THE IMPACT OF JEBA DAM ON THE SPATIAL AND ECONOMIC ORGANISATION OF THE IMEDIATE ENVIRONMENT OF JERBA

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D E C L A R A T I O N

I hereby declare that this thesis has been composed by me and that it is a product of my own research work. It has not been presented for any previous application for high degree. All quotations are distinguished by quotation marks, and sources of information are appropriately acknowledged by means of referencing.

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Date: .....

CERTIFICATION

This thesis entitled "THE IMPACT OF JEBBA DAM ON THE SPATIAL AND ECONOMICAL ORGANISATION OF THE IMMEDIATE ENVIRONMENT OF JEBBA" by James Ma'ajin Matthew, meets the regulations governing the award of the degree of M.Sc.(URP) of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to my wife, son, and family, for their love, expressed in form of patience and understanding.

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ABSTRACT

The construction of dams has become a common feature of development in many developing countries. It involves the building of a barrier across a stream, river or lake, to hold back water for single or multiple purposes. Such dams always creates positive and negative physical and socio-economic impacts on their upstream and downstream areas.

Jebba Dam, was constructed mainly to complement Kainji Dam in generating electricity for the country's growing industrial and domestic demands. In the process of its operation, the obvious impact created on the spatial organisation upstream, was the displacement of 6,111 people in 42 villages, by the reservoir. Being a forseen impact, however, adequate arrangements were made by NEPA for the resettlement, though it attained only little success due to lack of effective and efficient management of the exercise.

In the downstream areas of the dam, impacts have been created on the spatial organisation and the economy of the people. This is because, with the regulation of flow downstream, the floodplains formerly liable to flood annually, became permanently exposed. This in turn enhanced the development of agriculture and the spatial organisation of the areas.

This regulation of flow, on the other hand, also reduced the river regime downstream so much that navigation became difficult.

Finally, with the creation of the dam, sedimentation of the river downstream had declined so much that fishing had declined drastically in the area. All these impacts, some of which are in form of problems, prevailing in the downstream area today, have

received no attention from the National Electric Power Authority or any other agency. This study therefore argues that, dam construc-tion should always be seen as a multi-purpose programme, whereby the authority in charge oversees the impacts created in both the upstream and downstream areas of the dam, for an effective and unitary river basin development. This is demonstrated in the proposals made for the downstream areas of Jebba Dam.

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CHAPTER ONE

1.0.0. INTRODUCTION

Since time immemorial, man has directed attention towards the great rivers of the world, to extract from these rivers, some benefits to living (Baylis, 1965). One of the techniques applied to achieve this goal is dam construction.

The building of such dams started in Iraq and Egypt on Rivers Tigris and Nile. These areas, that is, the craddles of civilization, clearly indicates that the advent of dam construction is an aspect of man's civilization. Since the 19th century industrial revolution, however, man has become more technologically equiped to explore and construct more and efficient dams.

The plateau nature of the continent of Africa had given rise to much rapids and falls at the edges of the plateau, providing a favourable forum for the promotion of dams construction. This of course, has made Africa the continent with the greatest hydro-electric potential (Hilling, 1975).

Interestingly however, inspite of the greatness of this endowment, the distribution of dams construction in Africa is very uneven. West Africa and North Africa for instance, contribute only 3.1% and 1.7% respectively, of Africa's total potential. Central Africa alone, accounts for 45%, while South Africa, accounts for the balance. The major schemes in Africa include, the Akosombo on River Volta, (768mw), the Kariba on River Zambezi (705mw), the Aswan on River Nile (2,100mw) and the Kainji on River Niger, (960mw) - (Hilling, 1975).

In the past, dams construction largely focused on the development of a single resource. For instance, limited sources of energy required to sustain industrial development had necessitated the construction of

most dams in Africa. The Akosombo for example, was constructed to generate the required power demand of Valco - a consortium of aluminum Companies at Tema, Ghana(Grove, 1978). In reality, when the dam was constructed, these companies alone, consumed two-thirds of the total energy generated by Akosombo Dam.

The Helman Steel Complex, one of the largest steel producers in Africa outside South Africa, also consumed 10% of the total energy generated by Aswan Dam. Kariba Dam, on the other hand, supplied the energy requirements of the mines at the copper belt and other mines and industries of Zambia (Hilling, 1975).

Apart from these large schemes, which attract great attention, much electricity is also produced from a large number of smaller dams like the Nkala Falls (Malawi, 16mw) Koka and Tississat (Ethiopia, 45mw and 11.5mw respectively) Hale (Tanzania, 21mw) Sennar (Sudan, 15mw) and Edwaleri (Swaziland, 40mw).

In the relatively drier parts of Africa, dams have been constructed for domestic and industrial water supply and for the watering of the dry irrigable lands, familiar examples of such dams include J. Aulia and the Sennar Dams purposely for the Gezira scheme in Sudan. In the recent times, smaller dams of this nature have been constructed all over the savanna regions of Africa for the same purpose.

In Nigeria, dams construction, has been until recently, limited to the use of water for domestic needs and for irrigation in the drier areas of Northern Nigeria (Ayoade, 1975). The earliest dams in Nigeria, were on the Kura and Jeko Falls in the present Plateau State of Nigeria. These dams, supplied power to Jos and Bukuru and other mining towns on the plateau.

With the wake of industrial development at the period of

independance, the Federal Government proposed and passed the Niger Dams Act of 1961 (NEDECO REPORT, 1959). From this report and those of B. Beatty (1958) and Sir Alex Gibb and Patners with Preece, Cardew Rider (1959), the Federal Government, with the Northern Region Government and the Electricity Corporation of Nigeria, recommended the construction of Kainji dam, to be followed by Jebba and Shiroro dams.

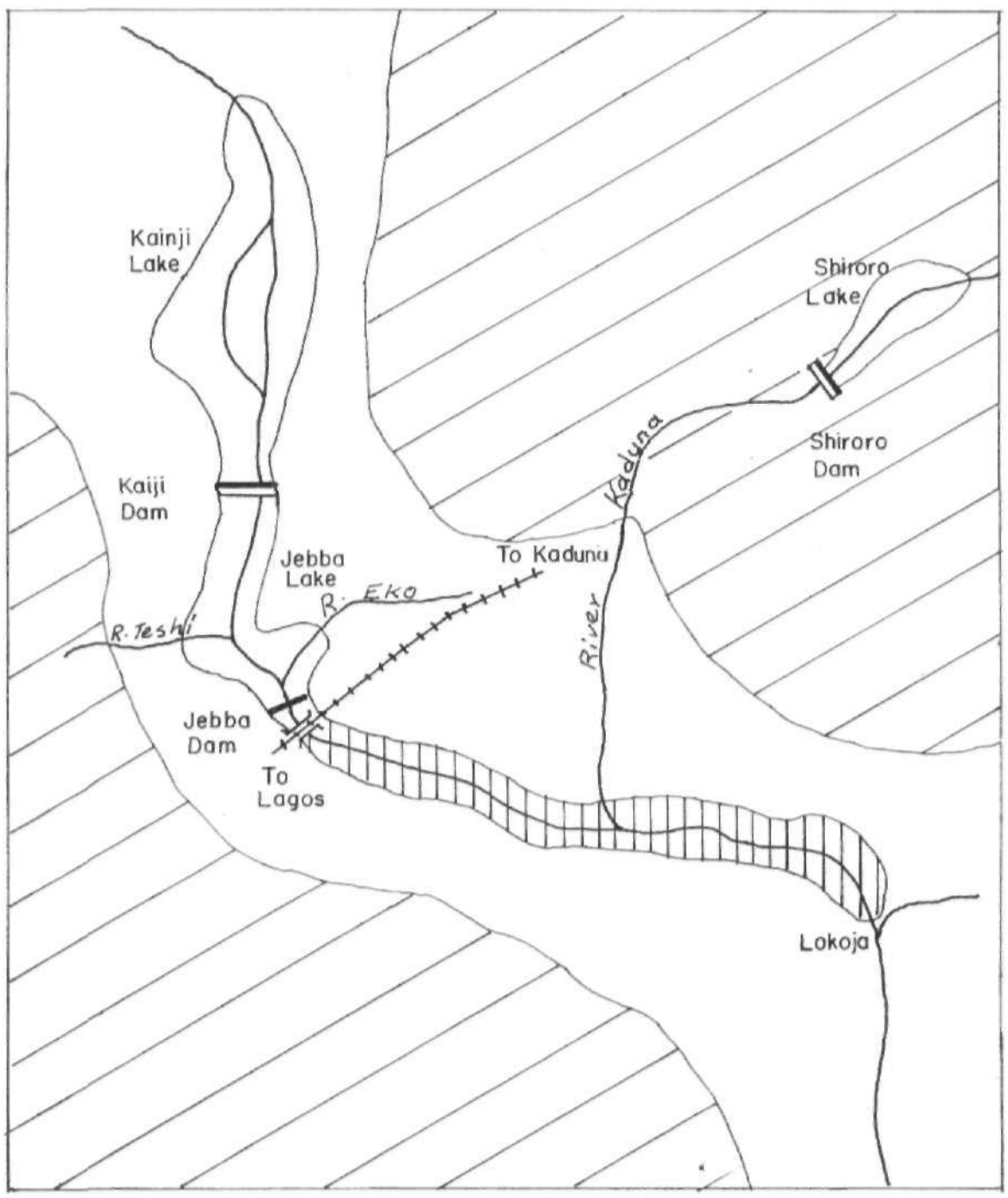
Towards this end, work started on the multi-purpose Kainji dam by 1964 and was completed by December, 1968. The report prepared by NEDECO, states that, Kainji Dam "will cope with the electricity demand of the country up till 1980" (NEDECO REPORT, 1959) and so to complement Kainji Dam, the second phase of Niger Dams Project, that is the construction of Jebba and Shiroro Dams, started in 1977 and was completed by 1983.

Apart from these three large dams in Nigeria today, many other smaller dams have been constructed in the savanna regions for irrigation purposes. Some examples of such dams include, the Kano River Dam Project, in Kano State, the Thomas River Dam Project(Kano State) the Kubanni Dam Project in Kaduna State, the Kiri Dam Project in Gongola State, the Goronyo Dam Project in Sokoto State, etc.

Generally, from the experiences of man-made lakes in Tropical Africa, planners have always paid particular interest on the problems of the upstream areas affected by the lake created by the dam, construction while no attention is paid to the downstream. Most of these problems, usually associated with man's socio-economic activities, which invariably must change as the river regime changes, are usually complex and more diversified.

1.1.0 STATEMENT OF PROBLEM

Jebba Dam, situated between latitudes 9^{o} 06' and 9^{o} 55' north and longitude 4^{o} 02' and 4^{o} 45' east and some three kilometres upstream of Jebba town (see Fig.1.1) was built primarily to complement Kainji dam



SCALE- 1:500,000

LEGEND

- Plateau Area
- Dam With Power Site
- Dam Without Power Site
- Areas That Can Not Be Irrigated Fully
- Railways
- Rivers

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FIG. 1·1
THE NIGER DAMS PROJECT

in meeting up with the increasing national demand for power. It was also to bring about some positive impacts on the economic and social life of the Niger Valley. However, in the course of operation, some problems were generated by the dam.

The foreseen problem, to which the Authority paid much attention, was that of the displacement of 6,111 people in 42 villages. This is relatively small when compared to other larger dams in Africa. In the High Aswan Dam for instance, the reservoir doomed forever, the land of Nubia, its monuments, and the homes and farms of 100,000 people living in it (Little, 1965). The 8,500 square kilometres lake (the largest man-made lake) created by the Akosombo Dam, displaced 80,000 people in 739 villages and their cocoa farmlands (Hart, 1980). Kainji Dam too, displaced 45,000 people in 221 villages. These people were resettled in 136 villages (Adeniyi, 1970).

Studies have revealed that, the resettlement scheme under Jebba Dam, just like other examples in Africa, attained little or no success. Some of the reasons for this failure include, lack of manpower to oversee the exercise, lack of efficient management, misappropriation and lack of funds, and a host of other socio-economic problems.

With the opening of Jebba Dam, there appears to be some occupational and other spatial changes in the downstream areas of Jebba. The authority, should have investigated into these changes and the associated problems, so as to reorganize the people for more viable economic opportunities. Unfortunately, no attention was paid to the area.

Furthermore, at the construction of Jebba Dam, the Montreal Engineering Company in their report, postulated that for the fact that Jebba Reservoir will be a small one, it would discharge floods at almost the same rate as they enter into the reservoir. That is, there will be no significant change in the river regime in relation to the construction

of Jebba Dam. With the opening of Jebba Dam, however, instances of drastic reduction in the river regime or disastrous floods are experienced in the downstream areas. The effects of these changes have been manifested on the spatial organisation and economic activities of the study area. This study will therefore, examine the extent of these changes and its consequent problems created in the downstream areas of Jebba to Shonga in Kwara State.

The study will attempt to establish the extent to which the dam has influenced.

a. the settlement pattern

b. the location and hierarchy of settlements

c. the transportation network

d. the distribution of utilities, facilities and services

e. the land - use pattern

f. the occupational pattern

g. the incomes

h. the industrial developments

1.2.0. AIM

The aim of the study is to examine the impact of Jebba Dam on the spatial organisation and economic activities of the immediate environment of Jebba, as a basis for making recommendations for the development of the downstream areas.

1.3.0 OBJECTIVES

1. To review the considerations and general findings of the studies on the impact of dams.
2. To review the economic and physical characteristics of the study area, prior to the construction of Jebba Dam.
3. To examine the impact of the dam on the spatial and economic organisation of the study area.

4. To identify the problems created by the dam construction.

5. To make recommendations and planning proposals for the development of the downstream areas.

1.4.0 SCOPE AND LIMITATIONS

The impact of Jebba Dam is well pronounced in the downstream of Jebba which covers large areas in Niger and Kwara States. However, the focus of the study will only be on those areas lying between Jebba and Shonga towns of Kwara State. The study will also be limited to the extent to which the dam has influenced the pattern of spatial organisation and economic activities in the study area.

1.5.0 METHODOLOGY

The methods employed in the collection of data included

i) the questionnaire administered by the interview method
ii) informal interview
iii) personal observations
iv) published and official records

The questionnaire survey was carried out in two stages. The first stage involved the selection of eight settlements(40% sampling) from the study area representing those that are large and accessible, large and remote, small and accessible, and small and remote. In the second stage, 20% household-heads in each of the sampled settlements were selected and the questionnaire was administered on them. A total of 220 questionnaire were subjsequently administered.

Secondary data was also collected from the authoritics of Jebba Dam, Nigerian Sugar Company, Limited Bacita, and Niger River Basin Development Authority through informal interviews.

Other necessary informations were collected through published

and official records from Jebba Dam, Nigerian Sugar Company, the Local Government Area, and the State's Ministry of Lands and Survey. Personal interviews and observation, undoubtedly, also played a vital role in the process of data collection.

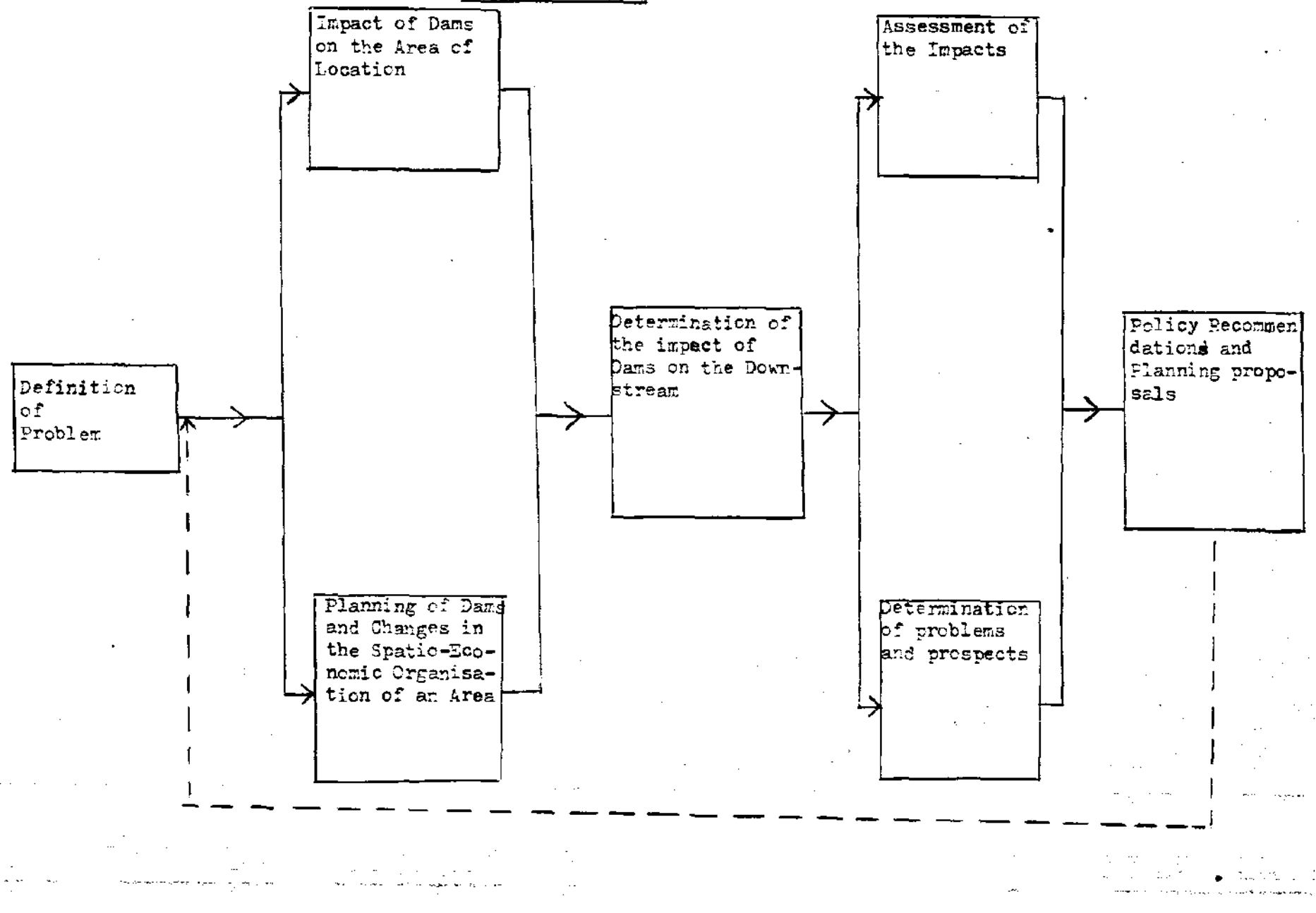
1.6.0 THESIS FRAMEWORK

The thesis is organised into three parts. The first part covers the theoretical component of the study. It reviews the general considerations and findings of studies on the impact of some selected dams, in chapter two. Chapter three also reviews the economic and physical characteristics of the study area prior to the construction of Jebba Dam. These fulfil objectives one and two respectively.

The second part of the report is the emperical component of the study. It attempts to examine the impacts of Jebba Dam on the spatial organisation and economic organisation of the study area. Some of the problems created by Jebba Dam construction have also been identified. These issues are discussed in chapter four to fulfil objectives three and four.

The third part, discussed in chapter five, concerns the formulation of recommendations and planning proposals for the development of the downstream areas. This is in fulfilment of objective five.

Fig. 1.2 - THESIS FRAMEWORK



CHAPTER TWO

GENERAL CONSIDERATIONS AND FINDINGS OF THE STUDIES ON THE IMPACT OF DAMS

2.1.0 INTRODUCTION

Though environmental awareness is a relatively recent phenomenon, some authors still believe that, in the past, certain impacts (environmental) have been experienced, complained about and temporarily solved for a minimum of seven centuries (Stocks, 1977).

Generally, there are two sources of environmental impacts or changes. In the first place, there are those related to the natural processes and secondly, there are those related to human activities. In the absence of man for instance, the natural environment continues to experience changes on a time-scale of hundreds of million years, bringing about changes like the continental drift and mountain building (Munn, 1979).

Since the 19th century industrial revolution, man, on the other hand, became an intrusion on the overall balance of the processes that maintain the earth as a habitable place. This is illustrated vividly in the process of man reorganising the space for profound physical, economic and social reasons. In the Developing Countries, the consequent environmental changes associated with such development processes have always been ignored. Only recently have some attention been paid when the environmental factors started to play a significant role in the speed and direction of the national progress. This is because, the environmental factors are now developing in the values, a new concern and recognition of the dependence than exists between man and the long-time viability of the environment.

The relationship that exists between man and his environment is is two-way. When man was bare of technology, the environment determined

all aspects of man's activities. But with the 19th century industrial revolution, man became technologically equiped to modify the environment for different purposes. As this control of the environment increases, conflicts started to arise between the set goals (of man's activities) and the natural process, thereby resulting into the environmental impacts.

Dam construction, is presently one of the attempts by man to modify the landscape. It involves the building of a barrier across, a stream or lake, to hold back water for multiple and integrated purposes (Waren and Rubin, 1968).

Before this century, most of the dams constructed, were structures of low to moderate heights and of simple design and purpose. With the increasing demand for hydro-electric power, and also water for domestic, industrial and irrigational purposes, larger and more complex dams were constructed. The world's largest dam today, in terms of the volume of materials used in construction, is the Fort Deck Dam on River Missouri in Montana, U.S.A.

Generally, dams also range in size and complexity of construction from the low earth embarkments, constructed mainly to impound or divert water in small streams, to massive earth or concrete structures built across major rivers to store water for various purposes. Such dams vary from the embankment dams to arch dams, concrete gravity dams and buttress dams, differing in terms of the materials used in the construction and the complexity of construction. The necessity for which the dam was built, topography and the geology of the area, could also be other factors that determine the different dams constructed.

In terms of purpose too, dams can be distinguished into two types, that is, the single purpose and multi-purpose dams. In the former, a dam is constructed solely for a particular purpose, like the provision

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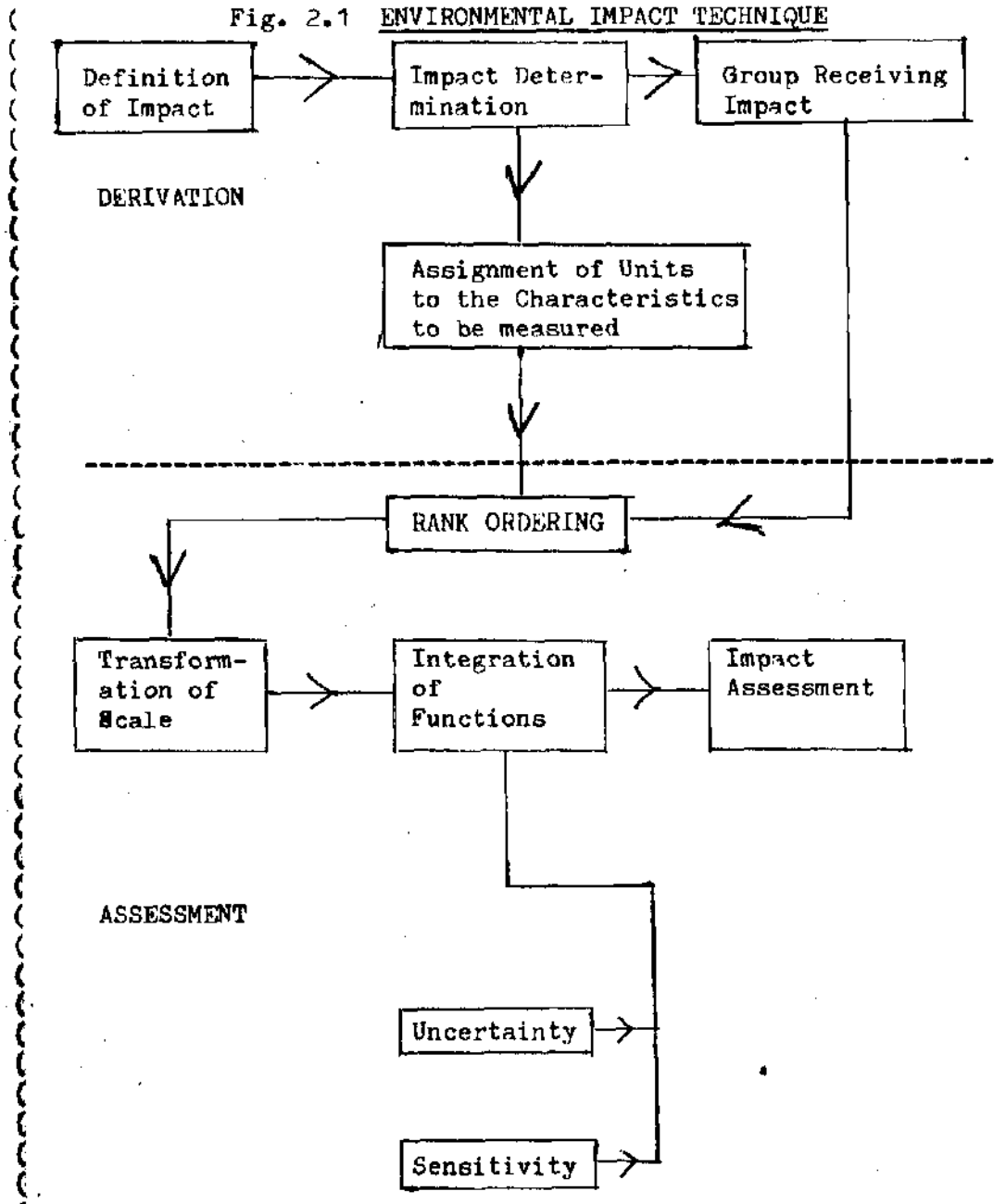
of water for domestic, irrigation or industrial uses, generation of electricity or for the promotion of navigation (Faniran, Akintola and Okechukwu, 1977) The initial dams were generally of this type, as most of them (dams) were constructed only for irrigational purposes.

The multi-purpose dam on the other hand, is constructed to serve a number of purposes. For instance, such dams may be aimed at generating hydro-electric power, promote fishing, enhance irrigation agriculture, promote tourism and control flood in the downstream areas of the dam. This comprehensive approach is a recent strategy to the building of dams in many less developed countries. Some examples of such multi-purpose dams include, the Akosombo Dam of the Volta River Project, the Aswan Dam, the Kariba Dam and Kainji in Nigeria.

It must be mentioned here that, in the multi-purpose dams, if the purposes of the dam construction are all sucessfully implemented, a remarkable development will be noted in the river basin as a whole. If on the other hand, attention is diverted or focussed on only one of the purposes, both foreseen and unforeseen impacts will be created in the immediate environments of the dam or the river basin as a whole. Various attempts have been made on the consideration of such impact assessments, by Canter (1977) Stocks (1977) Munn (1979) Jain, Urban and Stacey (1981) and Golden, Quellette, Sa'ari and Misinoff (1979), etc.

However, the work of Jack, Quellette, Saari and Chene Misinoff (1979) will be used to illustrate the technique of impact studies, indicating all it involves and to serve as background for this work. Their work has been summarized in figure 2.1 below.

Fig. 2.1 ENVIRONMENTAL IMPACT TECHNIQUE



Source: Environmental Impact Data Book by J.Golden, R.P. Quellette, S. Saari and P.W. Cheremisinoff (1979).

As illustrated in the chart the technique has distinguished the studies into two, namely the derivation and assessment categories. In the former, that is, derivation, there are four main stages involved. These are, the definition of the impact, the determination of impact, the impact allocation and the determination of the impact receiving groups. The requirements for each of the stages is discussed below.

2.1.1 Derivation category of the impact study technique

Defination of impact: This stage involves, in the first place, the definition of the events or changes that may create impacts on the environment. Examples of such events could be industrial establishment in an area, dam construction etc.

When this is defined, then the areas of activities on which the impacts may occur are identified and categorized. Along this line, Jain, Urban and Stacey (1981) identified four attributes of the environment, that may reflect the activities on which the impacts may occur. These are water, land, ecology and human aspects. Under water, some of the aspects to be considered include;

i) the variation in the flow of water (maximum discharge) measured in cubic metres per second

ii) the amount of suspended solids carried by the river

iii) the aquatic life

Land on the other hand, embraces aspects like:

i) soil suitability of the area

ii) effect of natural hazards, like floods on the area

iii) land use pattern

iv) drainage pattern

Under ecology, the aspects to be considered include,

i) the fish population

ii) the crops/aquatic plants

iii) natural land-use vegetation

Finally, under human aspects, some of the aspects for consideration include;

i) the human population

ii) distribution of the population

iii) occupation of the population

iv) income and welfare of the population

All these listed environmental attributes differ outstandingly from the environmental impact/changes because it is the changes on the attributes that usually provide an indication of the impact of the project on the environment. That is, it is from these attributes that a model for the prediction of all the impacts of a project can be derived.

After these attributes have been identified, the next step is to determine for each of the classes of events (in the project) the kind of action associated with it, through which impact may occur.

In dam construction a barrier is created along the river to hold back the water in a reservoir. This reservoir behind the dam, create many impacts on the environment up stream of the dam. In the downstream areas on the other hand, the regulation of flow and the consequent change on the river regime, equally enhances some impacts on the physical environment and the economic activities related to the river basin. Some examples of such activities inlude fishing, agriculture, navigation and commerce.

The final step under this stage involves the classification of the actions, matched with the areas of human activities using explicit or implicit criteria. For example, the electricity supply by the dam, will promote industrial development in the immediate environment of the dam and the country as a whole. Also, with the reduction in the suspended solids carried by the river, reduced fishing will be witnessed in the downstream areas, and this will in turn reduce commercial activities.

The next stage in the technique is impact determination. Under this stage, the initial step is to translate the potential impact into a level of concreteness. This can be achieved by specifically establishing the advantages and disadvantages capable of observation. When this is attained, then the kind and level of impact that may be received by different segments of the population engaged in different activities is established, while the specific observable characteristics to be used as a measure of specific impact are also selected.

In the third stage, that is, impact allocation, the population is first segmented into different groups using different distances that are affected differently. For instance, the population in the close vicinity of the dam may constitute one group, while those located far away from the dam constitutes other groups, depending on the magnitude of the impact on them.

After this segmentation the various impacts defined for a given class of events, affecting each of the segments above, is determined. For example, with the construction of the dam and the consequent reduction of the supended solid carried by the river, fishing is bound to decrease in the downstream areas. By using the different populations at different distances, the nature of the decline will illustrate variation from one place to the other.

After carrying out the above stages under derivation category, the next category in the studies is that of assessment. This also has four stages, namely measurement of impact, transformation of scale, rank ordering and impact integration.

2.1.2 ASSESSMENT CATEGORY OF THE IMPACT STUDIES

Measurement of the impact step involves the determination of the units in which the impact is to be measured. This could be in form of per capita income and so on. Also, in the process of determining the units, the method of obtaining the measurement should also be secured, for example, either by survey or expert judgement.

Transformation of Scale:

In the transformation of scale step, the scale to be used as a common parameter for all the measurements is determined. This could be ordinal, cardinal, ratio and interval.

Rank Ordering:

Under rank ordering step, the relative rank of different impacts is derived for all the characteristics to be measured. When this is achieved, then the relative weights to be attached to each of the impacts or population segments is determined.

The Impact Integration:

This stage, more or less a summary of the whole studies, involves the determination of the dimension to be applied, that is, either each of the inputs is to be presented seperately or as a summary with the aid of statistical or graphical methods

Finally, to cross-examine the validity of the result attained from the studies, the result may be compared with the model of changes in the basic parameters or the documentation of similar impacts from alternative sources.

Though this technique is so comprehensive and indicates what impact studies involve, the technique is so detailed that it can only be achieved through the incorporation of scientists from various fields of study. This also explains why experiences from the past impact studies are so limited in scope as shall be highlighted in the following discussions on the impact studies of some selected dams.

2.2.0. IMPACT OF SOME SELECTED DAMS

To complete the review of the impact of dams on their immediate environment, studies on the impact of some dams in their immediate environment, have been selected for discussion. These include, the Aswan Dam, the Akosombo Dam, the Kubanni Dam and Kainji Dam.

2.2.1. ASWAN DAM

Before the construction of this dam, Little (1965) made an assertion that "the problem of Egypt had become apparent all this century. It needs more water to cultivate more land, to feed its growing population and more importantly, to eliminate the country's dependence on annual floods, through storing in the reservoir, more water than is needed in any one year". In view of this precarious situation, summarized in Little's assertion, it was felt that the building of Aswan Dam was the break - through for Egypt. Therefore, having this purpose and that of generating hydro - electricity, the Aswan Dam was constructed.

With the opening of the dam, a reservior, which extends some 560 kms from the dam site in Egypt to Dal-Cataract in Sudan was created. This reservoir, covering the Nubian land, doomed forever, homes and farm lands of 100,000 people. The whole town of Wadi - Halfa, its surrounding villages, the traditions and the penurious living of a hardy and proud people who have clung to the banks of the Nile River from generation to generation all vanished with the reservoir.

In the first place, the objectives of Aswan Dam were to generate electricity for the development of industries, promote irrigation agriculture and enhance navigation and tourism. In the process of operations, the successful implementation of the purposes accounts for why the Aswan Dam is presently considered one of the successful projects in Africa.

2.2.2. THE VOLTA RIVER PROJECT IN GHANA

The idea of Volta River Project was first conceived by Sir Albert Kitson, the Director of Gold Coast Geological Survey by 1915 (Moxon, 1969 page 49). Before developing the idea, Kitson, first discovered bauxite near Mpraeso in Chana in 1914 By 1915, in the course of travelling down the Volta River, Kitson further noted that the river flowed through a gorge in a long range of hills which he conceived as a good site for a dam.

Kitson inter-linked these two discoveries, in that, to produce aluminium from alumina, a lot of electricity is required. Consequently, he felt that the construction of a dam on Volta, could contribute the required electricity to the aluminium smelter.

Kitson made this idea public in London in 1924 at the first world power conference, where he presented a paper titled" the possible sources of power for industrial purposes in the Gold Coast" (British West Africa; Kitson, 1924).

The report generated various other investigations and reports on the Volta River project. Some of the Consultants who participated included, African Aluminmim Syndicate, West Africa Aluminuim Ltd, Unilever (UAC) AICAN and British Aluminuim Company Ltd. (BACO).

After all the investigations and reports, by 1948 to 1949, United Kingdom and the Government of Gold Coast began to have serious intentions of producing aluminuim in Ghana. By February 1962, the Legal and Financial aspect of the Volta River project were settled and work started on the project.

From the foregoing, it is evident that the main objective of the Volta River Project (Akosombo Dam) was the provision of cheap power to the aluminium industry, so as to be able to produce at the rate of 210,000 tons per year for a target of 60 years.

When Akosombo Dam was commissioned, the striking and foreseen impact of the dam was the displacement of 80,000 people in 739 villages by the reservoir, which was about 8,500 sq kms in area and believed to be the largest man-made lake in the world. Some of these people were resettled in 52 settlements, while others resettled themselves elsewhere after receiving compensations from the Government. Unlike other resettlement schemes of similar nature, this attained the most success than other resettlement schemes in Africa as indicated in Volta River Authority Publication (1961). Before the dam, there were only 2,000 fishermen along River Volta. But with the inception of the dam, the number of the fishermen rose to 12,000, while the production rose to as high as 60,000 tonnes in 1969, before falling to 38,000 tonnes as against the 18,000 recommended by the Preparatory Commission of 1956 (Kumi, 1973).

However, being a foreseen impact, a settlement scheme was organised for the displaced, at a site offering better opportunities than their traditional home lands. The site was on a flat scrubland besides Atbara, an area viable for irrigational opportunities. But in the process of resettling the people affected, problems like those of transportation means for evacuating the refugees, misappropriation and mis-management all contributed to the failure of the resettlement scheme.

Another impact of Aswan Dam on its immediate environment is that related to flood. Flooding had been a yearly problem of the downstream areas of Aswan Dam. But with the inception of the dam, the flooding ended in the areas affected. This was very important to the people of Egypt and Little (1965) called for "a feast day to mark the end of the flood".

Since the inception of Aswan Dam, the population of Aswan town has been increasing tremendously. This was caused by the tourists and the employees of the dam and other industries in the area. This growing population does not augur well for the town as the utilities, facilities and services provided will all be overstretched. The resulting social problems can also not be overemphasised,.

Also, the 2,100mw of electricity generated by Aswan Dam enhanced the establishment of many industries around Aswan town. Though the literature has been silent about the impact of the dam on the economy downstream, there is still some lessons to be learnt from the Aswan Dam.

In relating this production to the country's demand, it was also reported that, this total catch was satisfying 20% of the country's total demand while financially, Ghana started making a total revenue of ₵9.5 million, which is comparable to the total revenue from the Akosombo Electricity Generation, which was just ₵ 28 million (VRA Annual Report, 1926).

Kalitsi (1971) also revealed that, with the construction of Akosombo Dam and the consequent Volta Lake created, some roads in the areas of the dam were submerged. The major roads linking Kumasi with Tamale and Yendi, were for instance, severely affected. This in turn, affected the transportation of food crops like yams and groundnuts to Kumasi. However, in overcoming this predicament, two alternative roads were constructed besides the lake as substitutes.

In terms of navigation, after the openning of Akosombo Dam Volta River Authority initiated navigation on the Volta Lake on small - scale basis. By 1970, when Volta lake Transport Corporation took over, they used two cargoes to run the Lake Region. (VRA Annual Reports, 1973)

Another remarkable impact of the Akosombo Dam is that related to irrigation agriculture. Immediately the dam was commissioned, 40,000 acres of the Accra plains, south of the dam site was put into large scale cultivation using directly the waters of the Volta Lake through the gravity irrigation methods. The main crops cultivated here included rice and sugar cane.

Health was another aspect affected with construction of Akosombo Dam. Before the dam, and the lake, the level of infection in terms of urinary schistosomoasis was just about 1 - 5% . With the opening of the dam, the level of infection increased to 40 - 50% in the upstream of the dam, and 80 - 90% in the downstream areas (Ansari, 1973).

One other disease common along the eastern side of the Lake where tributaries feed into the lake is onchocerciasis. Since the openning of the dam, this disease equally became rampant in the areas of the lake.

From the foregoing, it is evident that the Volta River Project is a typical example of a comprehensive approach to river basin development. Kalitsi (1971) commenting along the same direction, stated that "the Volta Project is the most adventurous event in the life of Ghana. Its construction was the boldest step taken by Ghana to diversify her economy and underpin the newly independent country's industrial development. It was conceived to develop the total resources of a river, which runs into the heart of a small country for the benefit of not only its riverine dwellers but the entire population".

"Nevertheless, implementation concentrated on power as the direct economic objective and important work to achieve socio-economic objectives and ensure desirable biological conditions were left in abeyance resulting in problems more difficult to solve than would have been the case"
(Kalitsi, 1971)

2.2.3. KUBANNI DAM IN NIGERIA

The Kubanni Dam, built across River Kubanni was first mooted by the Eatate Department of ABU Zaria in 1970. This was in an attempt to satisfy the rapidly increasing water demand of the main Campus, Samaru, Zaria. Consequently, Engineering Consultants were commissioned to design the dam, recommending its water intake, treatment and distribution.

After the reports prepared by the Consultants, Kubanni Dam with a reservoir covering 80.90 ha and a strong capacity of 2.4 million cubic metres and a catchment area of 35 sq kms was constructed.

Though this dam is relatively small in capacity when compared to the large - scale dams, it still created some impacts on its immediate environment and the people who have traditionally used the physical resources of the basin.

In the downstream for instance, with the inception of the dam, and the consequent regulation of flow the small trickle of water which persist throughout the year became source of water for vegetable cultivation in the dry season, using the shaduf irrigation method. The Fulani and their cattle also depended on this water especially in the dry season.

Another implication of the dam is that, according to the design, there was no provision for the release of water downstream in the dry season. Assuming this design holds, the irrigation cultivation and the use of water by the nomadic Fulani would have been practically impossible.

In the upstream areas on the other hand, the prevailing problems associated with the construction of the dam are those of soil erosion in the catchment areas of the dam, and a high rate of sediment yield. These problems are further intensified by the grazing of the areas by cattle. After weighing this and other similar negative impacts, Ologe, 1973 (P.78) stated that, "if we are to learn by the mistakes made in the economically advanced countries, before people became aware of the need for conservation of the environment, we must learn to think in terms of integrated planning for drainage basin development, so that we can utilize our resources more fully without destroying the environment in the process".

2.2.4. KAINJI DAM IN NIGERIA

The multi - purpose Kainji Dam, built at a cost of ₦174 million was primarily to bring some positive impacts on the economic and social life of the nation as a whole and the Niger River Valley in particular. To achieve this goal, some objectives set for the Niger Dam Authority in charge of the dam included

a) generation of 960 mw of electricity which was anticipated to satisfy the country's demand till 1980;

b) developing a commercial waterway at both national and international levels on River Niger;

c) provide alternative crossing of River Niger especially for the Nomadic Fulani and their cattle, who were then, causing traffic hold ups at the then single track railway bridge at Jebba.

d) promoting fishing on the Kainji Lake at an estimated tonnage of 10,000, involving 2,500 fishermen.

e) Finally enhancing irrigation agriculture on the flood plains and tourism (Adeniyi, 1975. P.233-234)

With these set objectives, Kainji Dam was commissioned on the 15th of February, 1969. Some of the achievements of the dam since inception include.

a.) a two - fold increase in the generation of electricity, adequate for overcoming the theoretical inadequate power for Nigeria's industries and private consumers till the 1980s, in addition to the supply to the neighbouring countries.

It is however not enough to have enough electricity generating capacity but there must be an extensive and adequate transimission. To achieve this, the Federal Government promulgated a Decree, merging Niger Dams Authority and Electricity Corporation of Nigeria into the present National Electric Power Authority. This decree which came into effect from 1st April 1972, stipulated that, NEPA is to develop and maintain an efficient, co-ordinated and economical system of electricity for all parts of Nigeria.

b.) accessibility to the sea from the inland port of Yelwa through the ports of Warri, Sapele, Burutu and Koko. River Niger actually became a commercial waterway on national and international standards. Navigation became possible for most parts of the year from Excravos Light House to Niamey in Niger Republic.

To ensure a normal flow of traffic in the dam area a 2km canal was constructed on the left bank of River Niger with two locks, that is, gates for controlling water level and allowing vessels to pass through. This improvement in the river communication with the dam construction, is a positive proof of Nigeria's readiness not only to develop her resources but to eliminate a major obstacle to social, commercial and industrial progress, namely lack of adequate communication system.

Under transportation too, the crest of the dam provided an alternative route for the Nomadic Fulani and their cattle formerly creating heavy go-slow on the Jebba Bridge. It was also an opportunity for the cattle to bye-pass the tesetsefly infected areas of Jebba.

c) In terms of tourism, the location of Kainji Dam which gives it an excellent panoramic view, in addition to Kainji Hotel, and the great wild life attraction in the nearby Borgu Game Reserve all became aspects of tourism development in the area.

d) with the completion of the dam, a full flood control was obtained in Niger valley as far down-stream as the Kaduna River confluence, while partial flood control was obtained in the stretch of the valley from Kaduna River Confluence to Lokoja.

With this control a high supply of vital agricultural resource, that is, water, was realized. This aided the irrigation projects like the Nigerian Sugar Company as it could irrigate its plantations at any time of the year.

Inspite of these successes, the construction of Kainji Dam still created some problems on the immediate environment. In the first place, Kainji Lake displaced 44,000 people living in 203 villages and in the towns of Yelwa, headquarters of Yauri Emirate and Bussa, headquarters of Borgu Emirate. The people were resettled in 139 new villages and in the two towns of Yelwa and New Bussa (see fig. 2.2.) Owing to the problems of lack of public participation, ineffective and inefficient management, and those of socio-economic and socio-cultural, the resettlement exercise attained little or no success.

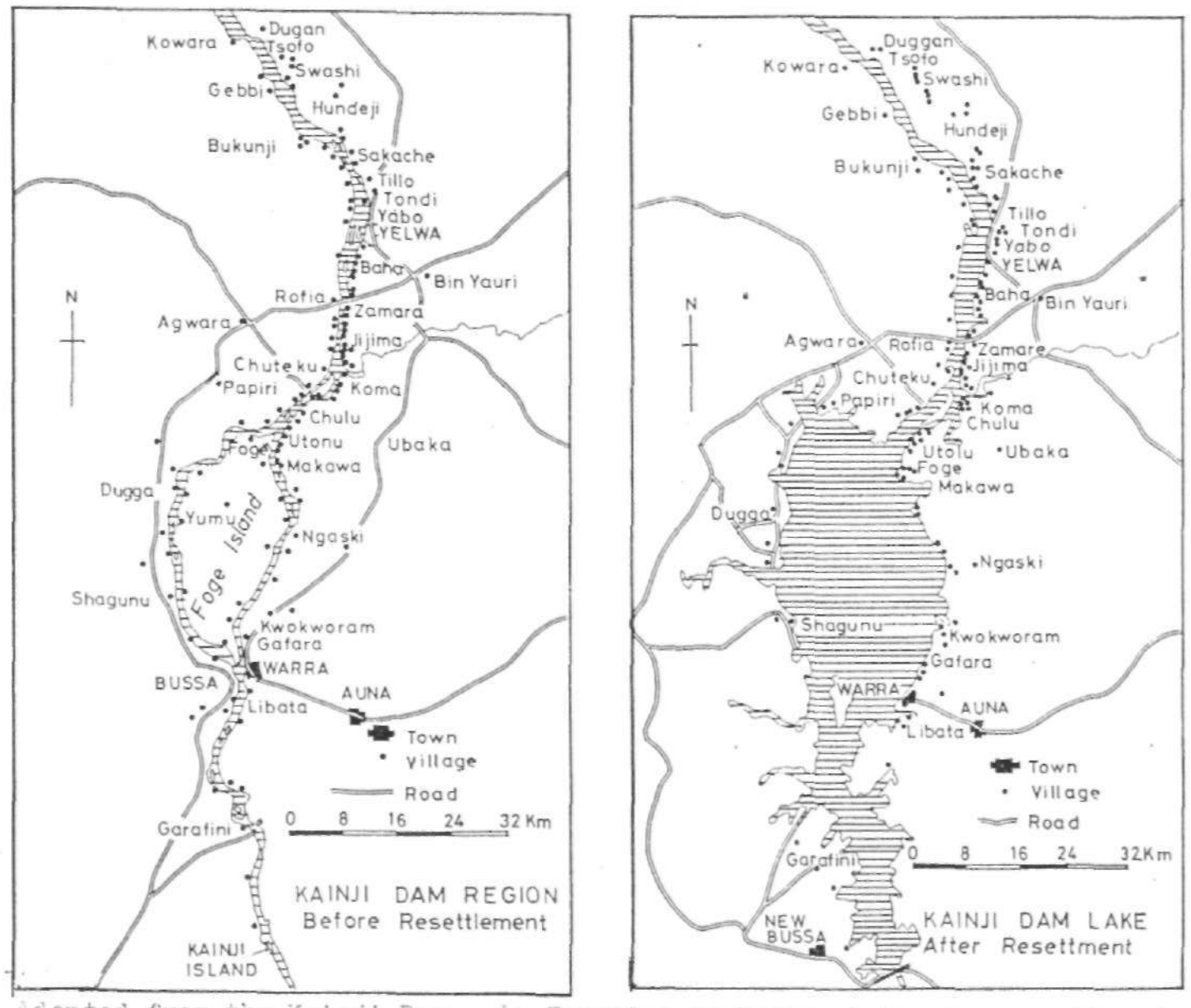
Another problem was that, rather than the flood control to reduce the flooding of fadamalands, and expand agriculture downstream, Adeniyi (1979) observed that it led to a decline in the cultivable fadamalands reflected in both the acreage cultivated and the yields as indicated in table 2.1 below

Table 2.1 DECREASE IN FADAMA CULTIVATED FOLLOWING CHANCE IN THE RIVER REGIME

SETTLEMENTS	Approx.Acreage cultivated 1967/68	Approx. Acreage cultivated 1968/69	Lost Acreage	% Loss
Rabba	500	150	350	70.0
Muregi	2700	1500	1200	14.4
Katsa	1600	750	850	53.13

Source: Adopted from Adeniyi (1970) Table 1 Page 178.

Fig. 2.2 The Resettlement in Kainji Lake Region.



Adopted from the Kainji Dam. An Exercise in Regional Development Planning Reprint Series No 101. NISER IBADAN.

The next problem created with the construction of Kainji Dam is that relating to fishing. From the planning stage the potentialities of Kainji Dam in fishery production was identified. In view of that, Niger Dams Authority spent about £1 million on clearing 100,000 acres of bush in the inundation area to remove any obstacle to future fishing. The estimated fishery potential was an annual yield of 10,000 tons of fish per annum, and by Kariba's experience, this was to support on full-time basis, 2,500 fishermen of the area.

However, few months after the filling of the lake (Kainji) shortages started being experienced in the markets of the Emirates bounding the lake. This development is not unrelated to the new river regime created, to which the former methods of fishing on the river and the social organisation tied to it, may not be appropriate.

The reduction in the quantity of fish catch was also not restricted to the dam areas alone, but extended to places far downstream. At Jebba for instance the 1969 field survey by Adeniyi (1970) revealed that fish catch decreased by 75%, just like the landing of fish catch reduced considerably from 19.6 tons to 17.2 tons in 1968 and 12.2 tons in 1969.

Finally, as the industrial developments continued to expand in Nigeria, the 3.5 million kilowatt - hours of electricity generated by NEPA from Kainji Dam, became unreliable with characteristic problems of low voltage, and incessant power cuts (Oguntoyinbo, 1978).

Consequently, work was started by 1977 on the construction of Jebba Dam (500 mw in capacity) and completed in 1983 before commissioned in 1984.

Unlike Kainji Dam, which was a multi-purpose dam, Jebba Dam was constructed mainly for the generation of electricity. Other objectives like fishing, navigation, agriculture, etc, were overlooked. So, since the inception of Jebba Dam various impacts have been created particularly in the downstream especially on those overlooked objectives. It is within this framework that this work intends to examine the impacts of Jebba Dam on the downstream, with special attention to the spatial organisation and the economic activities of the areas. Before this, the next chapter will discuss the study area, considering the physical and economic characteristics prior to Jebba Dam construction.

CHAPTER THREE

THE ECONOMIC AND PHYSICAL CHARACTERISTICS OF THE STUDY AREA, PRIOR TO THE CONSTRUCTION OF JEBBA DAM

3.1.0. LOCATION

The study area, which covers about 800 sq kms stretches over the South in plain of River Niger from Jebba to Shonga, in Edu Local Government Area of Kwara State. It lies between latitude 8°50' and 9°05' North and longitude 4°50' and 5°25' East. It is 100 kms north-east of Ilorin, the State Capital, and some 40 kms north-west of Lafiagi, the Local Government Headquarter.

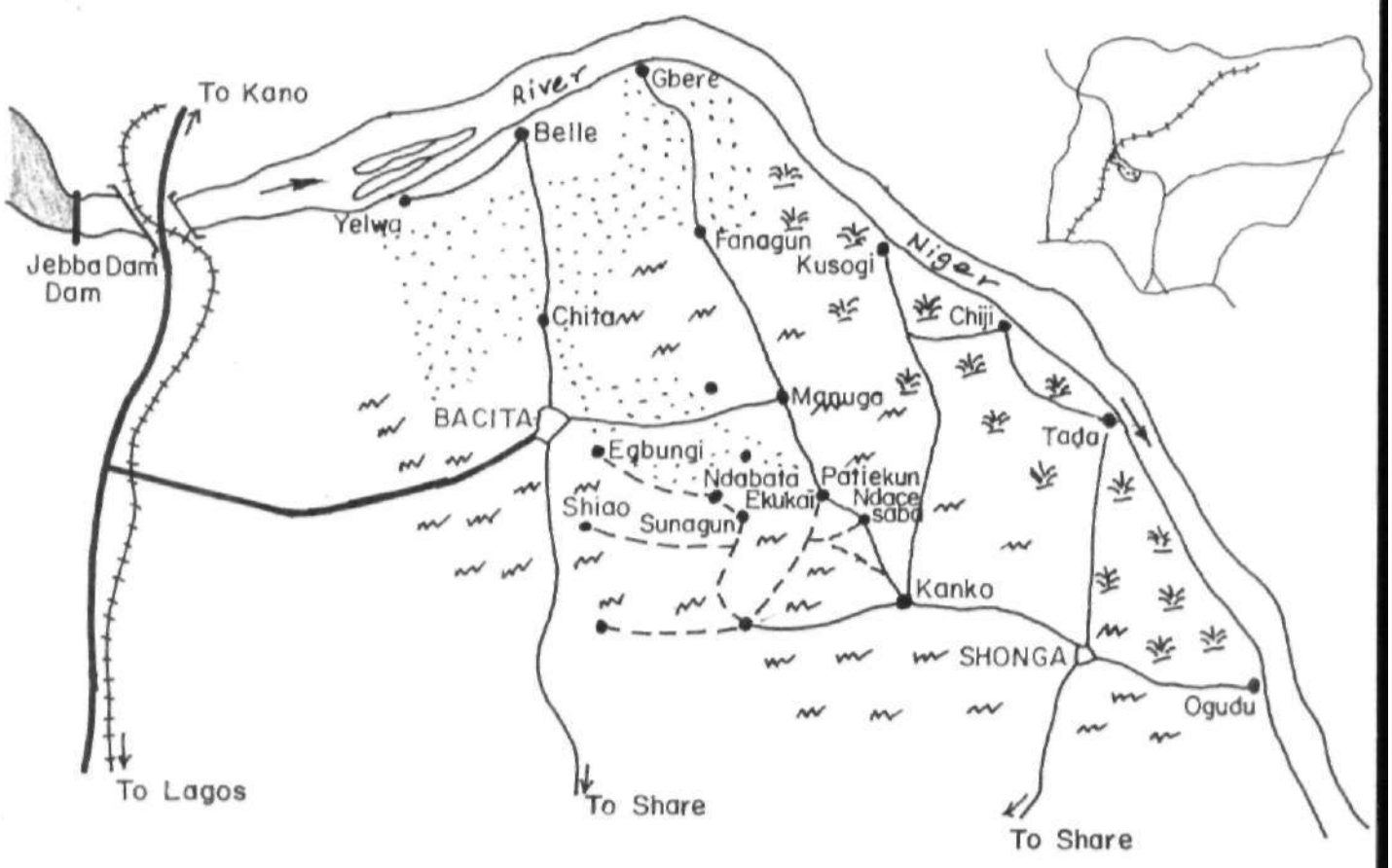
(Fig. 3.1)

The area is located within the (central middle belt of Nigeria which is largely backward in development when compared with the Northern and Southern parts of Nigeria. In recent times however, this area has become a scene of large-scale, capital intensive agro-based projects, like the Pioneer Sugar Company at Bacita, Niger River Basin Development Project at Shonga, and Kwara Agric Development Project which covers the area as a whole.

3.2.0. TOPOGRAPHY

The topography of the study area can be divided into two sections. In the area upstream of Jebba, especially where the dam is located, Niger valley lies within a narrow gorge, bounded by quartzitic vertical walls.

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LEGEND

- Central Town
- Villages
- Sugar Plantation
- Areas Under Upland Agriculture
- Fadama Land With Rice Plantation
- Roads
- Main Path
- Foot Path
- Railways
- Rivers

SCALE — 1: 200,000

N

FIG. 3·1
THE STUDY AREA

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immediately below Jebba town, the character of the valley changes significantly, as the width of the valley becomes wider with extensive swampy floodplain on both banks (Fig.3.1). These swampy plains have become the area of large scale agro-based industries.

At Shonga, however, the extension of the Gulufu Hills into the floodplain, has narrowed the floodplain which in turn has reduced the fadamaland in the area as shown in Fig. 3.1.

3.3.0. SOILS

Generally, the fertility or quality of any soil is determined by the climate, parent material and the topography of the area. In confirmation of this statement, in the areas above Jebba town which is characterized by pre-cambrian and cambrian formations, subjected to post formational tectonic movements, the soils are mainly of medium grained quartizitic sands yet fully ripened. They are still in the hydromorphic conditions (Arugbemi, 1983). In view of this, fadamaland is relatively scarce in the area.

In the areas downstream of Jebba on the other hand, the extensive floodplains are characterized by loamy and clay sediments, deposited by the annual flooding of the plains in the past. These soils, also known as Niger alluvium (Arugbemi, 1983) has a depth of about 2.3 metres and are humus in fertility at moderate or low levels. Consequently, when these soils are used for some years the fertility disappears completely. Therefore, the application of fertilizer must always go hand in hand with the cultivation of the area.

3.4.0. CLIMATE

The study area belongs to the continental type of Koppen's climatic zones (Olajide, 1974). It is influenced by two major wind systems, that is, the rain bearing S.W. Monsoon from the Atlantic ocean (also called the Tropical Maritime) and the dry dusty north east trade wind, otherwise known as the Tropical Continental (Harmattan).

The Tropical Maritime airmasses prevail over the area from late March to early October. During this period most of the precipitation in the study area is received. The mean annual rainfall in the study area is 1150 (MIC. VOL. 1, 1977) Table 3.1.

Table 3.1. RAINFALL AUTHORITY FOR JEBBA DAM AND ITS ENVIRONMENT IN (mm)

YEAR	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT
1984	450	630	1200	2950	1000	2000	2900	430
1985	370	380	2150	1630	2670	3400	3880	280
1986	70	540	720	2560	1060	1810	7020	610
1987	340	60	880	730	1050	2050	1720	630
1988	30	590	1240	1900	1970	1000	2270	560
1989	230	1270	1300	2150	1640	1640	1640	1400
1990	-	1500	1360	1220	2180	1530	2810	840

Source: Jebba Dam Hydrological Office.

Within the months of October - March, the area goes under the influence of the dessicating, continental dry winds known as Harmattan . This wind is characterized by cold and dry spells which enhances the dry season in the area. The hottest months in the study area are March and April, but in the rainy season, there is always a cooling effect on the area. On the average, the maximum temperature of the study area is about 85° F.

3.5.0. DEMOGRAPHY

The study area has a total population of about 46,800 as shown in Appendix II 80% of whom are Nupes. The other percentages are tribal groups like Pangwas, Yorubas, and the Hausa - Fulani. The presence of these tribal groups in the study area is related to the migration from different parts of Nigeria into the area since the last century (Udo, 1970).

With this population figure, the area has a population density of about 40 person per square kilometre, a situation peculiar to the middlebelt of Nigeria as whole. This low density is attributable to the post endemic and wide spread of diseases, as well as high infant mortality (Udo, 1970). Buchanan and Pugh (1969) in explaining the low density of population, identified the social factors which were less favourable when compared to the the Yoruba and Hausa lands. The 19th century Fulani raid and wanton destruction of life and property in the middle-belt as a whole, Buchanan and Pugh (1969) also explain as the reasons behind the low density.

3.5.1 SETTLEMENT PATTERN

The settlement pattern of the study area is a mixture of the nucleated and dispersed types. Before 1983, Bocita and Shonga, were the nucleated settlements in the study area. They comparatively had higher populations with some utilities, facilities and services as indicated in table 3.2 below.

Table 3.2. HIERARCHY OF SETTLEMENTS IN THE STUDY AREA

BEFORE 1983

ORDER	SETTLEMENTS	POPULATION	AVAILABLE U.P.S.
1	Bocita	15,000	Primary and Secondary schools, Hospitals, clinics, industries, Police station, Regional Market. Available electricity and water.
2	Shonga	3,788	Primary school, Rest House, Regional Market. NAEDA Office.
3	Ogudu, Jebba North and Tada	1,400 1900	Primary schools
4	Yelwa, Bello, Chiji Panagun, Kanko, Monuga Chita, Gbere, Kusogi, Patickun, Ndabata, Ndoccaba Asukolo Gbasun	Below 1000	-

Source: 1991, Field survey.

Source: 1991 survey

Surrounding Pacita and Ohonga are hamlets and fishing camps usually at a radius of about 9 - 10 kms (Udo, 1970). Apart from these settlements, there were vast uninhabited areas upon which the industrial developments in the area had capitalized to expand their establishments without any difficulties.

Pacita, which is the largest settlement in the study area, is inhabited mostly by the 5,500 employees of the Nigerian Sugar Company and their familes. Ohonga which is the next populated town is inhabited mainly by indigenes most of who engage in farming and fishing.

In the hamlets and fishing camps are found the immigrants from other parts of northern Nigeria notably Yelwa, Kano and Sokoto. Just like the relationship between the Yoruba town and its farmland, in the cocoa belt, these hamlets and fishing camps, were founded by the inhabitants of the nucleated settlements in search of "greener pastures" before the settling of the migrants (Udo, 1970).

These hamlets and fishing camps, according to Padwin (1957), were rarely permanent and "with no social life of their own, no markets, no political organisation .. and even celebrates its feasts and ceremonies with the mother village".

3.5.2. TRANSPORTATION NETWORK

Before the construction of Jebba Dam, the annual flooding of the floodplains did not encourage the construction of roads in the study area. Consequently, the only secondary road in the area, was that which linked Pacita with the main road from Lagos to Kano. Other roads are the all-weather and seasonal types as illustrated in Table 3.3.below

Table 3.3.

ROADS IN THE STUDY AREA

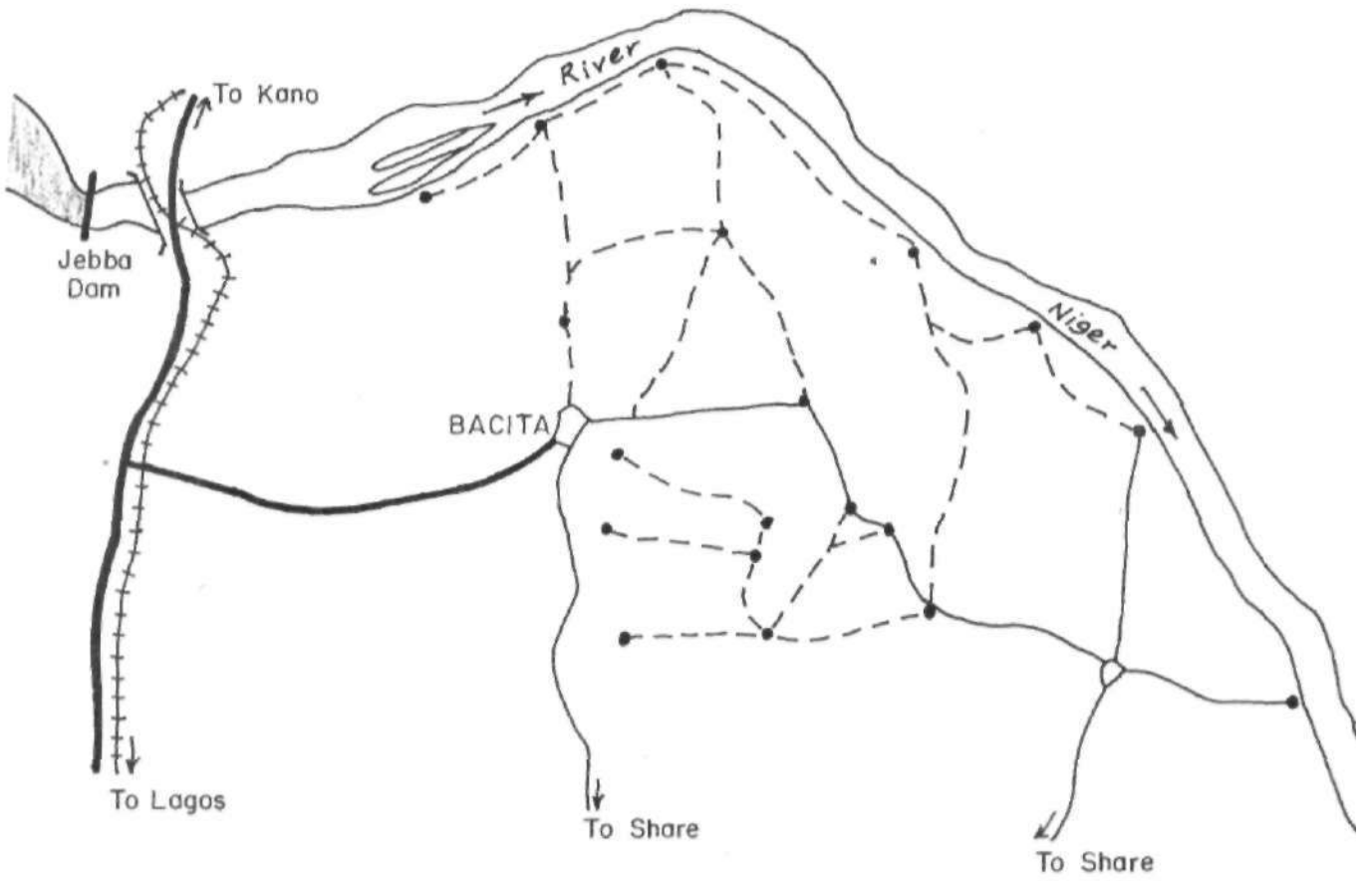
	ROAD	DISTANCE (kms)	REMARK
1	Pacita-main road	7	Tarred
2	Pacita-shore	40	all-weather
3	Shonga-shore	60	all-weather
4	Shonga-Ogudu	12	Seasonal
5	Pacita-manuga-shonga		Seasonal

Source: Base maps of the Area before 1983.

Apart from these roads, there were many foot paths linking the hamlets, and the hamlets to the towns (fig.3.2.). This of course, illustrates the poor accessibility in the study area before the dam.

3.5.3. DISTRIBUTION OF UTILITIES, FACILITIES AND SERVICES

As earlier mentioned before 1983 Pacita was the largest town in the study area. It had some utilities, facilities and services, provided by the Company for the comfort of its employees.



LEGEND

- Roads
- Main Paths
- Foot Paths
- Railways
- Rivers
- Villages
- Central Town

SCALE:— 1:200,000

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FIG. 3·2
TRANSPORTATION NETWORK OF THE STUDY AREA BEFORE 1983

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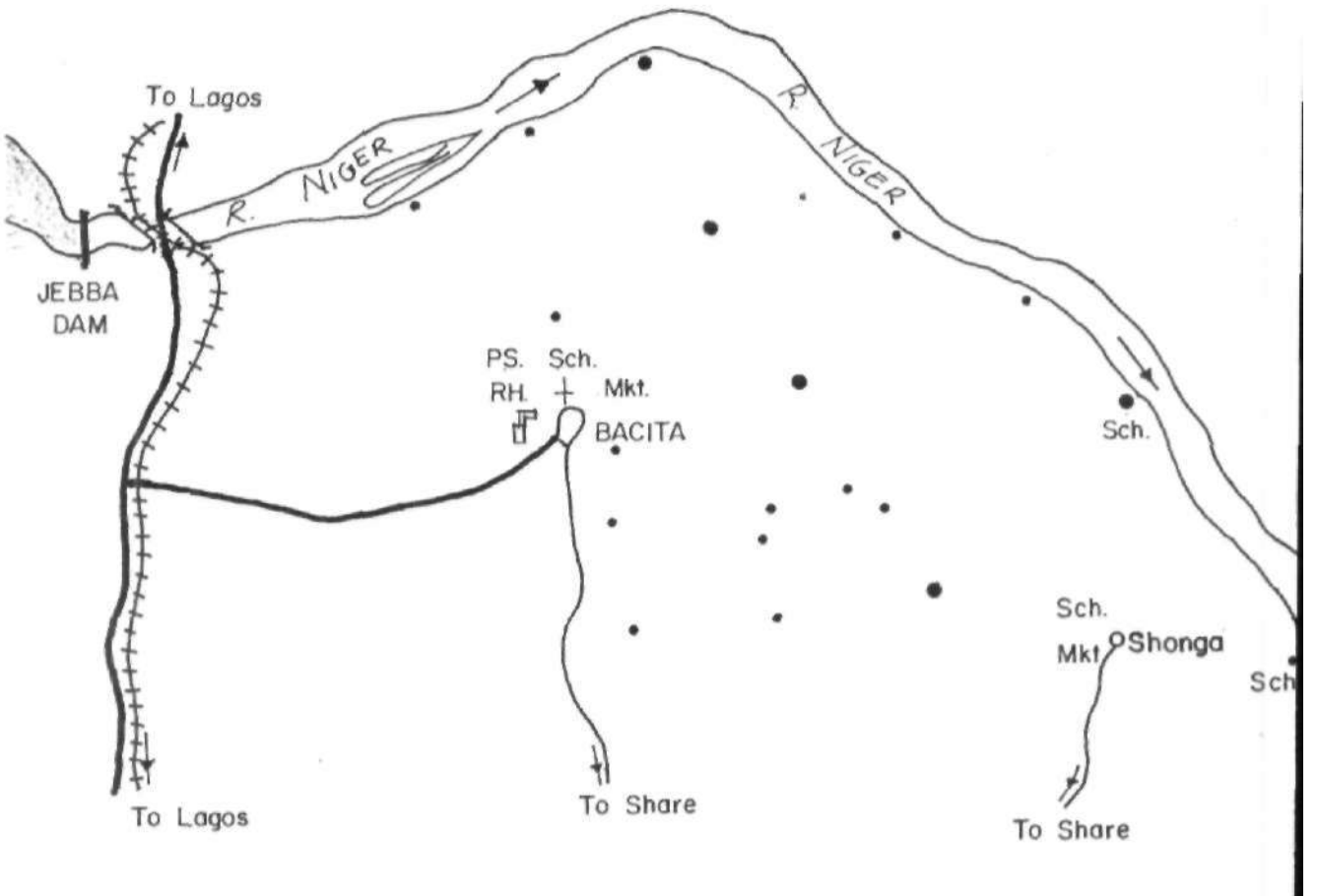
Shonga which was next in the hierarchy had few services, enjoyed by its own inhabitants and the nearby settlements. (See Table 3.2). Other settlements except for Ogudu, Jebba North and Tada, that had primary schools, in view of their inaccessibility and their small population sizes had none of these utilities, facilities and services (see fig.3.3.).

3.5.4. LAND-USE PATTERN

The land-use pattern in the study area is classified into three categories as can be seen in fig. 3.4. That is, the areas under sugar cane plantation, the areas put under agriculture, and finally the areas liable to flood annually.

For an agro-based industry, like the Nigerian Sugar Company, much land is required for the cultivation of sugar cane. Consequently, since the inception of the Company, a total land area of 7,500 ha. was acquired around Bacita for the growth of sugar cane. This land, which accounts for 10% of the total land area uptill the present time has only 58% of it put under sugar cane cultivation.

The areas put under agriculture can be categorized into two depending on the nature of production. In the areas of Shonga-Tada, the available flood-plains is successfully utilized for rice cultivation and dry season vegetable gardening. This cultivation is embarked upon by the individual farmers, and the Niger River Basin Development Authority, that came into the scene in 1978/79. Though the total land under this cultivation is about 32,000 ha, (that is 40% of the total land area), the success of the cultivation depends on the rate of fertilizer input to the land.



LEGEND

Sch.....School

RH.....Rest House

Mkt.....Market

PS.....Police Station

+.....Hospital

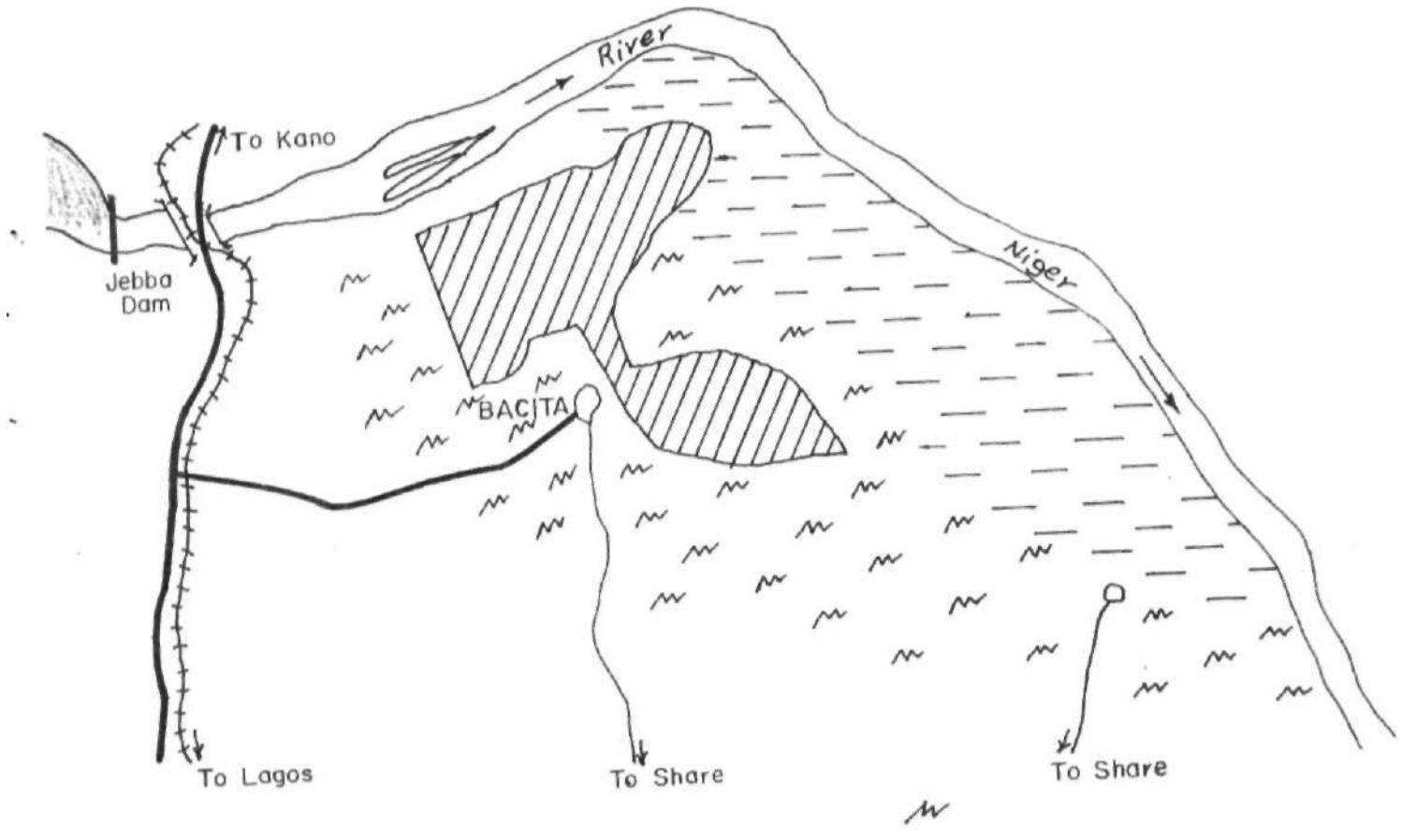
.....Industry

SCALE:— 1: 200,000

N

FIG. 3·3
DISTRIBUTION OF UTILITIES, FACILITIES AND SERVICE
BEFORE 1983

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LEGEND

- Sugar Cane Plantation
- Area Liable To Flood
- Areas Under Upland Agriculture
- Roads
- Main Paths
- Railways
- Central Town
- Rivers

SCALE:- 1:200,000

N

FIG. 3·4
THE LAND-USE PATTERN BEFORE 1983

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The other areas put under subsistence agriculture, which account for 19% of the total land area, are the uplands of the study area. These areas, notably located close to the settlemets, are cultivated in the months of March to November after which they (land) lie fallow till the following rainy season. Some of the crops grown on the land include maize, corn, yams, cassava, and so on.

Located close to the banks of River Niger and stretching from Bello down to Shonga are areas that are annually liable to flood, in the rainy season. Though the areas affected cover about 31% of the study area, the area is hardly put under cultivation. The table below, summarizes the various land uses, their area of coverage and the percentage of the total land area.

Table 3.4. LAND-USE PATTERN IN THE STUDY AREA BEFORE JEBBA DAM

LAND-USE	AREA COVERED (HA)	% OF THE TOTAL LAND
1 Agricultural land		
a. Upland farming	15,500	19.0
b. Rice plantation	32,000	40.0
2. Sugar cane plantation	7,500	10.0
3. Areas hable to flood	25,000	31.0
Total Land Area	80,000	100.00

Source: Base maps of the study area

3.6.0. ECONOMIC ACTIVITIES OF THE STUDY AREA

3.6.1. OCCUPATIONAL PATTERN/INCOME

Fishing has been the main occupation of the people in the study area, with only a few engaged in other occupations as shown in Table 3.5 below.

Table 3.5. MAIN OCCUPATION OF THE STUDY AREA BEFORE 1983 (n = 220)

	OCCUPATION	NO. INVOLVED	% OF THE SAMPLED POPULATION
1	Fishing	149	67.7
2	Farming	26	11.8
3	Trading	9	4.0
4	Crafts	19	8.6
5	"Others"	17	7.9
	Total	220	100.0

Source: Field survey, 1991

The intensive fishing period then was from September ending to April, the period during which, the floods resulting from local rainfalls must have subsided. Simultaneously, the black floods from Timbuctu arrive in the area by January, and though this floods do not necessarily raise the level of the river flow, it enhances a higher rate of evaporation which in turn creates lakes and ponds on the river valley and floodplains. These ponds and lakes aid in trapping the fishes for the fishermen. With these advantages, a fisherman then, realized about ₦10 - 15,000 per annum, as shown in table 3.6.

Other occupation in the study area before the construction of Jebba Dam included farming, trading, crafts, and other occupations.

As mentioned earliar on, only few people, that is 11.8% were engaged in farming before the opening of Jebba Dam. This was done on subsistence level, though sometimes, little of the crops are sold to raise money for solving other fundamental problems (Table 3.6).

Trading was another occupation of the inhabitants of the study area before the opening of Jebba Dam. This engaged about 4% of the population, and these were mainly immigrants like the Yoruba and Hausa who traded in basic commodities. Because of the limited capital involvement, such traders realized an income of only between ₦1000 - 1,2000 per annum (Table 3.6.).

Crafts which was another notable occupation engaged about 9% of the population. These people (in crafts) produced the basic needs of the society like mats, local fans, hats, etc. And because these crafts were sold at give away prices, the average annual income realized by the group was only between ₦500 - ₦560.00 per annum.

The last occupation in the study area before Jebba Dam, termed "others", was realized from the survey to imply civil service. This engaged 7.9% of the sampled population, and due to the low educational background, the average annual income for the group was between ₦500.00 - ₦760.00.

Table 3.6. AVERAGE ANNUAL INCOME BY OCCUPATIONS BEFORE JEBBA DAM CONSTRUCTION

OCCUPATION	INCOME (₦)
Fishing	10-15,000.00
Farming	3,712.00
Trading	1,200.00
Crafts	560.00
Others	760.00

Source: Field survey, 1991 and Adeniyi, 1970.

The nature of income distribution in the study area is summarized below in Table 3.7.

Table 3.7 NATURE OF INCOME DISTRIBUTION IN THE STUDY AREA BEFORE JEBBA DAM

	INCOME	NO OF PEOPLE	% OF SAMPLED POPULATION
1	Very poor (less than 150.	76	34.5
2	Poor (₦150-₦250)	56	25.5
3	Middle class (₦250-₦500)	66	30.0
4	High income (above ₦500)	22	10.0
	Total	220	100.0

Source: Field survey, 1991

The above income distribution, indicates that, 60% of the sampled population, were in the very poor and poor categories, while the remaining 40% are in the middle and high income classes. This pattern of distribution clearly indicates that the area was then economically backward before Jebba Dam construction.

This is due to the physical characteristics of the area, which renders little opportunities for economic activieies.

3.6.2. INDUSTRIAL DEVELOPMENT: THE NIGERIAN SUGAR COMPANY LTD BACITA

Historically, the idea of a Sugar Company came about in 1956, when the Federal Government felt it should possess a sugar industry of its own. In persuance of this objective, Bookers McConell Ltd, a British Sugar Manufacturing Company was commissioned to carry out a survey after which they ultimately selected Bacita as the most suitable location.

By 1959, again the Federal Government appointed the Nigerian Sugar Company syndicate to further carryout investigations on the area selected which is surrounding a small town called Bacita located on Latitude 90^{o}N and longitude 5^{o}E. In the reports of the syndicate, they recommended that the company be established at Bacita and so the company was incorporated on the 27th of October, 1961.

The sugar factory started operation in 1963 under the management of Bookers (Nigeria) Ltd, a subsidiary of Bookers McConell Limited of Britain. They managed the company from 1963 to 1973 when Nigerians assumed full responsibility of the management.

Productionwise, the factory was expected to handle 2,000 tonnes of sugar cane every day thereby producing 35,000 tonnes of white sugar annually.

To meet this target, the company acquired ar area of about 7,500 hectares of cultivable land, out of which 58% has been used so far.

Sugarcane, being a tropical crop, is grown predominantly between latitudes 30°N and 30°S, where the temperature requirements of between 18° - 30°C are met. Furtermore, sugar cane requires between 1,500 - 2,500 mm of rainfall per annum for its growth (Doorenbos et al, 1979). But in Bacita, just like in all other sugar cane growing areas, there was the problem of limited seasonal rainfall as Bacita has an average annual rainfall 1,036 mm. Under this situation therefore, the growing of sugar cane in the area requires supplementary irrigation especially in the months of November - March, a period the Managing Director (1991) identified as a critical period of vegetative growth and stem elongation stage in sugar cane.

The only source of water for this irrigation exercise is River Niger, and since the inception of the company, water has been drawn from River Niger for the irrigation of the sugar plantation by gravitation and overhead irrigation systems (see fig. 3.5).

It must, however, be mentioned here that for water to flow through the canal to the pump house, the regime of River Niger must be higher than the level of the canal to allow the water flow by gravitational force.

If on the other hand, the regime is lower than the level of the canal, the flow of water into the pump house becomes practically impossible. Instances of this nature started being experienced since the opening of Kainji Dam. The opening of Jebba Dam will definately creat some impact on the irrigation system of the Nigerian Sugar Company as dissussed in the next chapter.

CHAPTER FOUR

THE SPATIO-ECONOMIC IMPACTS OF JEBBA DAM AND RELATED DEVELOPMENTS ON THE STUDY AREA

4.1.0. INTRODUCTION

This chapter identifies and assesses the spatio-economic impacts of Jebba Dam on the study area. It begins with a discussion of the trend of developments in the area, prior to the dam construction. This provides the required background information on the study area for an effective identification and assessment of the project impacts.

4.2.0. PRE-PROJECT CHARACTERISTICS OF THE STUDY AREA

As mentioned in section 3.1.0. the study area covers the two districts of Sharagi and Shonga in Edu Local Government Area formerly, Lafiagi/Patigi Division of Kwara State. The headquarters are at Sharagi and Shonga respectively, with the latter located within the study area.

Shonga became a district headquarters since the Colonial Administration, and so just like the other District Headquarters in the Division namely, Lafiagi, Lade, Patigi and Kpada, it became accessible through an all-weather road, which is still the main access to the town and the area. The other access to Shonga, especially from the neighbouring settlements in Niger State, was through River Niger and Tada as shown in fig.4.1. below.

In view of its status, as a District Headquarters, Shonga became the most populous town in the area. This in return, attracted some developments to the town. As early as the Colonial Administration, for instance Shonga already had a Rest House, specially for the accomodation of the District Officer, who visits the district from time to time for administrative reasons.

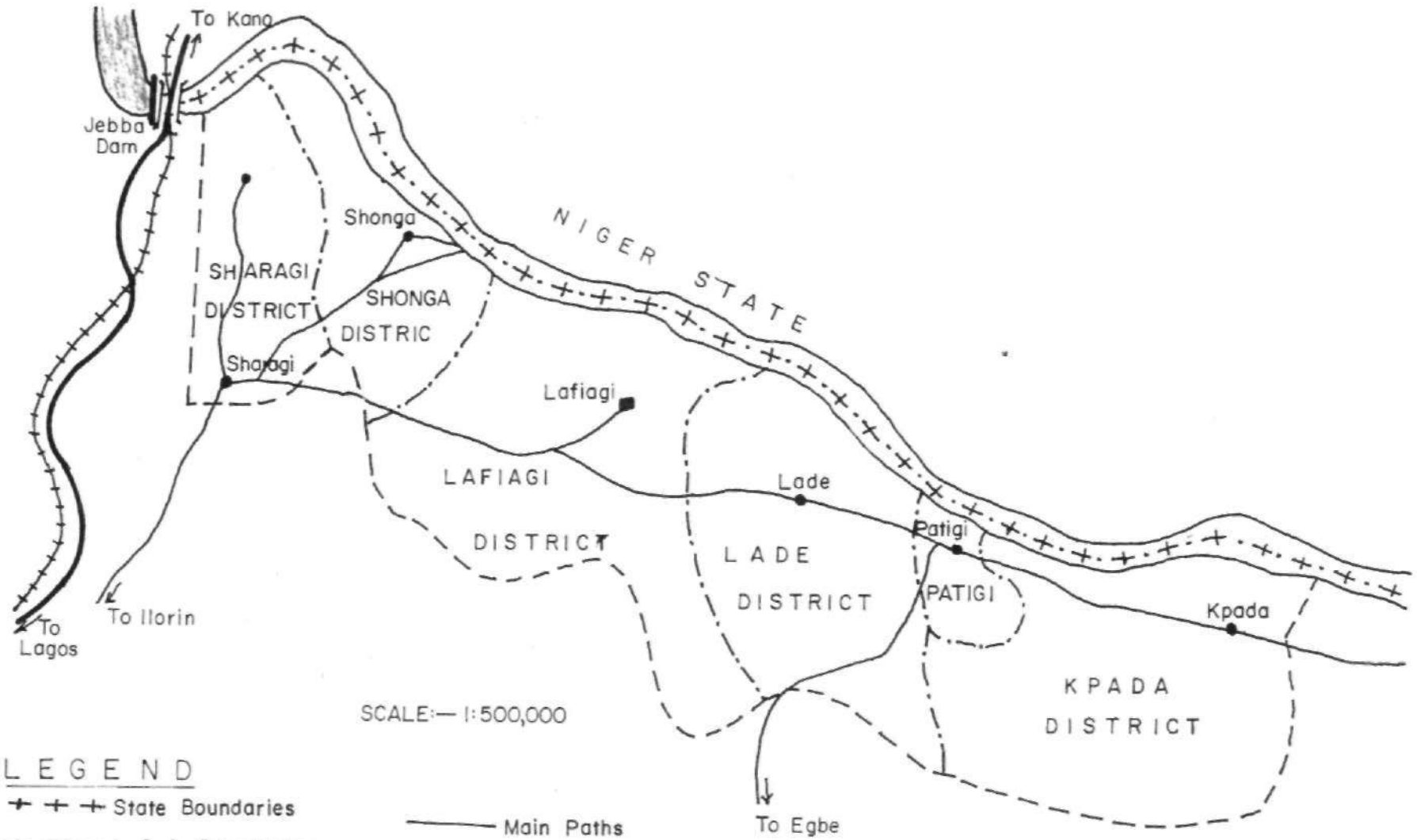


FIG. 4·1
THE DISTRICTS IN EDU LOCAL GOVERNMENT AREA OF KWARA STATE.

This Rest House, still exists in Shonga though more of an historic monument.

As a District Headquarters, a primary school was opened at Shonga to serve the town and the district as a whole as early as 1965. With the creation of states in 1967, two more primary schools were established at Tada and Ogudu, the next populous towns around shonga.

In terms of agriculture, the state's Ministry of Agriculture and Natural Resources opened an Agricultural Extension Office at Shonga. This office was charged with the responsibility of assisting the farmers through agricultural extension and through the establishment of pilot farms to serve as demonstration points to the farmers.

At Tada and Ogudu, the Ministry also opened Fishery Offices, also to assist the fishermen and sometimes chanelling their problems to the state's Ministry of Agriculture and Natural Resources. The establishment of these offices at Tada and Ogudu, necessitated the construction of seasonal roads to link them with Shonga, especially during the dry season.

Apart from these few developments all other parts of the districts in the study area were completely isolated from any form of development until the establishment of the Nigerian Sugar Company at Bacita.

Prior to the establishment of the company, Bacita was a small village with a population of less than 300 engaged mainly in farming and fishing. With the establishment of the company in 1964, the initial and the most essential requirement, was the construction of a tarred road by the Federal Government, to

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link Bacita and the Lagos - Kano main road. An all-weather road was also constructed to link Bacita to Sharagi by the State Government. Since the construction however, the road has been maintained annually by the Company bacause it provided a shorter route to Sharagi when compared to going through the main Lagos - Kano route as shown in Fig.4.1.

The establishment of the company had also created employment opportunities for over 5,000 people from all over Nigeria and to satisfy the living conditions of these employees and their families, primary schools, hospital and clinics, police station Rest Houses and other amenities were established at Bacita. Seasonal roads were also constructed by the company to link some of the nearby settlements in an attempt to facilitate their functions. With all these developments, Bacita became the dominant town of the study area thereby over-shadowing Shonga. That is, the development of the study area before 1983, has been biased towards Bacita and to a certain extent Shonga especially with the establishment of Niger River Basin Development Authority in 1978/79. Apart from these two towns, no remarkable development has been registered in the study area. This implies that the area was still maintaining the position of a backward region in Nigeria. The discussion that follows is an attempt to identify the aspects of the impact of Jebba Dam.

4.3.0. IDENTIFICATION OF THE ASPECTS OF THE IMPACT OF JEBBA DAM

When dams are constructed they create impacts on their immediate environment. These impacts could either be positive or nagative in nature.

The positive impacts are those in which the consequent changes of the dam construction are beneficial to the environment and human aspect. That is, such changes enhance physical development of the area and produce improved well-being of the people. The negative impacts on the other hand, manifest in form of problems to the environment and the inhabitants of the area. Some of such problems are anticipated by the planners of the dam and so attempts are made to contain them at the design stage. Other problems are those unforeseen by the planners of the dam.

Impacts could also be classified in terms of their relation to the dam. There are tose that are a direct consequence of the dam construction, while others are indirect. The construction of Jebba Dam, just like other dams, had created both direct and indirect impacts on the immediate environment and the inhabitants. Those aspects of the environment, that have received the impact can be categorized into four namely, human aspect, water, land and ecology as summarized in Appendix. I

Appendix 1. highlights those aspects on which Jebba Dam has created some impacts both directly and indirectly. The next section describes the spatio-economic impacts of Jebba Dam.

4.4.0. THE SPATIO-ECONOMIC IMPACTS OF JEBBA DAM

4.4.1. SPATIAL IMPACT OF JEBBA DAM

Before Kainji Dam was constructed in 1969, over 40% of the study area used to be submerged by floods every rainy season. When this happened, all forms of activities in the areas affected were always paralysed. With the opening of Kainji Dam, however, the regulation of the flow of River Niger, according to Adeniyi (1970) controlled the flood by 30% between Jebba and Lokoja to the situation indicated in fig. 4.2 on land-use. With the opening of Jebba Dam, this regulation of flow was further increased from the initial 1000m3 per second to 756m3 per second which is the present average outflow calculated from table 4.1 below.

Table 4.1 AVERAGE OUTFLOW RECORDS OF JEBBA DAM SINCE 1984 (IN M^3/SEC)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT
1984	366	376	425	439	523	624	802	818	796	800
1985	585	540	483	465	451	362	328	561	1502	1343
1986	1025	647	653	639	773	767	794	747	633	758
1987	759	711	699	632	618	914	672	691	919	770
1988	790	552	523	849	449	369	462	813	2491	1818
1989	991	613	514	744	836	717	672	1039	1357	1467
1990	848	690	627	683	1078	958	390	507	1163	759

Source: Jebba Dam 1991.

This regulation of flow, had exposed permanently, those areas formerly liable to flood. This development had influenced the spatial organisation of the study area. Some of the spatial aspects to be discussed that manifest this development include:

a. The land - use pattern

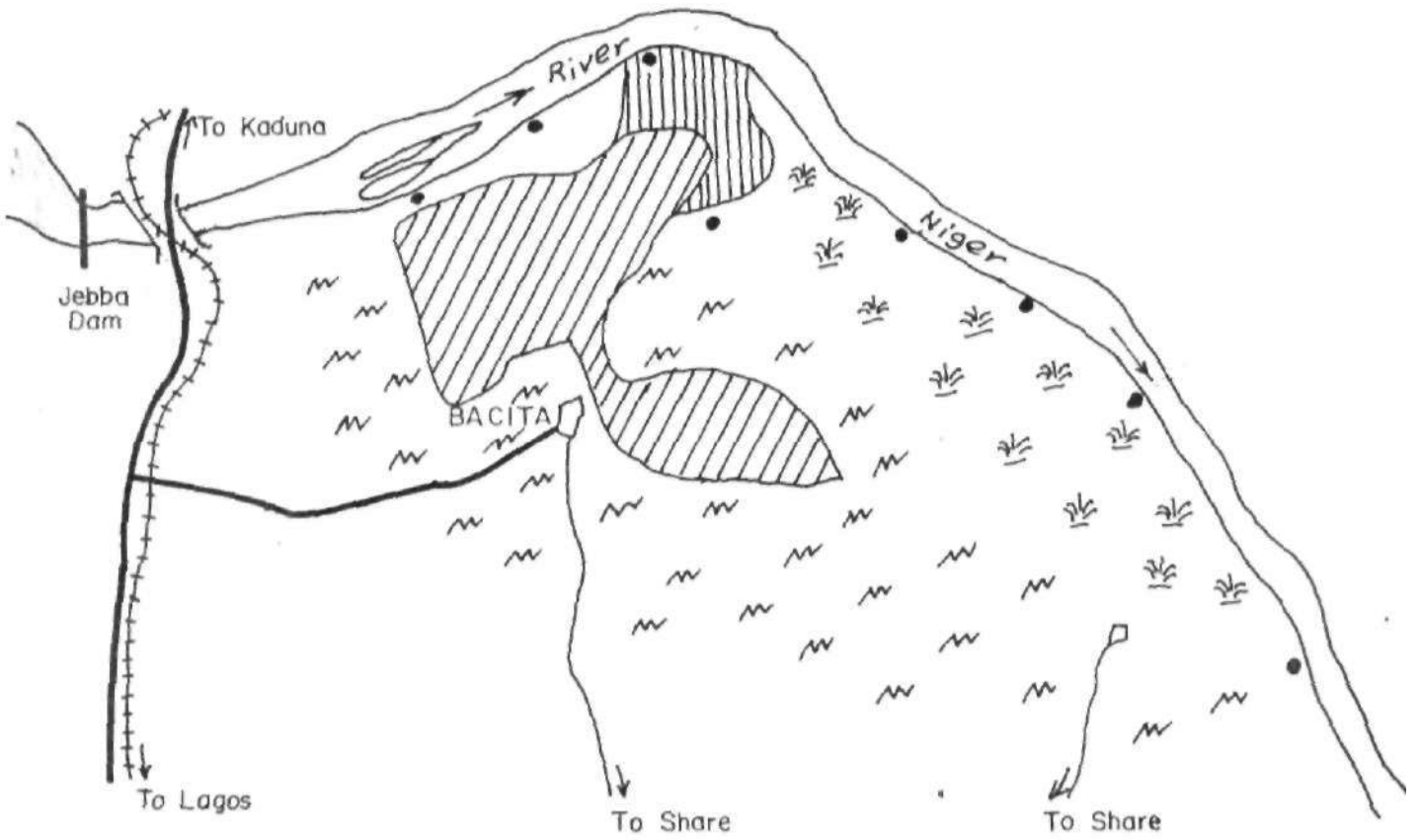
b. The settlement pattern

c. The settlement hierarchy and the distribution of utilities, facilities and services.

d. The transportation network.

a. LAND - USE PATTERN

The land - use pattern of the study area before the construction of the dam, featured mainly three land - uses namely the sugar cane plantation, areas under upland agriculture and areas liable to flood annually, with the latter accounting for 31% of the study area. With the opening of Jebba Dam, the regulation of flow downstream, had exposed permanently, those areas formerly liable to flood, which are now potential fadama lands under normal climatic condition, as shown in fig. 4.2. Capitalizing on this exposed floodplains, the Nigerian Sugar Company has successfully expanded its sugar plantation to Gbere and Fanagun areas as shown in Fig. 4.2. The problem confronting these new extensions is that of the recurring flood, which happens in years when much rainfall is received. When this happens, like in 1988, much of the sugar cane is submerged and washed off, thereby causing shortfalls in the total production of the company.



LEGEEND

- Sugar Cane Plantation
- New Extension Of Sugar Cane Plantation
- Areas Under Upland Agriculture
- Areas Under Fadama Agriculture(Rice Plantation)
- Roads
- Main Paths
- Railways
- Villages
- Central Town

SCALE:— 1:200,000

N

FIG. 4·2
THE PRESENT LAND USE PATTERN OF THE STUDY AREA

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In the areas of Shonga, the fadamaland has been successfully utilized for the cultivation of rice in the rainy season, and vegetables in the dry season, through irrigation. The Niger River Basin Development Authority, capitalizing on this opportunity, had introduced large-scale rice cultivation into the area. An interview with the remaining Senior Agricultural Officer of the Authority revealed the success of their rice cultivation, as between 700 - 1,000 tonnes of rice was achieved annually. However, because of political and financial problems, the authority has almost folded up in the area, while the state's Agricultural Development Project is gradually taking over, although their emphasis is on introducing agricultural incentives and construction of roads in the area.

b. SETTLEMENT PATTERN

Since the inception of Jebba Dam, the population of the study area has witnessed a remarkable growth as shown in Appendix II. Before 1983, the population was 35,105 but this has increased to 46,800, indicating a growth rate of 2.5% which is peculiar to the middle-belt of Nigeria.

Although natural growth is significant in this increasing population, the construction of Jebba Dam has also contributed indirectly because, with the exposure of the areas formerly liable to flood, the road network in the study area had improved. This in turn has enhanced the influx of people into the area, and also encouraged the search for better medical facilities, thereby reducing the mortality rate.

This growing population has reflected in the settlement pattern.

Before the dam, the small dispersed settlements which dominated the area were characteristically temporary with small populations and relying on the nucleated settlements of Bacita and Shonga. With the opening of Jebba Dam, although the settlement pattern is still a mixture of dispersed and nucleated settlements, the small dispersed settlements experienced increases in population as shown in Appendix II. This has made them more permanent to stimulate the establishment of some utilities, facilities and services, like primary schools, boreholes, and so on. In response to this development, the dependency existing between the dispersed and nucleated settlements had declined, though this has not been quantified.

In terms of the location of the settlements, the construction of Jebba Dam has actually created no impact on the location of the settlements. Unlike in the upstream, areas there has been no resettlement and emergence of new settlements so that the settlements still maintain their locations. However, for the settlements on the bank of River Niger like Tada, Chiji, Kusogi, Gbere, Belle and Yelwa, accessibility to them from the neighbouring Niger state has become difficult due to the changes in river regime. The settlements now depend on the all-weather roads developed in the area since 1983.

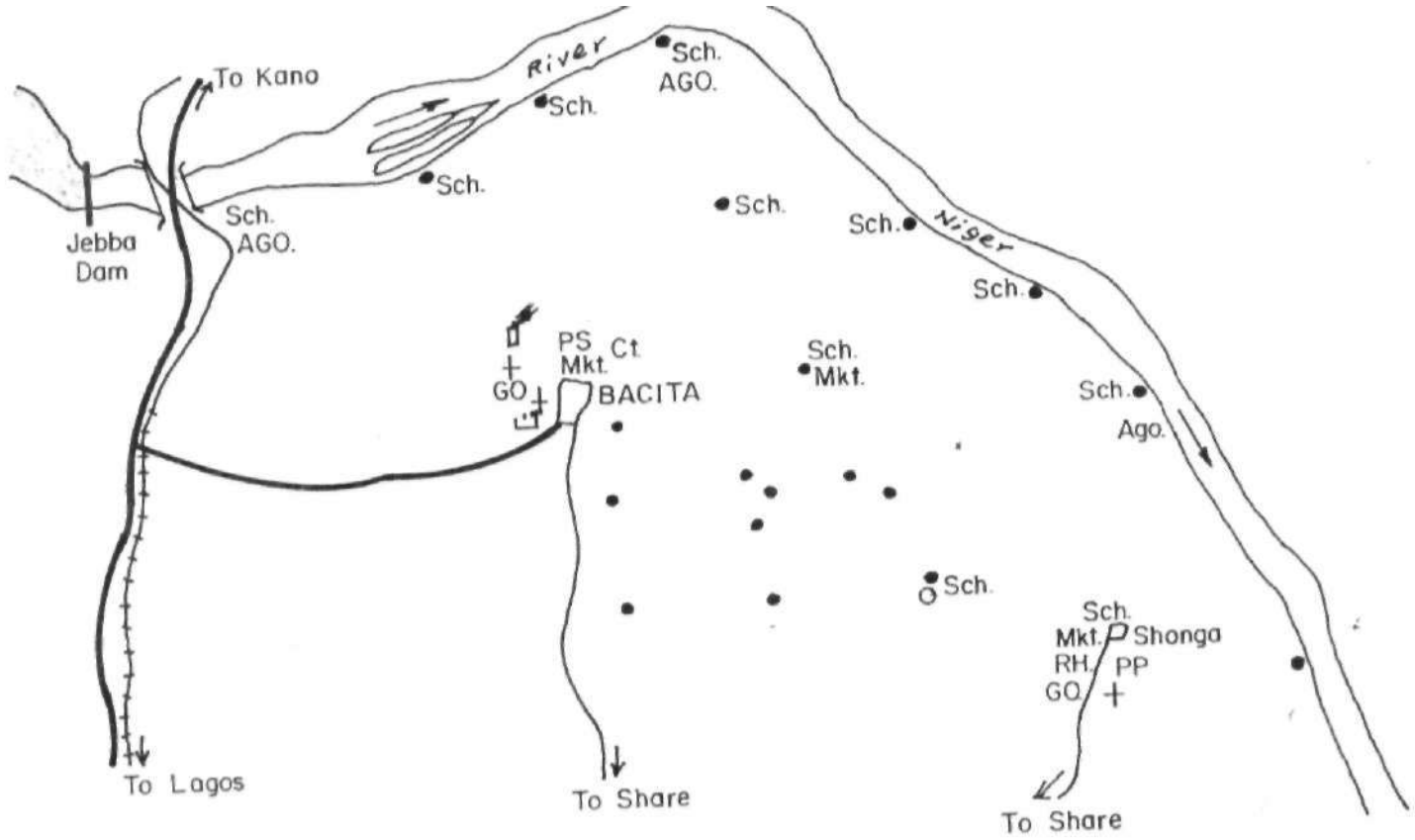
c. SETTLEMENT HIERARCHY

In determining the hierarchy of the settlements the population and the available utilities, facilities and services in the settlements were put into consideration. Before 1983, there were four orders in the hierarchy of the settlements as shown in Table 3.5.

With the opening of Jebba Dam, the consequent improvement in the road network had contributed tremendously towards increasing the population and the number and disribution of the utilities, facilities and services in the study area as shown in fig. 4.3. below. Due to these increase the order of hierarchy of the settlements had increased from four to five as shown in Appendix III.

It is indicated in Appendix III that, Bacita still maintains the first order with the highest population(of 20,000) and number of utilities, facilities and services. These developments in Bacita town is not exclusively unrelated tc the construction of Jebba Dam, because from the survey, it was observed that about 10% of the sampled population who left fishing as an occupation, took up jobs with the Nigerian Sugar Company. This had contributed to increasing the population of Bacita town to qualify it as a threshold population for additional facilities and services.

Next to Bacita in the ordering is still Shonga. It is qualified for this position because it population has increased to 5,050 while more utilities, facilities and services like secondary school, clinics and a police post have been established in it. The establishment of these services at Shonga had contributed towards rationalizing the availability of the services to the inhabitants of the study area s against the concentration of the services at Bacita alone.



LEGEND

- Central Town
- Villages
- Roads
- Main Paths
- Railways
- Rivers
- Sch. School
- RH Rest House
- Mkt..... Market
- PO..... Post Office
- \+ Hospital & Clinics
- Ct Court
- GO Government Office
- AGO Agricutural Extension Office
- X Filling Station
- O Borhole
- Motor Park
- Industry
- PS..... Police Station
- PP..... Police Post

N

SCALE:— 1:200,000

FIG. 4·3
THE PRESENT DISTRIBUTION OF UTILITIES, FACILITIES AND SERVICES

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In the third order settlements, the number of settlements had increased from three to four with Gbere as the additional settlement. Prior to the dam construction these settlements had primary schools only but presently Agricultural Extension Officers (for either the State's Ministry of Agriculture and Natural Resources or Niger River Basin Development Authority), clinics and periodic markets have been introduced to the settlements

Maintaining the fourth order, are the settlements of Belle, Kanko, Yelwa, Kusogi, Manuga and Chiji. These settlements have witnessed increases in their populations from the former less than 900 to about 1,300. This increasing population necessitated the establishment of primary schools and boreholes by the state and Local Governments. Some of these settlements are located within the areas exposed from the annual flood with the construction of Jebba Dam.

Other settlements with populations below 900 and without utilities, facilities and services now occupy the 5th order in the hierarchy. These settlements are located at the central part of the study area which is still lagging behind in development. The construction of a road to link Kanko and the Bacita - Sharagi main road, will in the long run, open up this area for future development.

d. TRANSPORATION NETWORK

Before Jebba Dam was constructed, the road network in the study area was inadequate as all-weather roads and footpaths dominated. The only tarred road, was that which linked Bacita and the main road from Lagos to Kano as shown in fig. 3.2.

With the opening of Jebba Dam, the termination of the annual flooding of the floodplains stimulated the up-grading of most of the footpaths into motorable all-weather roads by the establishmnnts in the area, like Niger River Basin Development Authority, and recently the State's Agricultural Development Project. This was done mainly for facilitating their projects. This is shown in Table 4.2. below.

Table 4.2 ROAD NETWORK IN THE STUDY AREA IN 1991

ROAD	DISTANCE(Kms)	CONSTRUCTED BY	REMARKS
1 Bacita-Main Lagos to Kano Road	16	Federal Govtrnment	Tarred
2 Bacita-Sharagi	40	Kwara State Government	All-weather
3 Bacita-Chita-Yelwa	10	Nigerian Sugar Company	"
4 Bacita-Belle	12	Nigerian Sugar Company	"
5 Bacita-Fanagun-Gbere	14	Nigerian Sugar Company	"
6 Bacita-Kanko-Shonga	20	NISUCO/State Government	"
7 Shonga-Tada	7	Niger Basin	"
8 Shonga-Ogudu	12	State Govt.	"
9 Shonga-Sharagi	60	State Govt.	"
10 Tada-Chiji-Kusogi	12	Agricultural Project	"

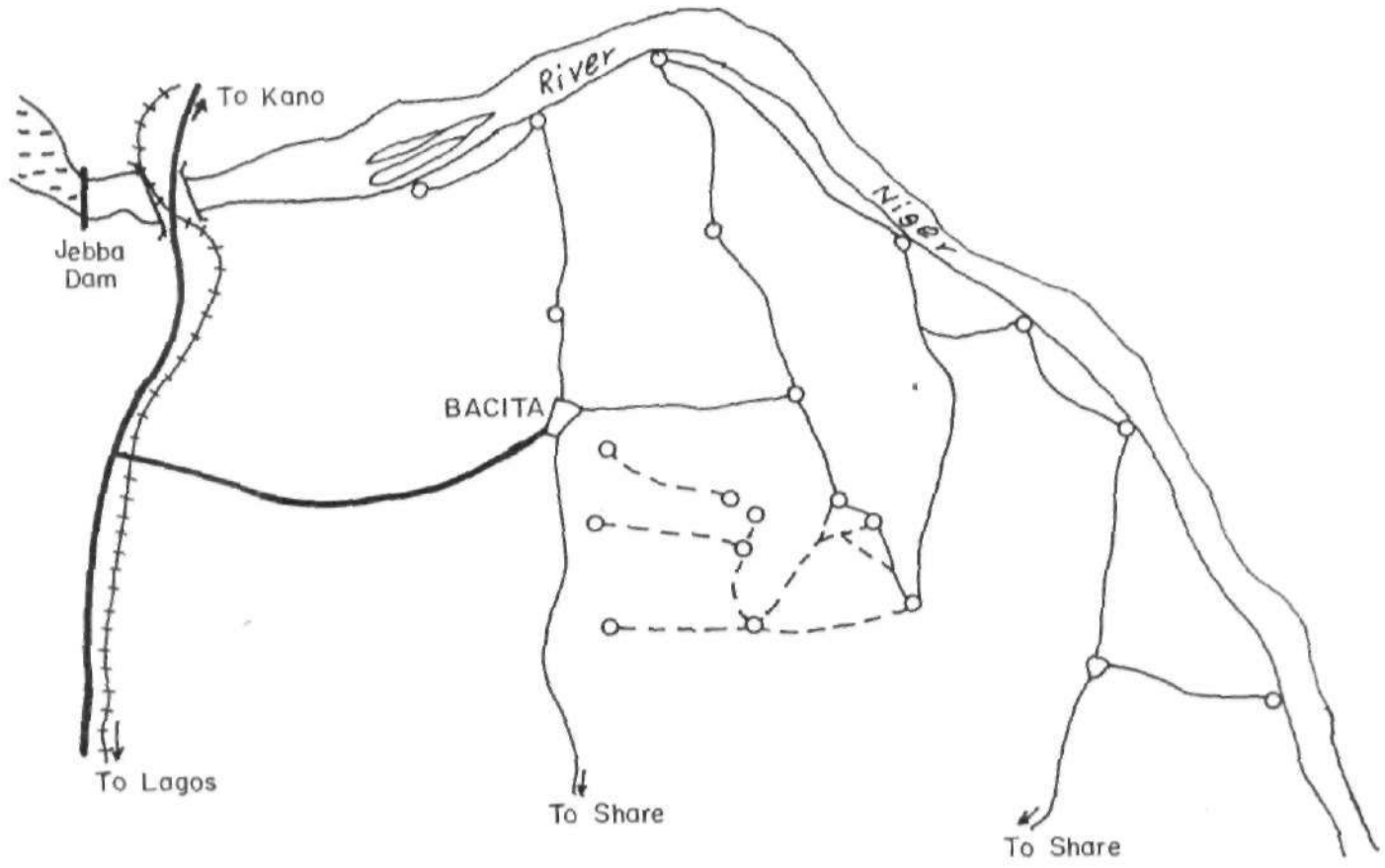
Source: Present Base Maps of the study Area.

Table 4.2. above indicates that apart from Bacita-Sharagi and Shonga-Sharagi roads, there is presently a total distance of 87 kilometres of all-weather roads against the former 32 kilometres as shown in fig. 4.4. This indicates a remarkable improvement in the transportation network of the study area.

The construction of these roads, apart from opening up the interior of the study area had enhanced the development of the settlements and the distribution of the utilities, facilities and services. Inspite of this development, however, the central areas of the study area still rely on footpaths as the main transportation routes.

In terms of navigation, Adeniyi (1970) indicated that, when Kainji was opened the regulation of flow in the down-stream made it possible for 50 - 100 tonnes boat to ply Jebba-Lokoja year round.

With the opening of Jebba Dam, the regulation of flow downstrea became so severe that at most points of the valley, the depth of the river is not more than one metre. In the months of November to March, the spread of islands all over the river valley, became an annual event. Informal interview of officials of Jebba Dam on this changes in navigation confirmed further that, since Jebba Dam was opened in 1984, only two boats of Japanese Explorers on Pan - African River Navigation had crossed the dam upstream in October, 1986.



LEGEND

- Roads
- Main Paths
- Foot Paths
- Rivers
- Railways
- Villages
- Central Town

SCALE:- 1:200,000

N

FIG. 4·4
THE PRESENT TRANSPORTATION NETWORK OF THE STUDY AREAS

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Another factor contributing to the decline in navigation downstream of the dam is the drastic reduction in fishing since the inception of the dam. This in turn, had discouraged the generation of even the local traffic by canoes in the study area.

So far, it is evident that the construction of Jebba Dam has relegated navigation in the study area and the downstream as a whole to the background. Those settlements in the bank of River Niger best accessible via River Niger, are now left with the all-weather roads, most of which are seasonal. The situation therefore calls for an immediate attention especially to achieve once again, a thorough navigation from Niger Republic to the Atlantic Ocean.

4.4.2. ECONOMIC IMPACT OF JEBBA DAM

The construction of Jebba Dam, has caused some changes in the economic charasteristics of the study area. Some of such changes are directly due to the dam construction, while others are indirectly related. The aspects discussed here however, include the occupational pattern, the family income, and the industrial development of the Nigerian Sugar Company at Bacita.

a. OCCUPATIONAL PATTERN

Before the opening of Kainji Dam, the economy of the study area was tied solely to River Niger. Over 90% of the inhabitants engaged in fishing directly on River Niger and the ponds and lakes created on the banks.

When Kainji was opened however, one of its impacts was the decline in fishing in the downstream areas due to the changes in the fishing condition. Responding to this decline, the number of people engaged in fishing decline and other occupations emerged (see Fig. 4.5.). The introduction of large-scale agricultural projects to the area, like the Niger River Basin Development Authority, can not be left out in explaining the emergence of new occupations as shown in Table 4.3. below.

Table 4.3. MAIN OCCUPATIONS OF THE STUDY AREA BEFORE AND AFTER JEBBA DAM 9n = 220)

Occupation	Before Dam		After Dam	
	NO.	%	NO	%
Fishing	149	67.7	43	19.5
Farming	26	11.8	114	51.8
Trading	9	4.0	21	9.6
Crafts	19	8.6	1	0.5
Others	17	7.9	41	18.6
Total	220	100.0	220	100.0

Sourde: Field Survey, 1991

With the opening of Jebba Dam the sedimentation, associated with the water discharged downstream, declined further, (although this has not been quantified) due to the trapping effect of the reservoir of the dam. Simultaneously, the regulation of flow by the dam had resulted into the non-formation of ponds and lakes on the floodplain downstream. These two developments, therefore, reduced fishing in the downstream drastically as indicated by the percentage of sampled population involved in fishing which had dropped from 67.7% to 19.5%.

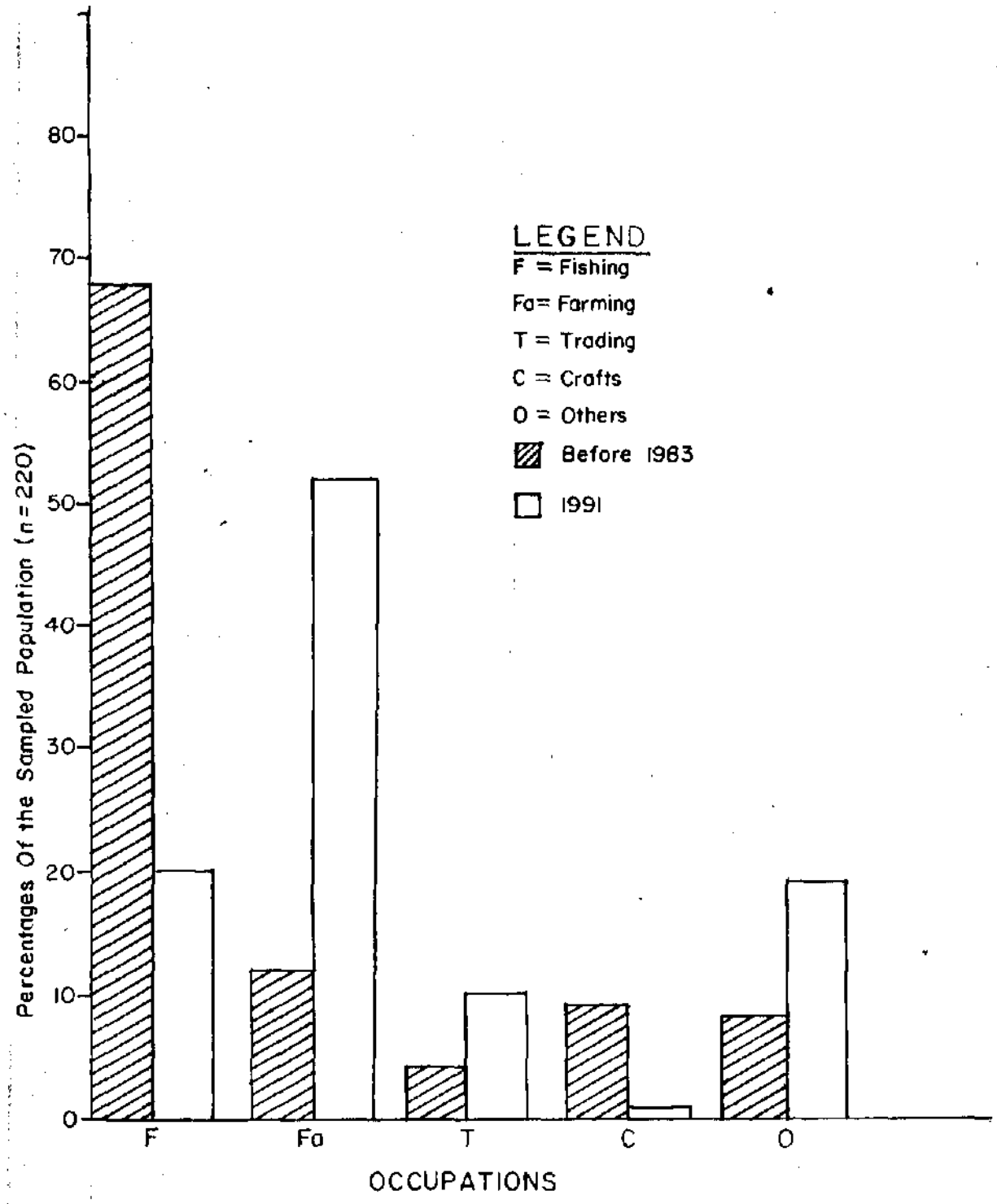


FIG. 4·5
MAIN OCCUPATIONS IN THE STUDY AREA BEFORE AND AFTER JEBBA DAM

SOURCE: FIELD SURVEY 1991

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At the settlement level, this pattern of change from fishing was more pronounced as shown in Table 4.4. below. This because, in some settlements, the percentage of those still found in fishing is less than 20% of the sampled population for the settlement.

Table 4.4. CHANGES IN FISHING OCCUPATION IN THE SAMPLED SETTLEMENTS BEFORE AND AFTER THE JEBBA DAM

SETTLEMENTS	SAMPLED POPULATION	NO IN FISHING BEFORE		NO IN FISHING AFTER		CHANGES	
		No	%	No.	%	No.	%
Jebba North	40	18	45.0	4	10.0	14	35.0
Belle	15	11	73.0	2	13.0	9	60.0
Gbere	40	28	70.0	4	10.0	24	60.0
Manugu	15	6	40.0	3	20.0	3	20.0
Chiji	15	8	53.0	4	26.0	4	27.0
Kanko	15	10	66.0	4	26.0	6	40.0
Tada	40	38	95.0	12	30.0	26	65.0
Ogudu	40	30	75.0	10	25.0	20	50.0
Total	220	149	68.0	43	20.0	106	48.0

Source: Field Survey, 1991

It has also been observed from Table 4.4. above that, this change in the number of those engaged in fishing was more pronounced in the areas of Shonga than around Jebba North. The settlements of Kanko, Tada and Ogudu experience relatively high percentages of change from fishing when compared to Jebba North, where only 35% change is observed. This is attributable to the fact that the people of Jebba North and the surrounding villages now fish directly on the reservoir of the dam, although the authority (NEPA) does not allow this officially.

In the areas of Shonga on the other hand, there is no option of fishing ground available, and so the people took up farming as a new occupation.

Consequent upon the decline in fishing and the number of those engaged in fish ng, the total output of fish in the study area had also declined as shown in Table 4.5. below.

Table 4.5. WEEKLY FISHING OUTPUT IN THREE SETTLEMENTS OF THE STUDY AREA IN LO RY LOADS

SETTLEMENTS	1967	1970	1991
Jebba North	2	½	¼
Bacita	-	-	½
Shonga	3	½	½

Source: Adeniyi (1970) and field survey, 1991

Table 4.5. above illustrates that, before the opening of Kainji Dam (in 1967) there was much production of fish in the study area as indicated by the weekly output in the table 4.5. When Kainji Dam was opened, as a result of its impact, according to Adeniyi (1970), there was a decline in the output by about 75%. With the opening of Jebba Dam, the output further declined to between 80 - 85% of the output before the two dams. This is undoubtedly due to the changes in fishing condition and the number of those engaged in fishing as shown in Table 4.3. and 4.4.

The next question then is, what has happened to those who changed their occupations from fishing with the opening of Jebba Dam?

Table 4.4. above, indicates that, before 1983, the percentage of the sampled population engaged in fishing was 68%. This declined to 19.5% with the opening of the dam indicating that about 48% of the sampled population had changed from fishing. In the analysis of the data, it was observed that 76.0% of those that changed from fishing went directly into farming while 8.0% and 16.0% went into trading and "other" occupations respectively as shown in Table 4.6. below.

Table 4.6: NATURE OF CHANGES FROM FISHING TO OTHER OCCUPATIONS (n=106)

OCCUPATIONS CHANGED INTO	NO INVOLVED	% OF TOTAL
Farming	80	76.0
Trading	9	8.0
"Others	17	16.0
Total	106	100.0

Source: Field survey, 1991

At the settlement level, the pattern of change from fishing to other occupations is as shown in Table 4.7 below.

Table 4.7. PATTERN OF CHANGE FROM FISHING TO OTHER OCCUPATIONS AT THE SETTLEMENTS LEVEL

SETTLEMENT	SAMPLED POPULATION	INITIAL NOS	PRESENT NOS	NEW OCCUPATIONS		
				FARMING	TRADING	"OTHER"
Jebba North	40	18	4	10	-	4
Belle	15	11	2	7	1	1
Gbere	15	28	4	12	6	6
Manuga	15	6	3	3	-	-
Chiji	15	8	4	4	-	-
Kanko	15	10	4	6	-	-
Tada	40	38	12	18	2	6
Ogudu	40	30	10	20	-	-
Total	220	149	43	80	9	17

Source: Field Survey, 1991

Table 4.6 and 4.7. above indicate that 76.0% of the sampled population changing from fishing took to farming, thereby contributing towards making farming the main occupation of the study area. This trend of change indicates the impact of Jebba Dam because, as the dam construction worsened the fishing condition, it exposed the floodplain for agricultural purposes. Before Jebba Dam, only 11.8% of the sampled population engaged in farming as shown in Table 4.3. Also, the full control of the annual flooding of the banks of River Niger, downstream, encouraged more people to go into farming as shown in Table 4.8. below

Table 4.8. PATTERN OF SHIFTS INTO FARMING FROM OTHER OCCUPATIONS AT THE SETTLEMENT LEVEL

SETTLEMENT	SAMPLED POPULATION	INITIAL NO IN FARMING	PRESENT NO	INCREASE	% OF CHANGES
Jebba North	40	10	20	10	25.0
Belle	15	1	8	7	46.7
Gbere	40	-	12	12	30.0
Manuga	15	7	10	3	20.0
Chiji	15	2	10	8	53.3
Kanko	15	3	10	7	46.6
Tada	40	-	18	18	45.0
Ogudu	40	3	26	23	57.5
Total	220	26	114	88	40.0

Source: Field Survey, 1991

Table 4.8 above indicates that, the sampled population engaged in farming had increased by 40% from 11.8 to 51.8%, which illustrates the importance of farming in the study area presently. There are two farming periods in the study area. There is the wet season farming which is practised all over the study area in the months of April to October. The dry season farming, on the other hand, involves the growing of vegetable and takes place in the areas of Shonga by the Hausa immigrants.

Though farming has been very successful on the floodplains, certain problems still prevail. In the extremely wet years like 1985 and 1988, much water is discharged downstream by Kainji and Jebba Dams.

This usually destroys the fadamalands and the crops planted on them, thereby causing acute shortage of food.

Those who engage in wet season farming become idle immediately it is dry season, because they are not engaged in any other activity. However, about 0.5% go into casual employment with Nigerian Sugar Company while only about 0.1% resort to part-time petty trading of food items. The income realized within this period is usually reserved for farming in the subsequent rainy season through either employing manpower or machinery.

The third important occupation in the study area is trading. Prior to the opening of Jebba Dam, 4.0% of the sampled population engaged in trading as their main occupation as shown in Table 4.3. At the settlements level, the pattern of distribution of those engaged in trading was so unevenly distributed that some of the sampled settlements had no recorded inhabitants engaged in trading as shown in Table 4.9 below. This shows the limited emphasis on trading in the study area before the opening of the dam.

Table 4.9. THE SAMPLED POPULATION ENGAGED IN TRADING IN THE SAMPLED SETTLEMENTS BEFORE AND AFTER JEBBA DAM

SETTLEMENTS	SAMPLED POPULATION	NOS BEFORE	% OF SAMPLE	NOS AFTER	% OF SAMPLE
Jebba North	40	4	10.0	4	10.0
Belle	15	-	-	1	6.6
Gbere	40	-	-	12	30.0
Manuga	15	1	6.6	-	-
Chiji	15	1	6.6	-	-
Kanko	15	-	-	-	-
Tada	40	2	5.0	4	10.0
Ogudu	40	1	2.5	-	-
Total	220	9	4.0	21	9.6

Source: Field Survey, 1991

With the opening of Jebba Dam, the sampled population engaged in trading had increased from 4.0% to 9.6%. Inspite of this increase, however, the number of settlements without sampled inhabitants engaged in trading still increased from three to four as shown in Table 4.9 above.

Although the relationship between Jebba Dam construction and trading as an occupation in the study area is not so direct, Table 4.7 indicates that about 43 of the people now in trading in various settlements are those who have changed from fishing with Jebba Dam construction. However, 1.3% of the initial population engaged in trading had left for farming (0.8%) and "others" (0.5%) respectively as shown in Table 4.10 below

Table 4.10 PATTERN OF CHANGES IN TRADING AS AN OCCUPATION OF THE STUDY AREA BEFORE AND AFTER JEBBA DAM (n = 200)

SETTLEMENTS	SAMPLED POPULATION	INITIAL NO	PRESENT NO	NEW OCCUPATIONS	
				FARMING	"OTHERS"
Jebba North	40	4	4	-	-
Belle	15	-	1	-	-
Gbere	40	-	12	-	-
Manuga	15	1	-	-	-
Chiji	15	1	-	-	1
Kanko	15	-	-	1	-
Tada	40	2	4	-	-
Ogudu	40	1	-	1	-
Total	220	9	21	2	1

Source: Field Survey, 1991

Crafts is the fourth important occupation engaging only few inhabitants of the study area. Before the opening of Jebba Dam, it engaged 8.6% of the sampled population as shown in Table 4.3. Presently, this has fallen to 0.5% . The change is more pronounced at the settlement level because, as it is shown in Table 4.11 below, many settlements now exist without craftsmen.

Table 4.11. THE SAMPLED POPULATION ENGAGED IN CRAFTS BEFORE AND AFTER THE DAM IN THE SAMPLED SETTLEMENTS

SETTLEMENTS	SAMPLED POPULATION	NOS. BEFORE	NOS. AFTER	% OF CHANGE
Jebba North	40	-	-	-
Belle	15	3	-	20.0
Gbere	40	12	-	30.0
Manuga	15	1	1	-
Chiji	15	2	-	13.3
Kanko	15	-	-	-
Tada	40	-	-	-
Ogndu	40	1	-	2.5
Total	220	19	1	8.1%

Source: field survey 1991

Three (1.5%) changed into farming, while six (2.6%) and 9 (3.9%) went into trading and "other occupations respectively. This decline is indirectly related to the dam construction because, with the development of the road net work, modernization started to penetrate into the area, thereby causing a decline in the quest for craft products. This of-course, discouraged the inhabitants involved in crafts.

For the fifth occupation which is "oth r" prior to 1983, only 7.9% of the sampled population were involved in mainly civil service job as shown in Table 4.3. At th settlement level, Belle, Tada and Manuga had none in sampled population in civil service as shown in Table 4.12. The obvious reason for this is the backwardness of the study area.

Table 4.12. PATTERN OF CHANGES IN "OTHER" OCCUPATIONS IN THE SAMPLED SETTLEMENTS BEFORE AND AFTER JEBBA DAM

SETTLEMENTS	SAMPLED POPULATION	INITIAL NOS.	PRESENT NOS.	NEW OCCUPATIONS FARMING
Jebba	40	8	12	-
Belle	15	-	4	-
Gbere	40	-	12	-
Manuga	15	-	1	-
Chiji	15	2	1	1
Kanko	15	2	1	1
Tada	40	-	6	-
Ogndu	40	5	4	1
Total	220	17	41	3

Source: Field Survey, 1991

With the opening of Jebba Dam, those involved in "other" occupations increased from 7.9% to 18.6% . This increase is a direct impact of Jebba Dam, because the Dam created employment opportunities for the inhabitants around Jebba. This accounts for why 80% of the sampled population in Jebba north is now involved in civil service jobs, employed directly by Jebba Dam.

As mentioned above, prior to the construction of Jebba Dam, in Belle, Gbere and Manuga none of the sampled population engaged in civil service jobs. After the dam however, the extension of the Sugar Plantation to the areas (see fig. 4.2) and the Niger River Basin Development Authority provides civil service jobs to some people, either on full-time or part-time basis.

This has resulted in 16% of the sampled population now engaging in civil service. Inspite of these changes into civil service jobs, however, 20% of the sampled population, initially in civil service jobs have changed to farming, which is presently, the main occupation of the study area.

The description of the impacts so far, shows that, the occupation that had received the most impact of Jebba Dam is fishing and this is because the experiences of this impact started since the opening of Kainji Dam. In adjusting to this change, and capitalizing on the exposed fadamaland, most people took to farming. The next discussion is on how these changes in the occupational pattern, have been reflected on the family income.

b. FAMILY INCOME

Table 4.13 below summarizes the average annual family income according to the various occupations since 1967.

Table 4.13 AVERAGE ANNUAL FAMILY INCOME BY OCCUPATIONS IN THE STUDY AREA

OCCUPATIONS	1967	1970	1991
Fishing	10-15000.00	3048.00	1200.00
Farming	3712.00	3900.00	8400.00
Trading	1200.00	1200.00	2010.00
Crafts	560.00	500.00	360.00
Others	760.00	1500.00	3600.00

Source: Adeniyi (1970) and field survey 1991

In attempting to present a clear understanding of the impact of Jebba Dam on the family income of the study area, the situation before Kainji Dam (1967), after the dam (1970) and the present (1991) have been summarized in Table 4.13. The construction of Jebba Dam had created impacts on the family income in the study area. For the sampled population still in fishing for instance, 93.1% indicated a decline in their annual income, while only 6.9% indicated increases. Although there has been increases in the prices of fish , the decline in the family income of those engaged in fishing, is due to the drastic decline in the amount of fish catch (see weekly out-put in Table 4.5). The average annual family income is now ₦1,200.00 which is about 10% of the average annual income before the construction of the two dams.

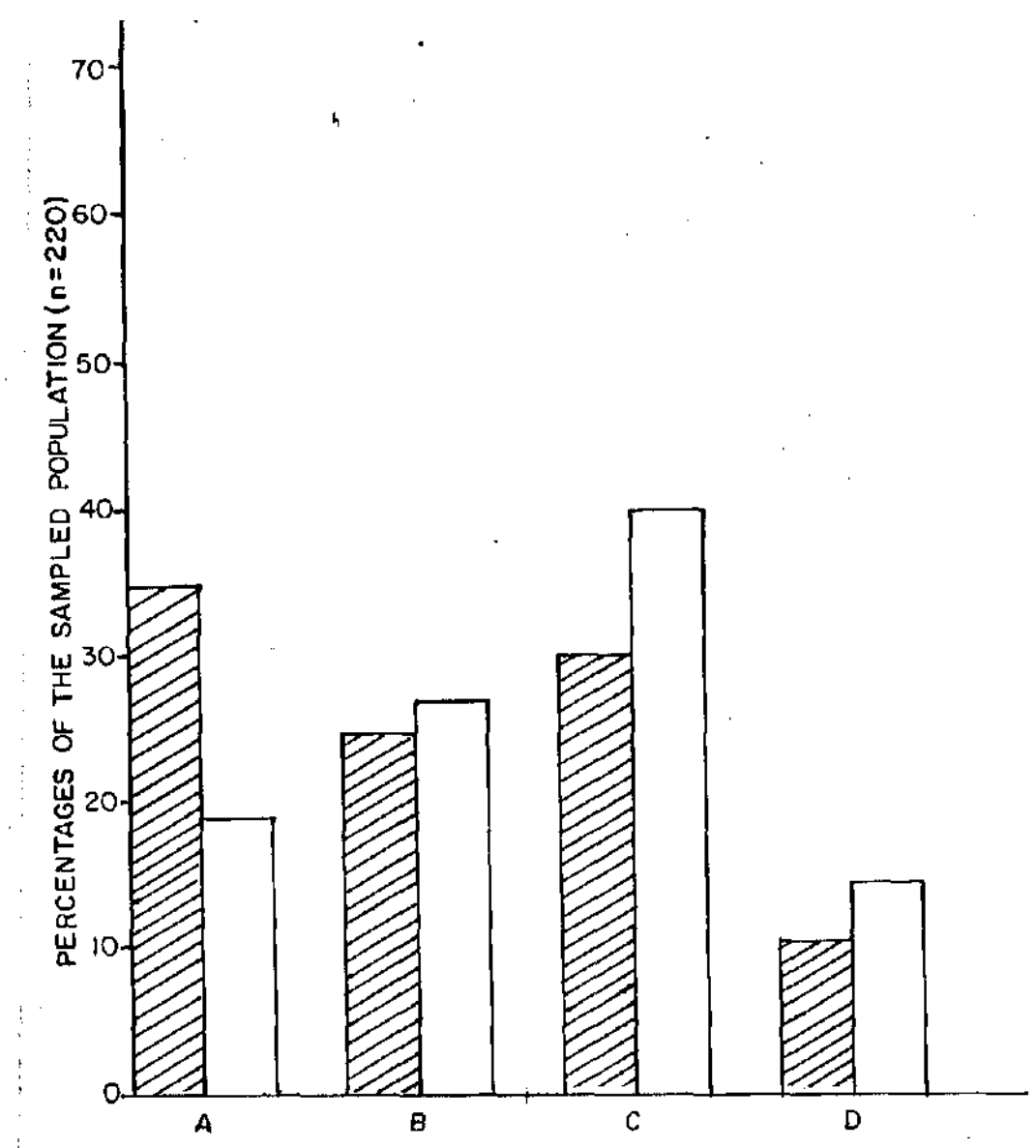
Table 4.13 also indicates that those engaged in farming have been experiencing appreciable increases in their income since the construction of Kainji Dam. After the opening of Kainji Dam, for instance, the income increased by about 4.5%. With the opening of Jebba Dam this had increased by about 103%: This rapid increase in the income of those engaged in farming is a direct impact of Jebba Dam construction, because the increased regulation of flow in the downstream areas made available more land for farming. This development had been shown to have also encouraged more people to change to farming.

Except for crafts, which is declining as indicated by the number of the sampled population presently involved (See Table 4.3) those involved in trading and "other" occupations, had also

witnessed increases in their annual income since the opening of Jebba Dam, as shown in Table 4.13. The obvious reason for the success in trading is the development of road network, which has opened up more of the study area for commercial activities. Those in civil service jobs on the other hand, in view of the educational backwardness of the study area, occupy the lowest cadre in the administrative hierarchy. Consequently, their average annual income is low: not substantially exceeding the National minimum wage of ₦1800.00 per annum. An interview with six of those presently engaged in Jebba Dam Project in Jebba North , however, revealed that all those is civil service jobs feel very satisfactory as they have witnessed up to 500% increase in their average annual income.

Based on this average annual income, an income distribution table was prepared for the sampled population of the study area. This is shown in fig. 4.6 below.

It is evident from fig. 4.6 above that, there has been a decline in the category of "very poor" and "poor" from 60% to 46%. The very poor group in particular had reduced from 35% to 19%, while other income groups have all witnessed increases which is an indication of the improvement in the overall economy of the study area. This is directly related to the dam construction because it opened up opportunities for year round farming. The stoppage of the annual flood of some parts of the study area had also encouraged the establishment of roads which had opened the study area for better economic opportunities.



LEGEND

A Very Poor (Less than ₦150·00)

B Poor (₦150·00—₦250·00)

C Middle Class (₦250·00—₦500·00)

D *High Income (Above ₦500·00)*

▨ Before 1983

□ 1991

FIG. 4·6

INCOME DISTRIBUTION IN THE STUDY AREA (1991)

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However, for the fact that the very poor and poor income groups are still as high as 46%, evidently indicates the need for more impetus that will involve the participation of the inhabitants of the study area. Niger Basin Development Authority went a long way in achieving this goal, but because of political and financial problems it operated only for 10 - 12 years in the area before it packed off.

c. INDUSTRIAL DEVELOPMENTS

The growth of Sugar Cane at Bacita depends entirely on River Niger as the source of water for irrigation in the months of November - March. Consequently, any alteration on the river flow system will definately affect the irrigation system of the company.

The opening of Jebba Dam and the subsequent regulation of flow downstream, had created impacts on the sugar cane plantation by introducing unprecedented low-water levels. In responce to this it has become difficult for water to flow through the canal to the pump house for further distribution to the various plantations. This predicament, according to the Managing Director (1991), had made the possibility of increasing the area under sugar cane plantation, through improved water supply, problematic.

Most importantly, this inadequate water supply has been creating impacts on the crop yields of the company as shown in Table 4.14 below.

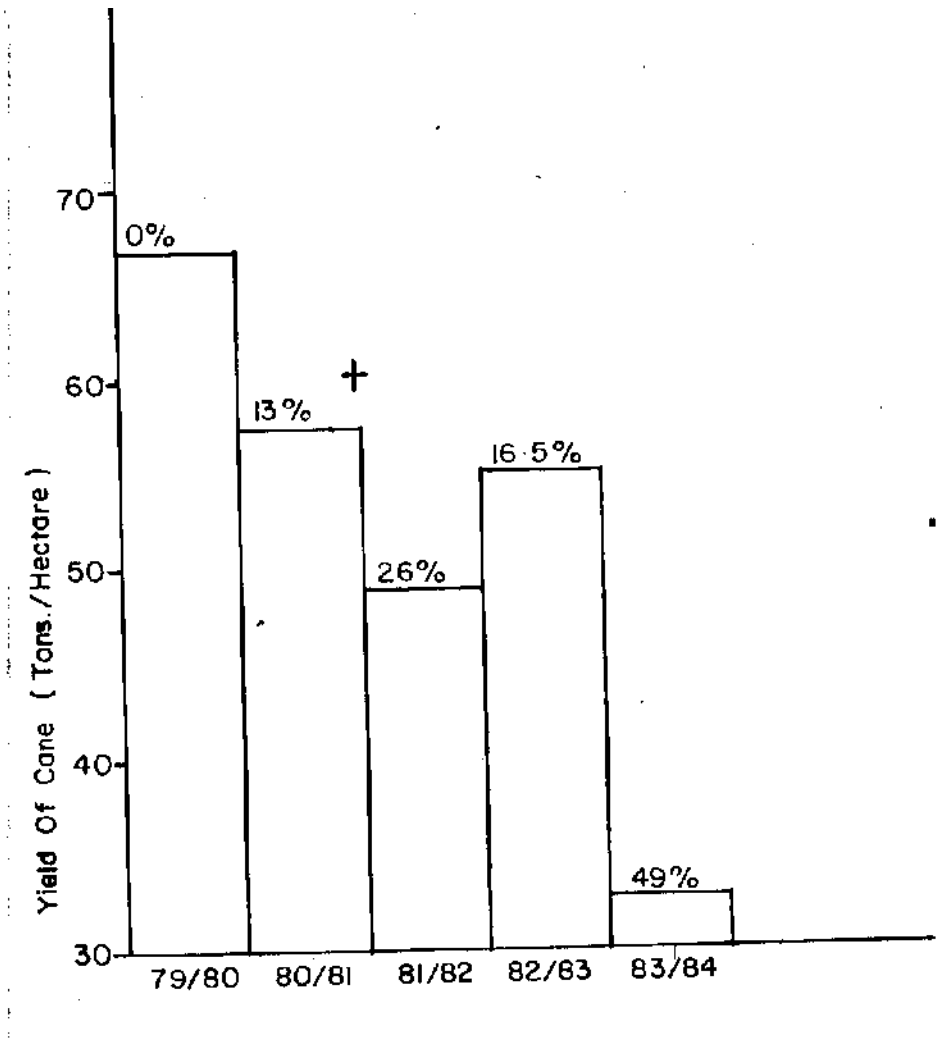
Table 4.14. CROP YIELDS OF NIGERIAN SUGAR COMPANY FROM 1979 - 1984

YEAR	YIELD OF CANE (TONS/HA)	TOTAL PRODUCTION (TONS)
1979/80	68	32,162
1980/81	58	31,230
1981/82	50	26,670
1982/83	56	28,143
1983/84	32	16,395

Source: Paper by Suleiman the Managing Director, NISUCO, 1991.

Table 4.14 above clearly indicates that the total production for the year 1983/84, which coincided with the opening of Jebba Dam, had declined by about 40% of the average production. For a better understanding and forecasting of this problem of water shortage on the production, the Managing Director used the same five years yield of cane per hectare including the maximum ever, that is, 1979/80, for further comparsion. When this compared with the yield figures for some years as shown in figure 4.7 below, 1983/84 yield had the greatest variation of 49%, that is, 36 tons/ha, thereby confirming the impact of Jebba Dam.

When this problem of the sugar cane plantation is examined from a different perspective, it has also been observed that when high amount of rainfall is recorded, like in 1985 and 1988, much water is discharged from the Kainji and Jebba dams downstream. This causes much havoc on the sugar cane plantation, thereby creating a short fall in the total production as indicated in Table 4.15 below.



LEGEND

Yield Level

+ Percentage Variation From Five Years Highest Yield

FIG. 4·7
YIELD LEVELS FOR FIVE CONSECUTIVE YEARS AT BACITA ESTATE.

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Table 4.15 below.

TOTAL PRODUCTION OF SUGAR IN THE NIGERIAN SUGAR COMPANY LIMITED

YEAR	PRODUCTION (TONS)
1984/85	20,401
1985/86	26,203
1986/87	33,338
1987/88	36,630
1988/89	31,154
1989/90	26,213

Source: NISUCO. TECHNICAL BROCHURE

Consequently, for a Company supporting over 5,500 workers and their familes and contributing tremendously towards the development of the study area in particular and the nation as a whole, there is the need to reconsider the impact of Jebba Dam on the irrigation system of the Nigeria Sugar Compnay, Bacita.

4.5.0. ASSESSMENT OF THE IMPACTS OF JEBBA DAM

In assessing the impacts of Jebba Dam on the spatio-economic characteristics of the study area, each of the aspects will be discussed accordingly.

4.5.1. Assessment of the Spatial Aspects

i) LAND - USE PATTERN

The construction of Jebba Dam has directly created positive impacts on the land - use pattern of the study area by exposing permanently, the 31% of the study area, liable to flood annually.

These areas are now under fadama agriculture by either the individuals or some of the agricultural projects in the area.

Inspite of this achievement, however, the problem still prevailing in these areas exposed from the flood, which is more of an environmental problem, is the recurring flood, which happens in the years much rainfall in recorded. As the people have adjusted to the new environment, when these floods occur, like in 1985 and 1988, much valuable properties are destroyed.

ii. SETTLEMENT PATTERN

The construction of Jebba Dam has actually not created any impact on the location of the settlements in the study area. This is unlike in the upstream of the dam, where a resettlement exercise has been carried out. The settlement pattern is still a mixture of the nucleated and dispersed and all the settlements still maintain their locations. The only problem on the settlement pattern, is that, since the construction of Jebba Dam, accessibility to those settlements on the bank of River Niger has become difficult through River Niger. This is because between November and March every year, the river regime in the downstream, becomes too shallow that navigation becomes difficult.

iii. DISTRIBUTION OF UTILITIES, FACILITIES AND SERVICES

The construction of Jebba Dam, has indirectly promoted positively, the development and distribution of more utilities, facilities, and services in the study area.

Before the dam, only Bacita and Shonga enjoyed these utilities, facilities and services. With the opening of the dam and the consequent exposure of more of the study area from annual flood; the state and local Government and the projects in the study area established more utilities, facilities and services in more settlements as shown in Fig.4.3.

Inspite of these developments however, the problem still featuring in the distribution of these utilities, facilities and services is that the distribution tends to be concentrated in Bacita alone. Although some of these services are established by NISUCO Bacita still exerts that magnetic force to those being established by the state and local Governments. This situation, it must be mentioned, does not augur well for a meaningful and rationalized development of the study area.

(iv) SETTLEMENT HIERARCHY

The construction of Jebba Dam has indirectly created some negative impacts on the hierarchy of settlements in the study area. This is because, before Jebba Dam, there were only four orders in the hierarchy of the settlements. With the opening of the dam, consequent upon the associated developments, most of the settlements have increased in their populations and received more utilities, facilities and services. As a result, the order had increased from four to five as shown in Appendix III.

This increase in the order from four to five, rather constitutes a problem to the study area, because for any meaningful and efficient development planning, the five orders may be too many and costly to maintain. Furthermore, it will feature duplication of functions assigned to the different orders in the hierarchy of the settlements.

v) TRANSPORTATION NETWORK

a. Road Network: The opening of Jebba Dam has indirectly contributed positively to the development of road network in the study area. This is because before the dam, only footpaths dominated the communication network of the study area as shown in Fig.3.2. This is due to the annual floods and the backwardness of the area. Since Jebba Dam was opened however, the control of flood in the downstream enhanced the upgrading of most of the footpaths into motorable, all - weather roads by either the state or local Government or the projects in the area. This is shown in Fig.4.4.

Inspite of this development in the road net-work, at the central part of the study area, foot paths still predominate. In view of this, those areas are still lagging behind in terms of development. There is therefore the need to upgrade these footpaths to motorable roads to open up these areas for development.

b. Navigation: The opening of Jebba Dam has directly created negative impacts on navigation on River Niger in the downstream of the dam. This is because in an attempt to maintain the required volume of water in the reservoir in the months of November - March, only a small quantity of water is discharged downstream. In response to this, islands are created all over the river valley and at most places the depth of the river is less than one metre. As a result, navigation has become difficult not only in the study area but the downstream as a whole

4.5.2. Assessment of the Economic Impacts

i. OCCUPATIONAL PATTERN

The construction of Jebba Dam had directly created negative impacts on the occupational pattern of the study area. This is because due to the proximity of the area to River Niger, fishing was the main occupation of the people as shown in Table 4.3. Since the opening of the dam fishing has changed as the main occupation because of the changes in fishing condition. Farming is presently the main occupation of the study area capitalizing on the permanently exposed flood plains. Other occoupations have equally witnessed some changes, indirectly an impact of the dam.

In view of these changes in the occupations, some problems have been created. One of such problems is that as farming has become the main occupation of the study area, those engaged in farming still lack the incentives and necessary assistance from the government. Consequently, the level of production is still at the subsistence level.

ii. FAMILY INCOME

The opening of Jebba Dam has created some positive impacts on the family income in the study area. This is due to the developments that have taken place in the study area. Since the opening of the dam, there has been a decline in the "very poor" and "poor" income groups from 60% to 46%. The middle and high income groups have equally risen by 10% and 4% respectively as shown in Fig. 6.

Inspite of this improvement in the family income, lack of credit facilities is another characteristic of the study area. The only bank in the study area is located at Bacita, and this is enjoyed by the Company and the employees. Therefore to attain a more viable and stable income, through rural saving, there is the need to establish more banking facilities in the study area.

As mentioned in sub-section 4.4.2. the irrigation system of Nigerian Sugar Company depends on River Niger as the source of water. The construction of Jebba Dam has therefore created direct and negative impacts on the irrigation system because since the opening of the Dam, in the months of November to March, the amount of water in Niger valley is so low that the flow of water through the canal to the pump house for further distribution to the plantation become difficult. This has been creating problems of water shortages in the irrigation system which always reflects in the yield per hectares as shown in Table 4.14.

In view of the importance of the company to the study area and the nation as whole, there is the need to redress this problem.

With this assessment of the impacts of Jebba Dam on the spatio-economic characteristics of the study area and the identification of the related problems, the next chapter will therefore discuss some recommendations and proposals for the future development of the study area.

CHAPTER FIVE

RECOMMENDATIONS AND PROPOSALS FOR THE FUTURE DEVELOPMENT OF THE STUDY AREA

5.1.0. INTRODUCTION

The preceding chapter critically identified and assessed the impacts of Jebba Dam on the spatio-economic characteristics of the study area. From the assessment, some of the impacts have been identified as negative and manifesting in form of problems which are direct impacts of the dam. Other problems are indirectly related to the dam construction.

The assessment of the impacts had also revealed that all the problems indentified in the downstream are direct consequences of the drastic regulation of river flow following the construction of Jebba Dam. At the time of constructing the dam, the Montreal Engineering Consultants that prepared a report on the dam indica ted that, since the reservoir of the dam is going to be relatively small, little or no impacts will be created on the regulation of flow downstream. This is because the reservoir was to discharge water as soon as it enters the reservoir.

Since the opening of the dam however, rather than this to hold, instances of adverse changes in the river regime are being experienced in the downstream. In the years of relatively much rainfall in the study area, like in 1985, 1988 and 1991, much water is discharged to the downstream areas from the two dams. Being an unprecedented flood, much havoc worth millions of Naira are always experienced in the areas covered. Therefore, to over come these predicaments, some recommendations and proposals for implementation in the future development of study area are given below:

5.2.0. RECOMMENDATIONS AND PROPOSALS

5.2.1. Recommendations for Agricultural Development

As the root - cause of the problems is the change in the river regime, the first recommendation is for an understudy to establish a more favourable river regime in the downstream areas that will support not only the irrigation agriculture, navigation and fishing but other aspects of development on the banks of River Niger.

When a favourable river regime is established, irrigation agriculture can further be enhanced through the establishment of an effective and efficient pilot irrigation schemes by the State's Ministry of Agriculture, to serve as a forum where valuable socio-economic and technical information and data could be accumulated to serve as a basis for planning large-scale irrigation projects in the area. The availability of such a pilot scheme would have contributed much to the success of Niger Basin which had collapsed after operating for 10 - 12 years.

When a favourable river regime is established, there will be the need to introduce new fishing techniques to suit the new environment. This can best be achieved through the extension of the services of Kainji Lake Research Institute to the downstream areas rather than being confined to the Kainji Lake alone. Public participation in this approach will not only reveal the problems but also ensure an effective diffusion of the new techniques designed.

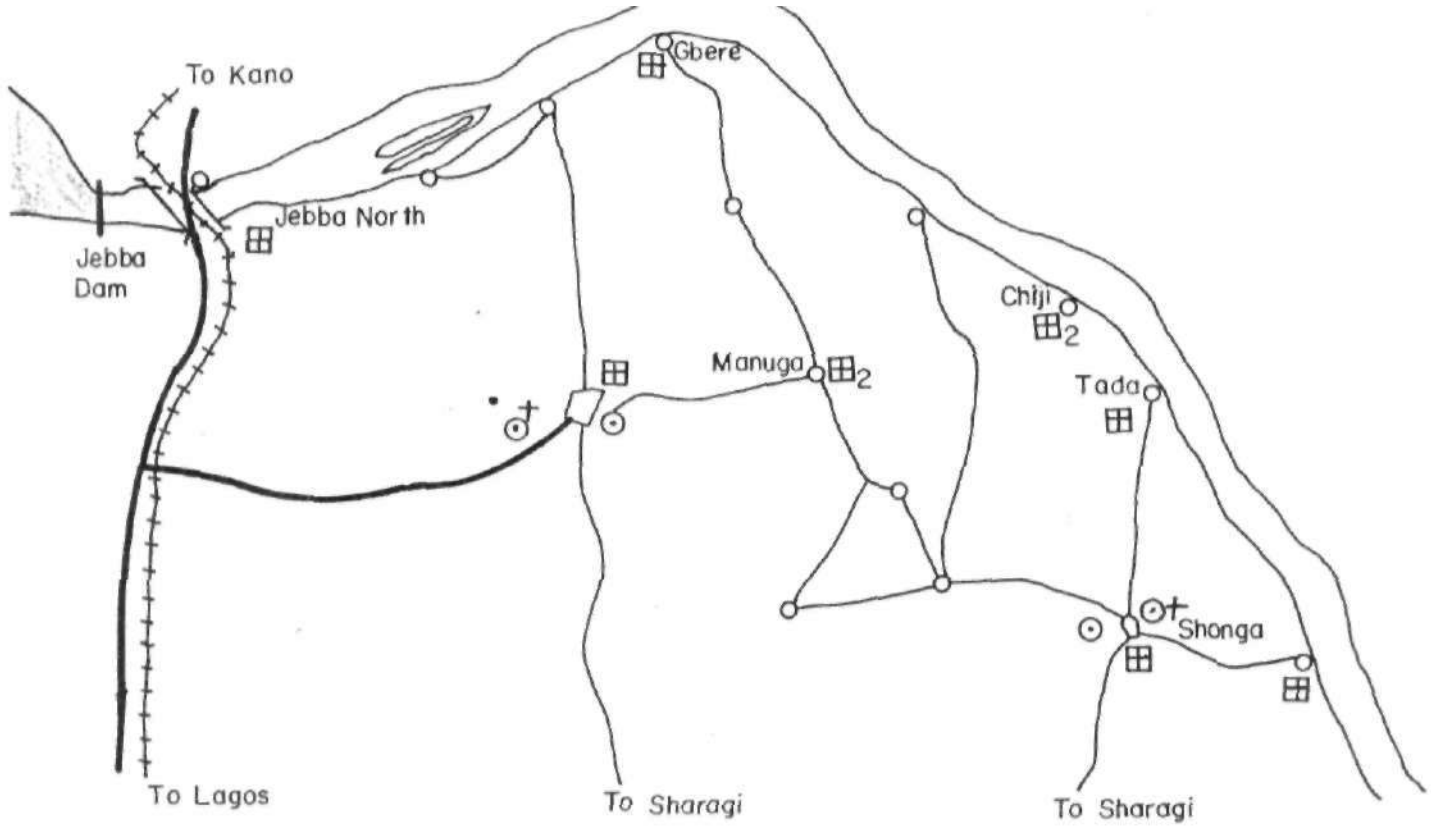
For the distribution of utilities, facilities and services in the study area, it has been observed that, the precondition for equity and balance has not been well maintained in the pattern of distribution. These utilities, facilities and services tend to concentrate at Bacita and Shonga. Therefore, to achieve an increased general welfare of the people, some proposals are given below on the projected population figures in Appendix II.

It must be mentioned here that these proposals have taken into consideration the hierarchy of the settlements for an effective demand and utilization of the utilities, facilities and services. Furthermore, the execution of the proposals have been divided into two phases each of 10 years, that is 1990 - 2000 and 2000 - 2010. Each of the utilities, facilities and services is then discussed accordingly.

5.2.2. Recommendations for Development of Health

Presently, there is only one hospital and two clinics at Bacita, while Shonga has one private clinic. Working on the adopted standards for the service units as shown in Appendix IV, it is proposed that by the year 2,000 three additional clinics be established at Bacita and one additional clinic for Shonga. Five health centres are also proposed for the settlements designated the service centres as shall be discussed later on (see Fig.5.1.).

By the year 2,010, the number of the health centres should be increased from five to seven so that with effective maintenance these health services proposed will contribute towards raising the standard of living in the study area.



LEGEND

- Existing Clinic
- Existing Hospital
- Proposed Clinics For 2,000 Years
- Proposed Health Centres For 2,000 Years
- 2 Proposed Health Centres For 2,010 Years
- Villages
- Central Town
- Roads
- Main Paths
- Railways
- Rivers

SCALE:- 1:200,000

N

FIG. 5·1
PROPOSED DISTRIBUTION FACILITIES OF HEALTH SERVICES FOR THE STUDY AREA BY THE YEAR 2,000 & 2,010

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5.2.3. Recommendations for Development of Educational Services

There are presently 12 primary schools in the study area, but going by the adopted standards, in Appendix IV it is proposed that this number be increased to 19 by the year 2,000 (see Fig.5.2).

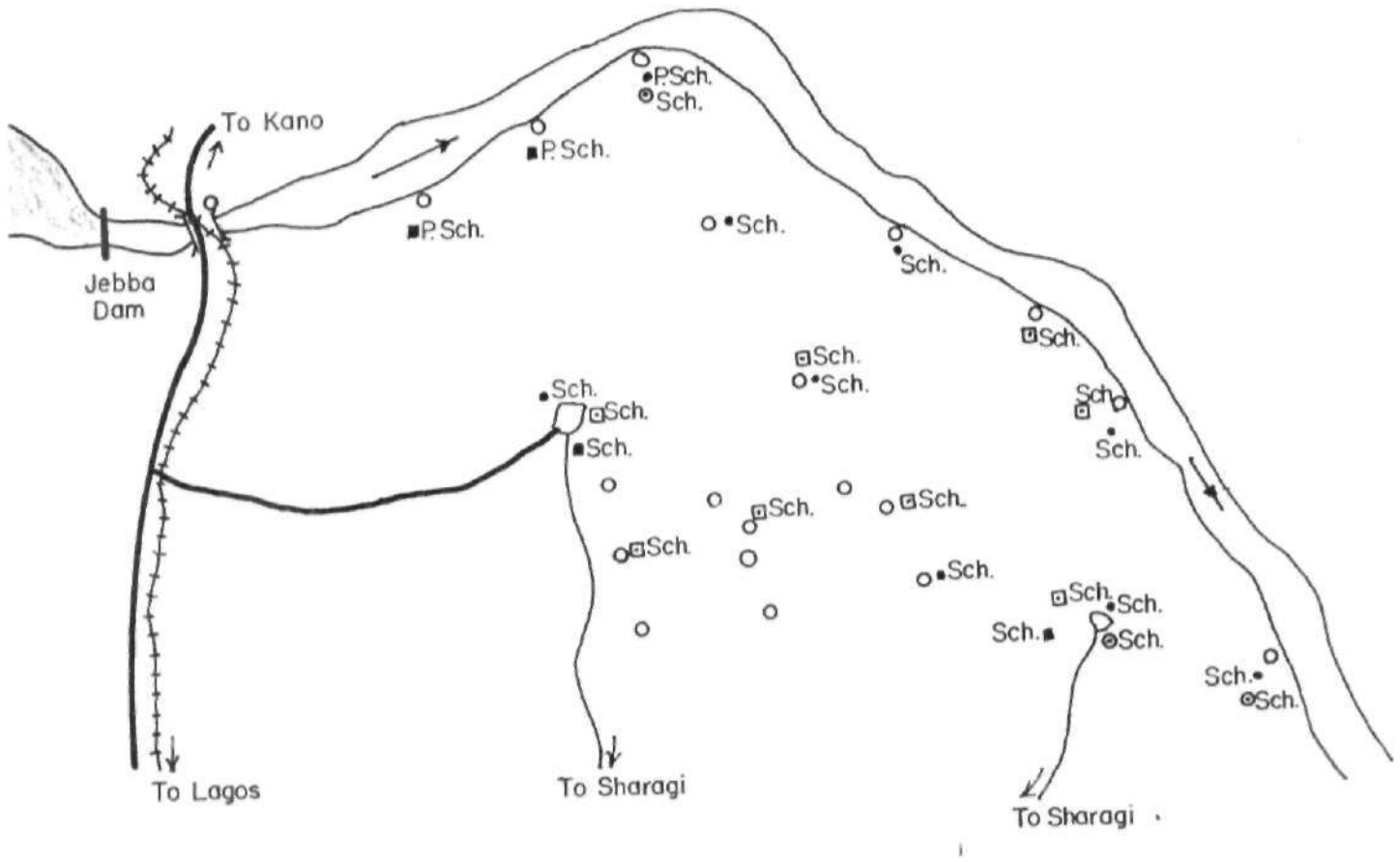
For secondary schools, there are presently only two in the study area, since the one at Shonga is a community secondary school, it is proposed that, by the year 2,000, this should be upgraded into a state secondary school. This will enable the school to enjoy more and better services and to admit more students.

By the year 2,010, it is proposed that another secondary school be opened at Gbere at the bank of River Niger. This will assist in rationing the location of the schools in the study area.

The need for these primary and secondary schools can not be emphasized since the area is educationally backward.

5.2.4. Recommendations for Commercial Development

Under the commercial activities, the proposals shall be limited to markets and banks. Presently, only Bacita and Shonga have organized periodic markets. Other settlements are characterized by unorganized market sites that are periodical too. Therefore to promote commercial activities in the study area, it is proposed that the markets at Bacita and Shonga be upgraded through the provision of market stalls and slaughter slab, and the introduction of other necessary utilities and services by the Local Government Authority.



LEGEND

o . . . . . Village

● - - - - - - Sch. Existing Primary School

⊡ . . . . . Sch. Proposed Primary School For 2000 Years

⊙ . . . . . Sch. Proposed Primary School For 2010 Years

■ - - - - - - Sch. Existing Secondary School

. . . . . Central Town

——— Roads

——— Main Path

+ + + + + + Railways

Rivers

SCALE:— 1: 200,000

N

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FIG. 5·2
PROPOSED DISTRIBUTION OF EDUCATIONAL FACILITIES FOR 2,000 & 2,010 YEARS

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It is also proposed that by the year 2,000 five more organized periodic markets be established in the study area, so that the number of these markets rises to seven. It is also proposed that the market at Bacita be upgraded into a fulltime daily market, so as to be able to serve the study area as a whole.

For the villages in the study area, some form of unorganized markets should be introduced to serve as a background for future commercial development in the area.

The establishment of banks and credit facilities has been increasing in the country as a whole. These institutions are needed to assist farmers either through offering loans or providing opportunities for rural savings.

In the study area, the only bank located at Bacita is used mainly by the Company and its employees.

Therefore to make available the banking opportunities to the rural populace, it is proposed that by the year 2,000 another bank be opened at Shonga to cater for that half of the study area. This can be through banking agencies or the State Government.

By the year 2,010, rural branches should be opened in seven settlements that are designated service centres. The overall achievement of this proposal will contribute tremendously to the economic development of the study area.

5.2.5. Recommendations for Development of Agro-Allied Industries

In view of the growing importance of farming in the study area, one agro-allied industry is proposed for the study area. This is a rice mill to be located at Shonga by the year 2,000. The proposed road network to Bacita and Sharagi will facilitate the distribution of the products within and outside the study area.

5.2.6. Recommendations for Development of Social Services

First,, as the population of the study area continues to increase, the traditional Law and Order may no longer be adequate in maintaining law and order. Consequently, in addition to the only police station at Bacita, a police post is proposed for the year 2000 and 2,010, at each of the settlements qualified as service centres.

Second, the distribution of fire service centres in the country has been predominantly concentrated in the urban centres. If an urban centre is determined by the population of 20,000, and above, (1963 census) Bacita is therefore becomes potentially viable for a fire service centre by the year 2,000 and 2,010. The existence of industrial sectors at Bacita also necessitates the establishment of a fire service centre.

3. The present hierarchy of settlements in the study area, features five orders as shown in Appendix III. This does not augur well for an efficient development because the orders are too costly to maintain and may feature instances of duplication of functions assigned to different orders.

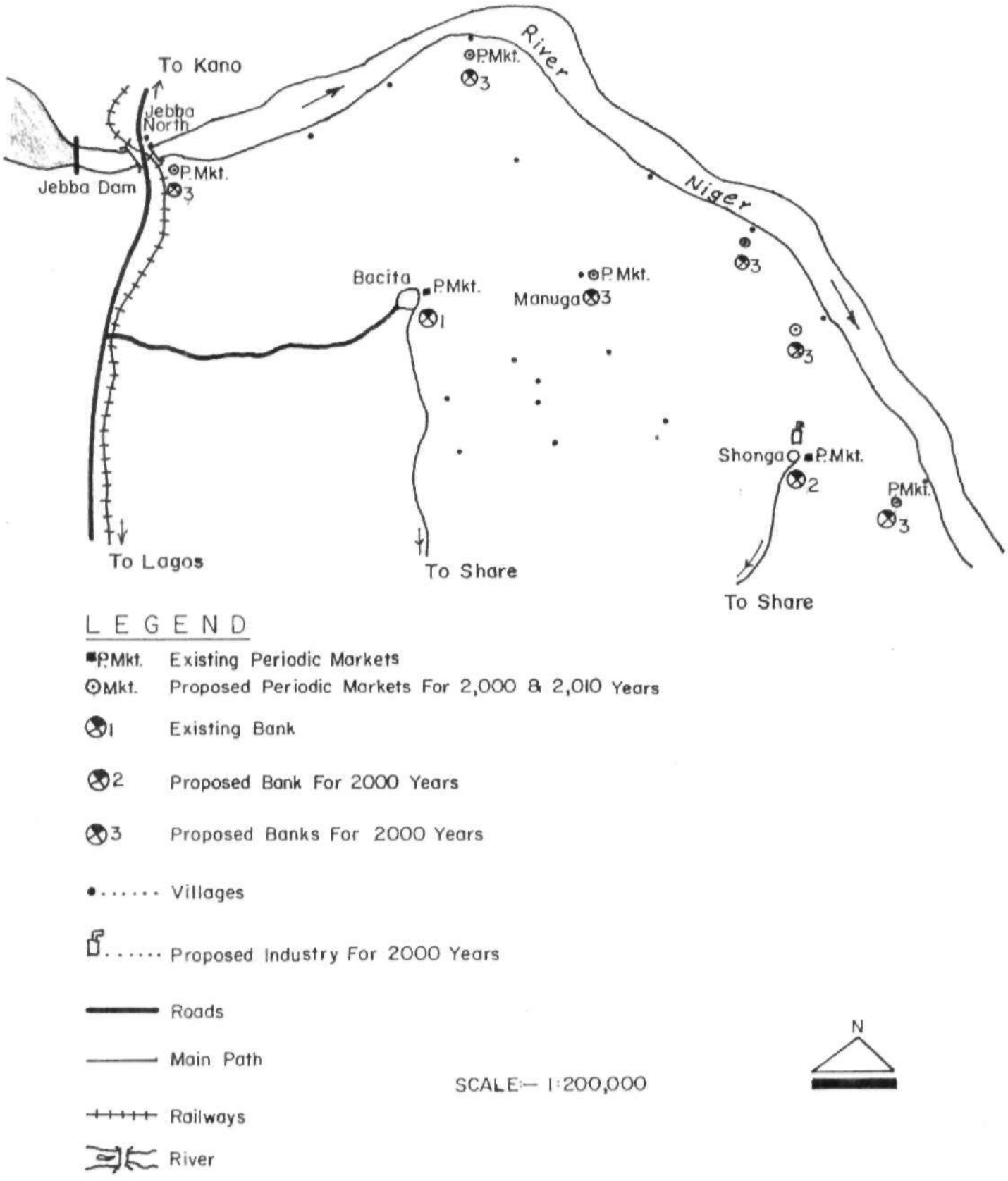
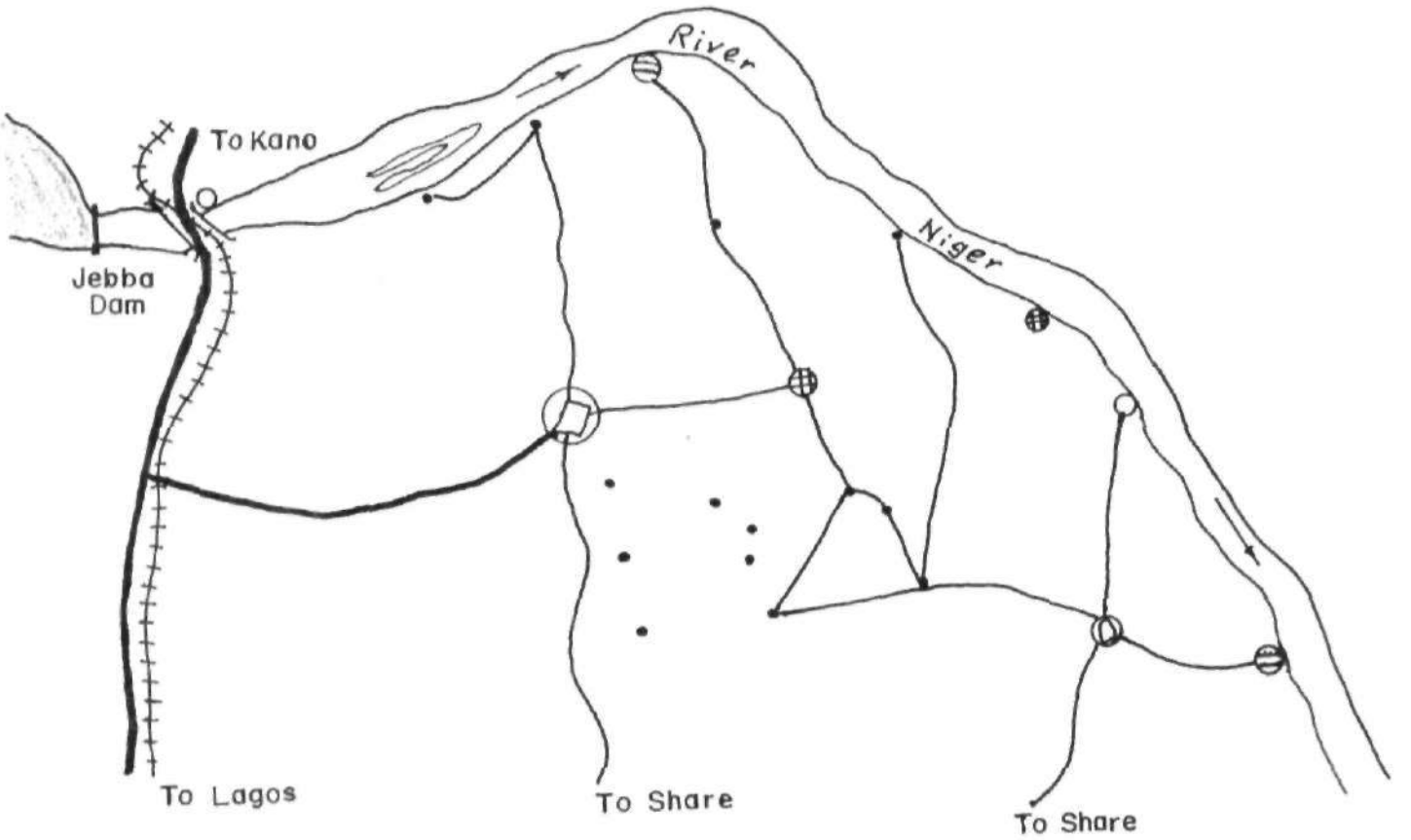


FIG. 5·3
PROPOSED INSTITUTIONAL FACILITIES AND SERVICES FOR THE STUDY AREA

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Central Town

Present Service Centres

Proposed Additional Service Centres For 2,000 Years

Proposed Additional Service Centres For 2,010 Years

Villages

Roads

Main Path

Railways

River

N

SCALE:— 1:200,000

FIG. 5·4
PROPOSED HIERACHY OF SETTLEMENTS FOR 2,000 AND 2,010 YEARS

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Therefore, depending on the population sizes of the various settlements, (Appendix II), location and accessibility to each of the settlements and the services rendered by the individual settlements to the neighbouring settlements, three orders of settlements hierarchy have been worked out. These are the central town, service towns and villages.

i. CENTRAL TOWN Presently, Bacita with the population of 20,000 stands out as the settlement, most qualified for the place of a central town. Its present characteristics and functions, further qualifies it for this position even by the year 2,010. Then it will be serving a population of 73,135.

ii. SERVICE CENTRES In view of the low population of the study area, the proposed service centres are settlements with a population of 2,000 and above. Presently, the settlements qualified for this position are Shonga, Jebba North, and Tada, By the year 2,000, with the projected population figures in Appendix II Ogudu and Gbere will be upgraded to the post of service centres, and by then, each will be serving a population of about 11,701.

By the year 2,010, Manuga and Chiji will add to the number of service centres making seven, each serving a population of about 10,448 people.

iii. VILLAGES All the other settlements with populations under 2,000 and depending on the services provided at the higher order centres belong to this category. The proposed hierarchy of settlements is shown on Fig.5.3.

4. As mentioned earliar, the study area, is characterized by a poor road network which is due to the physical characteristics of the area. The only tarred road in the area, is that which links Bacita to the main Lagos to Kano Road. Apart from this, other roads are the all-weather types linking most of the settlements. For an effective spatial organisation, some of these roads require upgrading or reconstruction.

In developing the road network of the study area, some precaution must be taken against difficult terrain and areas usually affected by the recurring flood. In integrating the road network to the hierarchy of the settlements, it is proposed that the central town be on a major highway. Bacita which is the central town of the study area is however not on the highway, but its proximity to the nearest highway (Lagos - Kano Road) justifies this requirement.

The service centres, on the other hand, should be linked with secondary roads. Recently most of these secondary roads are the all-weather types while some are seasonal. Consequently, it is proposed that all the seasonal roads like Shonga - Ogudu and Shonga - Tada and so on, must all be upgraded into all - weather types.

For the central part of the study area, the foot paths that dominate the transport network should be upgraded into tertiary roads through Community Development. This will help in opening up those interior areas for commercial opportunities.

It is also proposed that by the year 2,000 the road linking Bacita to Shonga and Shonga to Sharagi be tarred by the State Government for better accessibility of the study area.

5.3.0. IMPLEMENTATION

To be able to achieve the successful implementation of these recommendations and proposals made above, the execution has been divided into two phases each of 10 years. This is because of the slow nature of development in the study area. The rate of population growth is also one of the lowest in the country, and since the execution of the proposals relies on the population, the 10 year phasing seems more appropriate.

Since Jebba Dam came into operation, NEPA had been the authority overseeing all her operation and maintenance. The authority to certain extent has also been abetting some of the problems created directly by the dam. In the years of much rainfall for instance, NEPA tries to send information to the all the Local Government Chairmen, the traditional Rulers and the Management of all the Industries located at the banks of River Niger downstream. In most cases, these information get to these people lately, so that, there is practically no time to prepare for the flood. So that when much water is discharged to the downstream as flood, lots of properties are always destroyed. Because NEPA will always claim to have given prior knowledge, the inhabitants who bear such losses are hardly compensated.

In the months of November to March on the other hand, in an attempt to store enough water in the reservoir for the generation of electricity (which is the primary objective of the dam) only very little amount of water is discharged to the downstream. This in turn creates hardships on the activities of the downstream directly depending on River Niger. These situations illustrate the monopoly enjoyed by NEPA on the discharge of water to the downstream. Therefore to break this monopoly and effectively implement the proposals, a Niger valley Authority should be established, to oversee the implementation of all the development programmes in Niger Basin.

The membership of this authority should include NEPA. Representatives of all the on - going projects related to River Niger, like the Nigerian Sugar Company, Niger River Basin Development Authority, Kwara Agricultural Development Project and so on. Other members of the authority should include, representatives of the states and local Governments and Traditional Rulers whose territories bound River Niger and Professionals on those aspects related to the river like fishery officers, climatologists planners etc. The successful establishment of this authority will not only provide more accessibility to the understanding and solving of the problems created by the dams in the downstream, but contribute towards the successful and articulated development of the study area. This authority will also provide a more appropriate forum for the execution of the proposals made above.

5.4.0. FUNDING

The translation of the above proposals into reality depends on the availability of funds. To achieve this will involve all the tiers of the Government, the Companies in the study area and community participation.

Generally, the tradition in the study area is that Government provides all utilities, facilities and services.

With the recent change in the execution of projects, whereby, Government is now transfering responsibilities to the communities, the need for community participation cannot be ruled out. To be able to involve the inhabitants in executing some of the proposals, much mobilisation will be required to seek for the peoples' contribution in for example, the rehabilitation of roads and similar projects.

From the past experiences, agencies like Niger River Basin Development Authority and Kwara State Agricultural Development Project have been contributing to the development of the study area, through the establishment of utilities, facilities and services and construction of roads. Further involvement of these agencies and the Nigerian Sugar Company will contribute to the successful implementation of the proposals.

Finally, the state and local Government in particular, have the challenge of contributing financially to the execution of the proposals and also overseeing the implementation exercise. This is because the study area is located within Edu local Government Area of Kwara State.

5.5.0. SUMMARY AND CONCLUSION

Dams constructiln is presently a common feature of development in many developing countries. Such programmes usually involve many projects, depending on the purpose of the programme. However, when in operation, these dams always generate both positive and negative impacts on their immediate environments. Some of these impacts are foreseen and so always catered for at the design stage. Others unforeseen are peculiar to the downstream areas of the dam and usually receiving no attention.

This study has been able to establish that Jebba Dam construction had created much unforeseen and negative impacts on the downstream areas, most of which are presently problems in the study area, and the downstream as a whole. And, because Jebba Dam is a single - purpose project, that is, only aimed at generating electricity, no attention has been paid to these problems featuring in the downstream. Some recommendations and proposals have therefore been given for future development of the study area and the downstream in particular.

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APPENDIX 1

THOSE ASPECTS OF THE JEBBA ENVIRONMENT

THAT RECEIVED THE IMPACT OF THE JEBBA DAM

IMPACT OF THE DAM	NATURE OF THE IMPACT			
ASPECTS	DIRECT	INDIRECT	POSITIVE	NEGATIVE
1. Human Aspects				
a. Settlement pattern and location in				
i. Upstream	✓			✓
ii. downstream	✓		✓	
b. Occupational pattern	✓			✓
c. Income/Welfare	✓		✓	
2. Land				
a. Soil suitability and distribution				
i. Upstream	✓			
ii. downstream	✓		✓	✓
c. Natural Drainage	✓		✓	✓
3. Water				
a. Flow variation in the downstream	✓			✓
b. Degree of suspended solids in the water	✓			✓
c. Aquatic life				
i. Upstream	✓		✓	

ASPECTS	IMPACT OF THE DAM		NATURE OF THE IMPACT	
	DIRECT	INDIRECT	POSITIVE	NEGATIVE
ii. downstream	✓			✓
4. Ecology				
a. Fish				
i. upstream	✓		✓	
ii. downstream	✓			✓
b. Crops				
i. upstream	✓			
ii. downstream	✓		✓	

APPENDIX II

THE POPULATION FIGURES OF THE SETTLEMENTS IN THE STUDY AREA

SETTLEMENT	1980 POPULATION	1990 POPULATION	200 PROJECTED POPULATION	2010 PROJECTED POPULATION
Jebba	1688	2250	2813	3516
Yelwa	923	1230	1538	1923
Belle	893	1190	1488	1860
Bacita	15000	20000	25000	31250
Gbere	1388	1850	2313	2891
Fanagun	671	895	1119	1399
Manuga	1013	1350	1688	2110
Chiji	998	1330	1663	2079
Tada	1875	2500	3125	3906
Kusogi	821	1095	1369	1711
Patiekun	570	760	950	1188
Kanko	885	1180	1475	1844
Shonga	3788	5050	6313	7891
Ogndu	1485	1980	2475	3094
Chita	638	850	1063	1329
Ndabata	623	830	1038	1298
Etsukoto	563	750	938	1173
Ndacesaba	698	930	1163	1454
Sunasun	585	780	975	1219
TOTAL	35,105	46,800	58,506	73,135

APPENDIX III

HIERARCHY OF THE SETTLEMENTS IN

THE STUDY AREA (1991)

ORDER	SETTLEMENTS	POPULATION	AVAILABLE U.F.S.
1	Bacita	20,000	Primary and secondary schools. Clinics, Hospital Industries, Rest Houses, Police station, Motor Park, Filling station, Local Government Offices, and Regional Market.
2	Shonga	5,050	Primary and secondary school, Clinic, Police Post, N.R.B.D.A. Office, Rest House, and Regional Market
3	Jebba North, Tada, Gbere and Ogudu	1850 - 2510	Primary schools, Clinics Agric Extension offices, and periodic markets
4	Belle, Kanko, Yelwa, Kusogi Manuga, Chiji	1095-1350	Primary schools, Boreholes and unorganized markets
5	Patiekun, Chita Fanagun, Ndace-saba, Suasun	760 - 895	-

Source:field survey 1991.

APPENDIX IV

SERVICE UNITS AND THEIR RESPECTIVE

(ADOPTED) STANDARDS FOR THE STUDY AREA

SERVICE UNIT	CRITERIA	2000	2,010
1. Hospital	Urban centre	1	1
2. Clinic	1 in a settlement of over 5000 people	6	6
3. Health centre	1 in every service centre of 2000 and above population	5	7
4. Primary school	1 to 3000 people (UPE standard)	19	24
5.			
5. Secondary school		2	3
6. Police station	1/100,000-3000,000	1	1
7. Bank	1st Order settlement	1	1
Rural Banks	Service centres	5	7
8. Fire service	1st order settlement	1	1
9. Market			
10. Pipe borne water	Population above 7,500	-	1
11. Wells	1/500 population	67	79
12. Agro-based industry	Economy - expediencing	1	-