts and concepts in cartographic form. With the exception of maps of simple areal distributions, most agricultural maps and diagrams involves some precise depiction of amounts, values, area, ratios, distances rates and their compilation necessities the handling of a lot of agricultural statistics. Infact, these form the major part of cartographic data sources from which the cartographers selects Factual information, analysis using various statistical methodolysis and draws his conclusions. Agricultural Isopleth map, choropleth map, dot map, graphs or statistical diagrams may be used.

This medium of representations is employed because many statistics particularly of agricultural returns are published on a regional basis. Figures of areas, total yields, average yields per unit of area, total values and the like presented in tabular forms in agricultural censuses.

The cartographer can use these agricultural censuses from which various ratios and proportions for each region can be calculated and a scale values chosen for compilation of various agricultural maps of such regions. Such maps and diagrams may include:-

(1) The Percentage of the total area of region of Local Govt area under arable and permanent pasture.

(II) The average size of holdings in each region of Local Govt. area

(III) The average yield per unit area for each region of the Local Govt. area

(IV) The average number of animals per unit of area for each region of the Local Govt. area.

(V) The value of farmland per unit of area, which gives comparable impression of agricultural prosperity, and many more on a regional setting of the Local Govt. area.

Each of these agricultural maps and diagrams are readily used as tools for agricultural research.

It has been observed during this research work that some of these maps at pages 5,10,11,13, and 24, are available. Non utilization of these maps as a tool in monitoring these identified agricultural resources has hampered successful take off or completion of these viable agricultural development projects in Doko Local Government area and the State as a whole.

CHAPTER SIX

6.0 SUMMARY, RECOMMENDATION AND CONCLUSION

6.1 SUMMARY AND RECOMMENDATION

"Like a mathematics, cartography is a universal language. Within the context of natural development, one of its major functions is to transform the results of topographic, soil, ecological, census and other surveys into the universal language of the map" P.1 (Ologe, 1982).

"There is presently a dire need for a national soil map which can be used for the integrated planning of the utilization of the soil resources of Nigeria especially for agricultural development" P.6 (Ojanuga 1994) therefore it can be mentioned that poor performance in the development of agricultural projects in this country can be attributed to the little attention paid to maps (poor soil resources studies).

The relationship between the soil and agricultural development project to be sited in an area can be determined from the feasibility study of the available Topography Maps.

Finding from this projects "The role of Cartography in agricultural development" indicated that about 60% of the respondents have the knowledge of cartography but there is no application of maps in their agricultural development projects. Most of the projects are sited with view of the officials connected with this agricultural development projects institution. And one may add that because of the sophisticated technologies which they promote, these projects had no chance of benefiting the poor.

Still on the respondents of the administered questionnaires, it is noted that many does not know that meteorological/climatological information can be mapped and serve our farmers to plan their farming period to avoid seasonal drought.

It is obvious from the foregoing that in Doko Local Government Area and indeed the nation that within such a community the role of cartography is to provide maps at larger scales matching their various agricultural development projects. This can be achieved quickly with the employment of qualify cartographers in to Doko Local Government Services. It's been gathered that there is no one qualify cartographer in Doko Local Government Area. If employed (Cartographer) he can aid their agricultural planning, produce necessary maps at larger scales for agricultural development projects. Words of credit should go to Mokwa Local Government Area for given attention to their cartographers and application of maps of their agricultural development project and land matters.

6.2 CONCLUSION

From the research and application of maps it is clear that the usefulness of cartography in proper agricultural administration cannot be over emphasised. In a proper organised agricultural economy, the product of the cartographer and his expert knowledge is always relied upon when monitoring is envisaged. Advances in cartographic methods will ease agricultural practices if properly integrated in to agriculture.

Cartography should be given proper attention both in the state and local government levels.

Strong emphasis be asserted by the state and local government to educate general public on the importance of maps in agricultural development projects, and other development.

Ministry of Works, Ministry of Lands and Survey, Ministry of Agriculture and Natural Resources, Local Government Services should liase from time to time to map viable agricultural areas of fadama (alluvial plains) etc.

Our agricultural development institution's officials in their planning and execution should avoid corruption which usually come in form of inflated contracts towards their agricultural development projects.

Government should avoid overlapped in terms of reference of our agricultural development project institution with existing agricultural development projects institution. This is to avoid wasteful and duplication of programmes and projects.

The existing agricultural development projects institution should be made to survive a change in political power to avoid wastage of funds.

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APPENDIX

QUESTIONNAIRE IN RESPECT OF A PROJECT TITLE:- THE ROLE OF CARTOGRAPHY (MAP MAKING) IN AGRICULTURAL DEVELOPMENT IN DOKO LOCAL GOVERNMENT OF NIGER STATE.

(1) Do you use maps in your day to day activities on Agricultural development?

(Yes) (No)

(2) If above is yes what types of map and if no why?.....

.....

(3) In your irrigation farming do you employ usage of Topographic maps? (Yes) (No)

(4) Do you have cartographers in your Agricultural department (Yes) (No)

(5) If yes what types of Maps do they produce for your Agricultural Development Projects.

.....

.....

(6) With available Topographic maps before an Irrigation Officer, is it possible to carry out a feasibility studies of that area?. (Yes) (No)

(7) Is there any assistance Road maps of your State can serve in transporting your farm products to your market centres? (Yes) (No)

(7a) As a Forestry Officer Advice importance of map in your day to day activities .....

.....

.....

(8) If (7 is Yes) have you ever purchased road maps of your State available in the State Ministry of Land, Survey and Town Planning, Cartographic Section, Maps Sales Unit? (Yes) (No)

(9) If above is Yes do you encourage others to do the same ? (Yes) (No)

(10) Is it true that Soil map of an area can determine the types of crops to be planted there?

(Yes) (No)

(10a) As a Veterinary Officer have you been employing usage of map in your day to day activities? (Yes) (No)

(11) Give other comment where maps are relevant to your livestock development ..Projects.

.....

.....

(11a) If (10 is Yes) have you ever explained this to your peasant farmers?

(Yes) (No)

(12) How can you employ the knowledge of the use of Map to your community?

.....

.....

(13) How far has your Information Dept. gone in educating the farmers and peasant farmers on importance of Thematic map (Special Purpose map) towards Agricultural Development? Projects?

(14) What medium do they apply?.....

.....

(15) Do you believe that Meteorological/Climatological Information can be mapped and serve our farmers to plan their farming period to avoid seasonal drought?

(Yes) (No)

(16) Do you believe that map can serve as a guide to our fishermen where to construct fish pond or not to construct fish pond? (Yes) (No)

(17) Have you ever produce maps that can serve our farmers and fishermen to plan their farming and fishing activities? (Yes) (No)

(18) If these maps are available, have the Local Farmers been using such information in planning their farming and fishing activities? (Yes) (No)

(19) Other comment please :.....

.....

.....

.....

(20) Please state your place of work .....

.....

.....

.....