

**THE IMPACT OF USUMA DAM ON THE  
SURROUNDING SETTLEMENTS**

BY

**EKAETE ANDY AKPAN**  
PGD/GEO/2001/2002/256

DEPARTMENT OF GEOGRAPHY  
FEDERAL UNIVERSITY OF TECHNOLOGY  
MINNA, NIGER STATE

SEPTEMBER, 2003

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A PROJECT SUBMITTED TO THE  
  
DEPARTMENT OF GEOGRAPHY  
FEDERAL UNIVERSITY OF TECHNOLOGY  
MINNA, NIGER STATE

IN PARTIAL FULFILMENT OF THE REQUIREMENT  
FOR THE AWARD OF POSTGRADUATE DIPLOMA  
IN ENVIRONMENTAL MANAGEMENT  
(PGD ENVIRONMENTAL MANAGEMENT)

**SEPTEMBER, 2003**

## **ACKNOWLEDGEMENT**

All praise and thanks goes to Almighty God for His sustenance and making it worthwhile to successfully complete this work.

I wish to express my gratitude to Baby David Unachukwu and Mr. O. Unachukwu for their support and assistance in the course of this study.

I am highly indebted to my parents for their love, prayers and confidence reposed in me to attain greater heights in life. I equally appreciate the tremendous support and assistance rendered to me by staff of Usuma Dam. I equally thank them all for the invaluable materials made available to me.


I am full of thanks to my classmates for their friendship, sincerity and above all being nice to me all this while.

I must also thank all staff of the department of Geography (academic and non-academic) for their support and encouragement in the course of this study. I am particularly grateful to my supervisor Dr. P.S. Akinyeye who inspite of his numerous official and personal engagements took time to scrutinize this project. He equally offered useful comments and constructive criticisms that culminated to the successful completion of this work.

Finally, I wish to express my profound gratitude to those people who in one way or the other contributed to the success of this work. I sincerely thank them all.

## CERTIFICATION

This is to certify that this Project work was undertaken by EKAETE ANDY AKPAN and approved as meeting the requirement for the award of Postgraduate Diploma (PGD) in Environmental Management in the Department of Geography, Federal University of Technology, Minna, Niger State, Nigeria.

  
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## DECLARATION

I declare that this project titled "Socio-economic impact of Usuma Dam on the surrounding Settlements" is my own work and has not been submitted to any University or Institution for whatever reason before.

Information derived from published and unpublished works of others have been duly acknowledged.

.....  
EKAETE ANDY AKPAN

.....  
Date

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# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 An overview of Dam in Perspective

A dam is a structure designed and constructed as an effective means of regulating the flow of a river and storage of water that would otherwise go to waste through loss to the sea (Abubakar, 1997).

Through history, society has been the instigator of engineering works especially dam construction. Construction of dams became a necessity when the assurance of dependable sources of water became a societal requirement. Dams have influenced the rise and fall of civilization since early times, especially those cultures highly dependent upon irrigation. Many of the structures failed as subsequent generations lost the knowledge necessary to maintain or re-construct the dams.

Evidence exist that dams were used at least 5000 years ago in the cradles of civilization in Babylonian, Persia, Egypt, China, and India. In 1300 BC a 6m high rock dam was built at Orontos in Syria is still in use. Babylonians and Persians built dams for water supply and irrigation because rainfall was not ample and well distributed throughout the year.

Early dams in Europe were limited to reservoirs for towns, driving water mills and replacing water losses in navigation canals. Not until this century, however, have dams in many parts of the world become truly multi-purposes, with emphasis on power generation, irrigation and water supply.

An important stimulus to dam construction has been the tremendous growth in demand for domestic and industrial water throughout the world. A hundred years ago piped water systems were rarely in even the great cities of the world but now they are common place for many of these

systems. River water has to be stored by dams to provide a dependable supply and most of the urban population of the world now depends on reservoirs for their water.

Without the exploitation of rivers, the world would be a very different place. Life for many of the people in the great basins of the world would have been cycle of drought, floods and famine. In the days before irrigation was introduced, a severe drought in China or India could kill a million people. Without dams and reservoirs, the towns and cities of the world would face desperate water shortages. Some cities rely heavily on underground water, but aquifer depletion is now widespread and store water is needed increasingly to compensate for the (over pumping) of ground water.

## **1.2 Historical Background of Dams in Nigeria**

The first attempt at dam construction in Nigeria can be said to be the building of low barrages and dykes in the Sokoto basin in 1918 and subsequent years. But the first set of real dams was built in the 1950s. They were usually small concrete dams designed to supply water to towns or group of towns. By 1960s, about 67 towns mostly located in these areas were being supplied with water from reservoirs created by the construction of such dams. Since then a large number of dams have been built in the country. They are of various sizes from the very small earth dams for small-scale irrigation and livestock watering to the large multi-purpose ones on major rivers. Dams in Nigeria may be divided into four (4) main types.

Firstly, there is the municipals for water supply to towns and occasionally to surrounding rural areas, they are numerous. Oyo and Osun States have larger numbers than other States (NEST, 1991). Examples of municipal dams are Birnin-Gwari and Kubanni all in Kaduna State and Kogin Gira, Laminga and Shen all in Jos, Plateau State.

The second type of dam is the multi-purpose dam whose main objective is the generation of electricity. Some of these dams were found in the middle belt of the country. The Kainji dam on the River Niger, which is the first major multi-purpose dam in Nigeria and still the largest, was

completed in 1967. Its main objective is electricity generation while secondary objective include downstream irrigation, especially of sugar cane at Bacita, flood control, fishery development and year round navigation downstream of the dam. Other dams in this category which have since been built include the Jbeba dam on the River Niger and Shiroro George dam on the River Kaduna.

The third type of dam in Nigeria is the multi-power dam with two main objecties. The first being irrigation and supply of water to the town and villages. A large number of such dams have been built in recent years in Kano, Kaduna, Katsina, Sokoto, and Niger States.

The fourth type of dam in Nigeria is the small earth dam built primarily for small-scale irrigation, livestock irrigation and fish farming. A large number of such dams have been and are being built by government agencies, agricultural enterprises and private individuals. Examples of such dams are located in Niger State which include Tagwai dam, Chanchaga dam, Zungeru I and II dams in Niger State.

### 1.3 Problem of Statement

Water is basic to all human needs. So much importance is placed on the water that early settlers in most cases settled along river/streams. Living by water sources especially perennials ones therefore is a justifiable site location criterion (Adakaji, 1991).

Nigeria has a large number of dams, some of which are Tagwai dam, Usuma dam etc. These dams have altered the terrestrial environment in which they are located.

The socio-economic effects of dams could be dangerous in nature, and such impacts could be economical, social, physical as while as biological. The economic effects are often associated with the intolerable dbet burden imposed by the companies/ countries that build the dam. The social effects include the displacement of people from their original homes of residents and the destruction of historical monuments and farmlands. The physical effects are flooding,

sediments pollution, local microclimate change at the dam site and erosion. The biological effects are the spread of water borne diseases such as malaria, typhoid fever etc.

To understand these impacts and possible ways of solving them constitute the backbone of this study.

#### **1.4 Aims and Objectives**

The aim of this study is to assess the socio-economic impact of Usuma dam on the environment. This is to serve as a reference study for urban and regional planners, hydrologists, environmentalists, agro-climatologists, geologists, soil scientists, architects and landscapers, and also taking into consideration the land use map and questionnaires, the socio-economic impacts of the dam could be determined.

Under this general aim, the specific objectives are:

- a. To study the land use and land cover classification.
- b. To study the local microclimate during the pre-dam and post-dam periods.
- c. To analyse the socio-economic impacts of the dam on the environment.

#### **1.5 Justification of the Study**

Constructions of dams in the country are given too much of structural or engineering consideration with little or no consideration on the socio-economic impact assessment. After the design and construction of these dams, the socio-economic problems arise. This problem is usually devastating and often has effect on the settlements.

It is in the light of this that the socio-economic impacts of Usuma dam have been adopted with a view of finding solutions.

#### **1.6 Scope and Limitations of the Study**

This study covers the river, the dam and Bwari settlements. Both the land use and land cover parameters were used. Respondents' questionnaires were also used and data were collected from Water and Sanitation Board and other sources.



## CHAPTER TWO

### 2.0 STUDY AREA

The study area is Usuma dam located in the Federal Capital Territory of Abuja. The dam has a catchment area of about 53.04sq-km and a surface area of 550ha. The state of the dam is seasonal, and has the average annual rainfall of about 1500mm with average annual run-off of about  $25 \times 10^6 \text{m}^3$ . The dam has a maximum flood level of 257.5MOD.

It was constructed to supply water for the Federal Capital Territory. The water is also used for other purposes such as fishing and for agricultural purposes.

### 2.1 Geographical Background of the Study Area

The description of the geographical background of the study area takes into consideration climate and physiographic aspects, which includes vegetation, soil, terrain features and hydrogeological features. The land use, land form and population were also considered.

### 2.2 Climate

The annual rainfall amount has been estimated to be between 1300mm and 1500mm, with an annual runoff of about  $25 \times 10^6 \text{m}^3$ .

The relative humidity for the water shed ranges from 28-82.5% during the pre dam period, while the post-dam value ranges between 40-80%.

Long hours of sunshine combine with radioactive power across the study area result in high drying power across the entire area. The planning implications of these features relate to water storage deficit during the period when discharge exceeds recharge. This normally occurs in the months of October through May (Adefolalu, 19910).

### 2.2.1 Soil

The soil is a ferruginous soil which develops in tropical savanna or bush land zones with dry season. This allows the growth of broad leafy trees that for woodland under conditions of adequate moisture and relatively high temperature. The surface soils are usually loamy. Most of these soils are gravel type except the soil formed on alluvial/colloidal materials. The sub-soil texture is sandy-clay loam to loamy soil.

### 2.2.2 Vegetation

The vegetation of the watershed is guinea savanna. There are marked differences, which occur at intervals both in floristic composition and the open character of the vegetation. This is often caused by variations in soil types, topography, groundwater situation and human interference.

The vegetation is composed of mainly trees with shrubs and grasses. The trees are short with broad leaves and about 16.5m in height. Most of the plants in other areas are shrubs with scattered trees most especially *Azadirachta indica*, *Azadirachta africana*, *Parkia clappertonia*.

## 2.3 Other Physiographic Aspects

### 2.3.1 Hydrological Features

The river is a tributary to Kaduna river which flows. It takes its source from the North-central Plateau.

The surface hydrology has the problems of low base flow of the river. The storage does not sustain river flow during extended dry season. These seasonality characteristics of these rivers depend on rainfall. It is obvious therefore that the volume of the river varies with the quantity of the supply of rainwater. Thus, in the wet season, the dam swell in volume with ranging torrent while in the dry season they may dwindle or dry up (Abubakar, 1997).

### **2.3.2 Terrain Features and Geology**

The topography is highly undulating and varied in heights and isolated hills are common. The study area is underlain by rocks of the Precambrian Nigerian basement complex with outcrops prominently all around.

Gneiss and schist, which are Precambrian metamorphosed sediments, underlie most of the reservoir area. The massive biotite granite rocks later intruded the schist and gneiss.

### **2.4 Population**

The population of Bwari from the 1991 Census record shows that the town has an approximate population of about five hundred thousand (NPC, 1991).

From the available data which shows that the young are having a higher number than old men and women. The population of young/adult is 50% and the old men are 20%, whereas the women constitute 30%. Most of the people in Bwari where the dam is located, are students of the Law School. This attract many commercial activities ranging from Business centre, supermarkets and so on.

The population was said to be less than a hundred thousand during the pre dam period, while the post dam period shows a remarkable increase in the number of people in the area due to the construction of the dam and the establishment of the Law School.

The major languages in the study area are, the Gwaris, Gwandara and a few Kadara. Other major languages include Hausa, Yoruba and Ibo. These major tribes migrated to the study area due to the establishment of Federal Capital and the Federal Institutions.

The major occupation is fishing as a result of the dam, whereas the young/adult men are the ones that are engaged in the fishing activity. The women on the other hand are engaged in farming and few of them are engaged in farming and a few of them are involved in fishing.

There is also the practice of dry season farming as a result of the available water. That is, the irrigation system of farming. It should be noted however that the main reason for the establishment of the dam is to supply or provide water for the inhabitants of Federal Capital Territory. Pipes are being laid from the dam to various parts of Abuja, the recent being that of the Gwagwalada Water Works.

## CHAPTER THREE

### 3.0 LITERATURE REVIEW

The impact of reservoirs on the environment takes many forms and affects its various elements, hydrological regime in the headwater and tail water of hydroelectric stations right up rivers mouths, water ground ecosystems, the populations, social and economic living conditions (Avakyan, et al, 1977).

The extents of socio-economic changes are greatly influenced by parameters, operational regime and geographical emplacement of reservoirs. In turn, the degree of potential impact of planned reservoirs on the environmental influences the choice of their parameters and operational regime.

Hafez et al. (1977) in a study of the environmental impacts of the Aswan High dam attributed riverbed erosion to the sediments trapping. They observed that clean water flowing through the river causes erosion to the riverbed and banks and to some extents, to installations along the Nile.

Rutter et al. (1964) also stated that reservoirs generally lower peak discharges in downstream areas but the impacts of reservoirs on stream regime are variable since such impacts depend on individual's operational schedules of such reservoirs. Furthermore, they have argue that the effects of several reservoirs within a single drainage basin may be extremely complex in a downstream location.

They also noted in this study that there are two types of socio-economic impacts identifiable on the receiving regions. These are positive and negative impacts. Those regions which are largely rural areas, slows an increased in tempo of immigrant communities in the labour of such as agriculture, fishing , trading etc. Studies have also further shown that migrants have played

leading role in large scale plantations, irrigation, fishing and farming in some African countries. They went further to observe that settlements built in this areas were virtually uninhabited or being habited by small number of farming groups and fishing as a result of migration. Consequently a number of infrastructural and social services such as road network, education, health etc. have developed.

On the other hand, some large urban centers have not positive or advantageous impacts on their regional development as a result of migration observed. Though the socio-economic activities have contributed remarkably to developments in such areas as commerce, personal services and manufacturing industries, they also have contributed in no small measures to social, economies and physical problems. Such problems include lack of adjustment and identification with their host communities, which has resulted in development of slums and the worsening of housing shortages. These have contributed to slowing down the process of regional development.

Onimode (1977) stated that the physical environment residence or neighbourhood of individuals also exert differential impact on incomes in urban and rural areas. In particular, the concentration of schools, hospitals and other basic amenities in urban areas greatly has had the potential for job opportunities hence higher labour income earning of individuals who move into this dam areas.

The socio-economic impacts of dams of any environment are determined by the kind of activities and irrigation being undertaken. The kind of activities exhibits on these dams influence its functions.

David (1981) implied that the term economic impact is usually taken to refer to the effect on such economic conditions as level of output, employment or income.

In summary, the impact of any growth parameter such as dam, industry, establishment or any other major activity is felt in a variety of ways. Setting up a dam will have both the positive and

negative impact on the local economy (Though the acquisition of inputs, the disposal of outputs and the generation of income). It may also effect the physical environment through site construction, new structures due to expansion, the generation of affluent. It also affects the cultural life of inhabitants, due to the introduction of new people and system of farming. There are the human socio-economic regional changes and that for a region, for the economic structure of the region to take place.

The conclusion drawn from the study was that there was a serious increase in population during the post-dam period resulting to a change in landuse from the Fadama to mainly rain-fed had occurred.

## CHAPTER FOUR

### 4.0 METHODOLOGY AND DATA COLLECTION

This project work requires information on socio economic impacts which can help to explain behaviour/occupation of the settlers in the study area.

#### 4.1 Data Collection

Two methods of data collection were employed to extract the required information.

##### 4.1.1 Data from Primary Source

Bulk of the information was obtained using direct method of investigating through questionnaires. This instrument (questionnaire) would extract information.

##### 4.1.2 Data from Secondary Source

Most of the data derived from this source are either published/ unpublished literature. Others include topographic map of the study area which was published by the Federal Survey of Nigeria and was acquired from FCT Water Board including Journals and Reports. However, it should be noted that the information collected, presented and analyzed were limited to cover the scope of the study and also for the purpose of enhancing through analyses.

#### 4.2 Data Analysis

The method of data analysis used in this study is mainly the use of questionnaire. The questionnaires of the study area are virtually interpreted with a fore knowledge of the basic socio-economic impacts of the people in the study area.

#### 4.3 Ground Data

Ground data, generally referred to as ground truthing, which is the observation, measurement and collection of information about the actual conditions on the study area. This was embarked upon in order to determine the relationship between the social aspects, and the



economic activities of the study area. Note that ground data collection should be undertaken during data acquisition by the use of questionnaires, to determine any possible changes.

During the ground truthing, the following observations were made: There is a change in the land use, change in the vegetation of the study area and also change in the vegetation of the study area and also changes in the socio-economic activities were also noted. This is favoured by the fact that the changes were noticed during the pre-dam and the post dam periods, during which the ground truthing was conducted.

## CHAPTER FIVE

### 5.0 DISCUSSION OF RESULT

This chapter discusses the analysis on which the objective of the study was based. This will cover the analyses of the landuse and landcover classification, the analysis of the local micro climate during the pre-dam and post-dam period, analyse the socio-economic impact of the dam on the environment and the analysis and discussion of the questionnaires administered to individuals at the location of the dam.

### 5.1 Analysis of the Landuse and Landcover

For a proper assessment of the vegetation with the study area, a broad knowledge of the landuse and landcover information must be acquired as they serve as ingredient in any planning and resources management activities concerning the surface of the earth.

The term land cover relates to the types of features presents on the surfaces of the earth. Urban buildings, lakes, vegetation are all examples. Landuse on the other hand relates to the human associated with a specific piece of land. As an example, a tract of land on the fringe of an urban area may be used for single family housing. Depending on the level of mapping detail, its landuse could be described as urban use, residential use or single family residential use. The same land could also consist of land cover as roofs, pavements, grass and trees, Lillesand and Keifer (1987).

However, to afford an effective assessment of the landuse and landcover classification within the study area. The landuse and landcover classification system by the United State Geological Survey was adopted. But for the sake of this study the level I and II are chosen, with emphasis on the classes peculiar to the study area as given in Table 5.1.

**Table 5.1: Study Level**

Level I	Level II
Agricultural land	2.21 Cropland and pasture
	2.22 Orchard, Grooves and Nurseries
	2.23 Other Agricultural land
Rangeland	3.31 Herbaceous Range land
	3.32 Shrubs and Bush Rangeland
	3.33 Mixed Rangeland
Water	5.51 Stream and Canals
	5.52 Reservoirs
Wetland	6.62 Non Forested wetland
Barren land	7.73 Sandy areas other than Beaches
	7.74 Bare exposed Rocks
	7.75 Mixed barren land

Source: FCT Water Board

Cropland refers to land basically used for crop production. From the table above it was observed that only a few part of the study area was used as cropland. Notable croplands were found existing a bit far from the dam and along the river channels. Terrace farming systems were common due to the undulating structure of the land, which may have been brought about by construction of the dam. Plants especially grasses of stunted growth were identified with the cropland.

Orchards, Nurseries and Ornamented horticultural areas were present along the course since the soil remains wet with these areas. This was attributed to the presence of a fringing forest noted along the river course. This comprises mainly savannah and humid trees and shrubs with health dark green leaves.

Other agricultural land involves all the potential farmland masses that are poorly developed, covered by the shrubs and grasses noted with stunted growth. This occupies a vast portion of the study area. Herbaceous rangeland areas were identified to exist in some parts of the study areas. Shrubs, bush rangeland and mixed rangeland were identified to exist in most parts of the stud area without boundary.

Streams, drainage and reservoirs were also identified, particularly the Usuma dam occupying part of the study area was characterized by the accumulation of sediments and number of water loving plants found inside it. The stream and drainage identified include the main river Bwari and a small tunnel beneath the concrete that flows into the main river. The part of the channel is characterized by rich vegetation comprising shrubs and grasses with healthy green leaves. Non forested wetlands were also identified close to the reservoir.

Sandy areas were also identified especially in the areas nears the reservoir. The areas as observed have little or no vegetation as sandy soil rarely support plant growth. Also bare exposed rocks are peculiar features with the study area. There was also the existence of a solid concrete

structure resembling a built up that border the reservoir from the main land area. Other than these, hamlets and network were also identified.

As observed on the study area, an attempt was made in expressing each vegetation cover as a percentage of the land total area, as given in Table 5.2.

Vegetation	Percentage
Trees/Forest	5
Shrub	45
Grass	5
Farmland	20
Bareground	25

Source: Author's Fieldwork.

## 5.2 Analysis of local microclimate during the pre-dam and post-dam period

Local microclimate changes usually occur at dam site during the pre-dam and post-dam periods precisely from 1960 to 2000. Evaporation and humidity tend to increase because of the large area of the dam within this period mentioned above and temperature was found to be low at dam site especially around the dam area.

Generally, the water that is lost as a result of evaporation induced by high velocity wind in a hot dry region is quite noticeable, because of the flat floor of most reservoirs in Nigeria. High evaporation could be induced during the dry season (Abubakar, 1997).

### 5.2.1 Rainfall Erosivity at the dam site

Rainfall erosivity is the potential power of rainfall to cause erosion (Stocking, 1987). The efficiency of this power have been recognized by Meyer et al. (1969) who have related soil erosion to the rate

of detachment of soil particles from the soil mass by rain splash and run-off and capacity of these two processes to transport the detach materials downslopes.

It is quite noticeable that the rate rainfall erosion has increase from its initial stage of 3 metres per year to about 6 metres per year as a result of the constant availability of water in the study area. Although rainfall erosivity was more intense in the post-dam period unlike in the pre-dam period where it was less than 3 metres.

### 5.2.2 Water Balance

The water balance of Usuma dam has been calculated by using the Thornwaite's (1940) method but with modification. This has been done to estimate the deficit and surplus both at the pre-dam and post-dam period.

The figure below which shows the pre-dam water balance deficit estimated from (January to June and late September to December) is about 1,050mm. The difference between the pre and post dam is therefore 950mm representing 90% increase.

Fig. 5.2a: Simple Water Balance at Usuma Dam

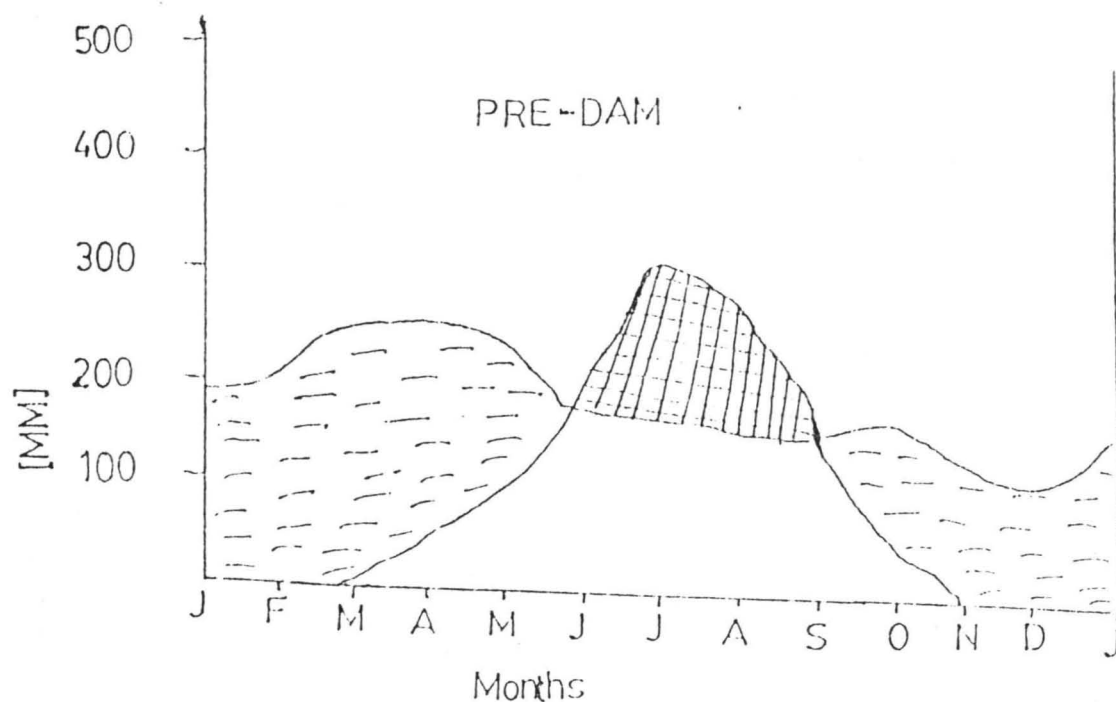
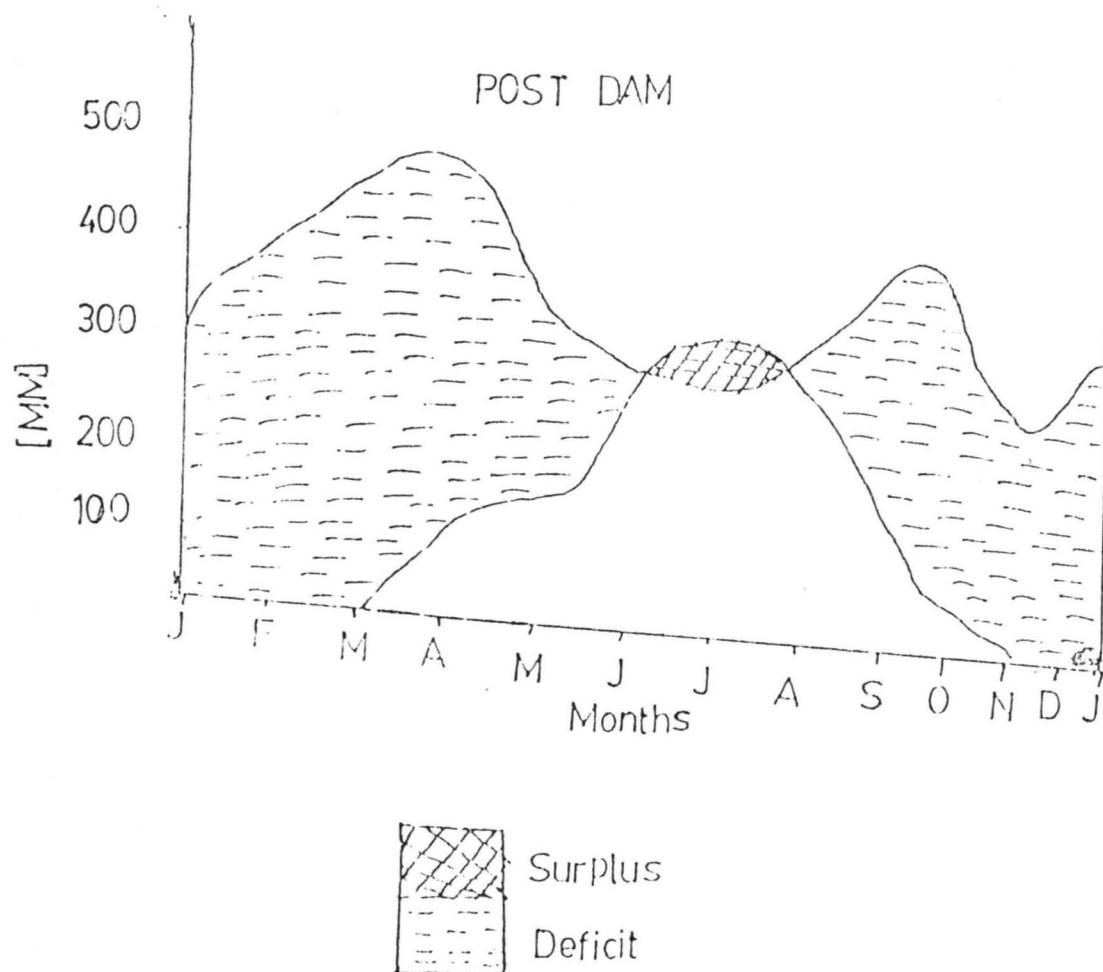


Figure 5.2a



The water surplus during the pre-dam period has been estimated to be 275mm while that of post-dam has been estimated to be 50mm (Fig. 5.2). The difference between the pre-dam and post-dam is 225mm representing 9.81% decrease in water surplus. This is very high and critical. The figure 5.2 on the post dam water balance also shows the period of deficit has been extended from June in pre dam to late June. Post dam start to change from late September to late August respectively.

### 5.2.3 A Mean monthly maximum/minimum temperature

Figure 5.3(a) shows that the highest dry season maximum temperatures for the pre dam and post dam have a difference of 3.13°C with pre dam maximum temperature of 40.8°C. Similarly, the lowest maximum temperature for the pre dam period is 33.2°C and occurred in August and it is about 3.2°C higher than the post dam. This implies that the post dam lowest maximum is 30°C occurring also in August.

The dry season maximum temperature occurs in November with pre and post dam having a difference of 5.23°C with pre dam having a value of about 38.40°C. Though not significantly, it has become cooler in the dry season and much cooler in the rainy season.

The annual mean of pre and post dam is having a difference of 3.57°C with pre-dam values 36.84°C (Table 5.4). This shows a 9.6% decrease from the pre dam annual mean. The test of significant difference shows that the calculated (t) is higher than table (t), which indicates that significant difference occurs between the pre-dam and the post dam maximum temperature. The pre-dam maximum temperature value contrast with the regional range of 34-37°C while the post dam values of 33.26°C did not contrast with the regional value indicating a difference.



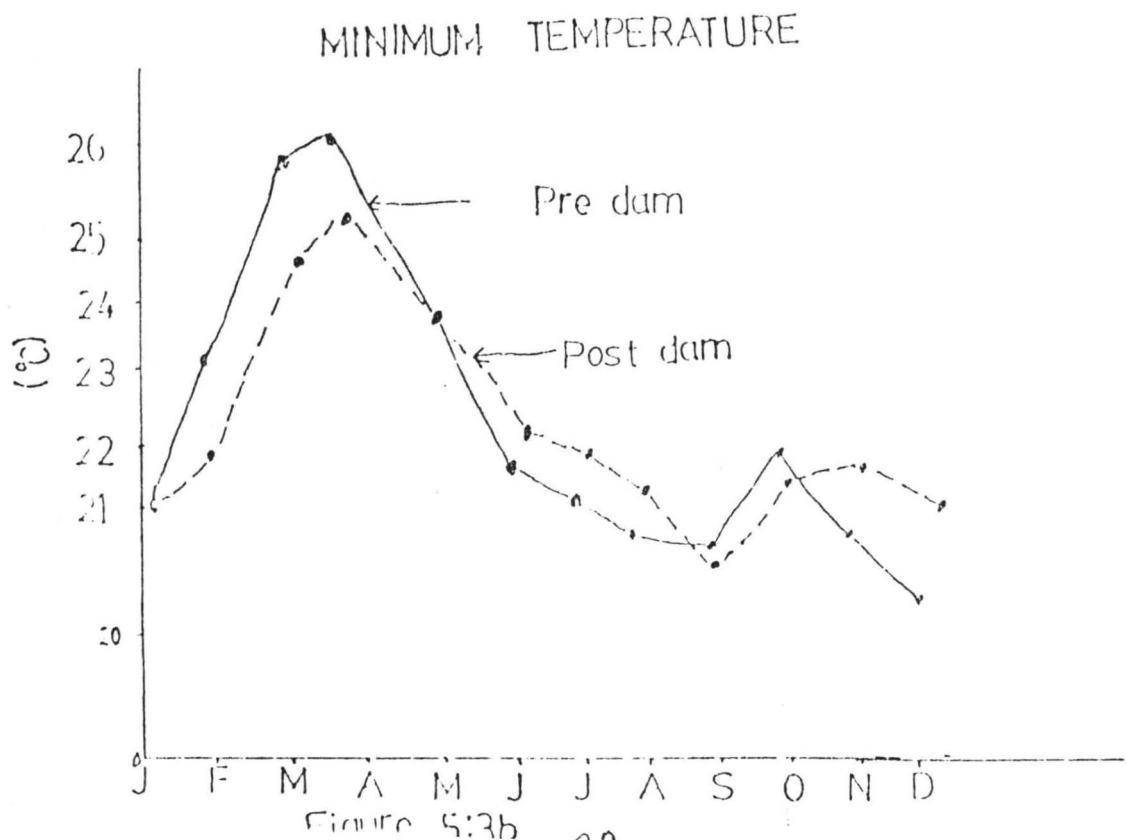
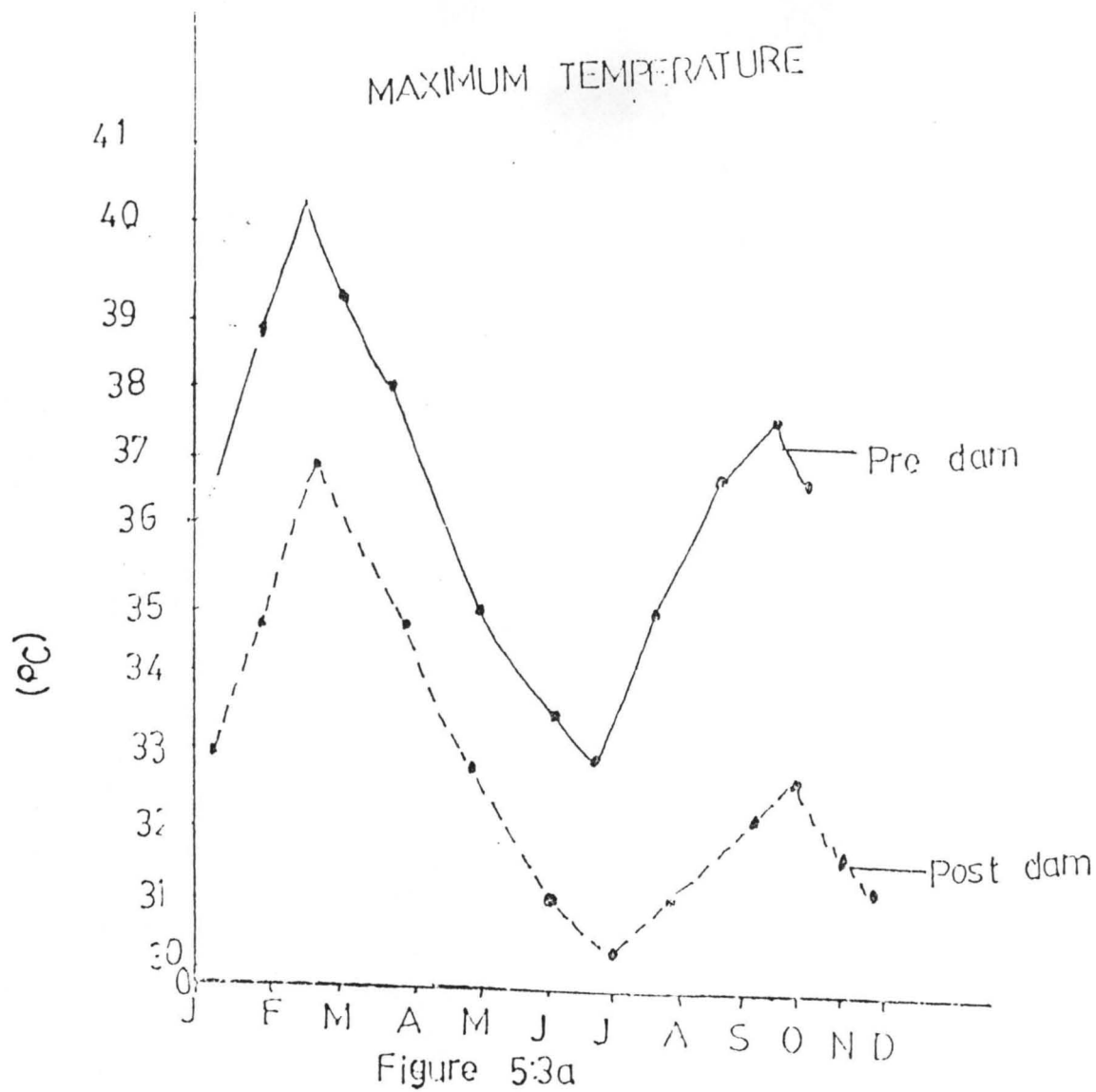


Table 5.4: Maximum and Minimum Temperatures

Month	Maximum Temperature (°C)			Minimum Temperature (°C)		
	Pre-dam	Post-dam	Difference	Pre-dam	Post-dam	Difference
January	36.40	32.33	-4.15	20.98	21.00	0.002
Fberuary	38.80	34.83	-3.97	23.00	22.25	-0.75
March	40.80	37.67	-3.13	23.80	25.00	0.80
April	39.80	36.50	-3.30	26.00	25.50	-0.50
May	38.60	34.33	-4.27	24.00	24.00	0.00
June	35.00	32.80	-2.20	22.40	23.00	0.60
July	33.60	31.00	-2.60	22.00	22.33	0.33
August	33.20	30.00	-3.20	21.60	22.00	0.40
September	35.60	31.30	-4.40	21.40	21.31	-0.09
October	37.40	32.50	-4.90	22.20	22.00	-0.20
November	38.40	33.17	-5.23	21.40	22.00	0.60
December	36.50	32.86	-3.64	20.00	21.25	1.25
Total	442.08	399.12	-42.97	290.72	271.56	-84
Mean	36.84	33.26	-3.57	22.56	22.63	0.07

Significant difference

Calculated t = 3.962

Table t = 1.717

Significant difference

Calculated t = 0.379

Table t = 1.717

These contrast with minimum temperature (Figure 5.3b) for both pre and post dam shows that virtually the minimum temperature remained unchanged (24-26°C) in the dry season, peak months of March-May and 20°C - 21°C in November and December. The lowest minimum temperature of pre and post dam in the rainy season occurs in September with a difference of -0.09°C. The highest minimum temperature for both pre and post dam occurs in April with a difference of -0.5°C between pre and post dam.

### 5.3 Analysis of the Questionnaire

The result of the questionnaire shows that about 70% of people reside in and around the study area for more than one decade. Their predominant occupation is mostly fishing, farming and civil service, thus they are very likely to notice changes in the environment given the fact that their livelihood was tied to it. The Usuma dam environment is a typical rural setting as such farming system practiced varies from the subsistence farming to the commercial farming system. The subsistence farming is geared toward the production of crops to meet the needs of the immediate family. But for the advent of migratory farmers and the production of fresh vegetables aided by the irrigation system afford the practice of commercial farming hence, production is enough for sales. The main purpose for the establishment of this dam however is to serve as water reservoir for the people at Abuja and its environs.

The analysis of the questionnaire is summarized below:

**Table 5.5: Analysis of the Questionnaire**

Age	Sex	Residential Years	OCCUPATION			NUMBER OF RESIDENT		OPINION ON AIDS	
			Fishing	Farming	Trading	Increased	Decreased	Govt.	NGO
20-45	M	Above 20	Yes	Yes	Yes	Yes	-	Yes	Yes
20-35	F	Above 20	Yes	Yes	Yes	Yes	-	Yes	-
16-20	M	3-10	Yes	Yes	-	Yes	-	Yes	-
16-20	F	11-15	-	Yes	-	Yes	-	-	-

Source: Compiled by the Author

**Table 5.6:**

Occupation	Pre-dam period in %	Post-dam period in %	Change	Remarks
Fishing	20	30	10	Increased
Farming	20	30	10	Increased
Trading	20	17.5	2.5	Reduced
No. of residents	15	17.5	2.5	Increased
Opinion on aids	25	5	20	Reduced

Source: Compiled by the Author

Fishing as an occupation was made possible for the inhabitant's due to the natural formation of drainages that allowed a normalized pattern of flow. As a result, the fair velocity of the stream, habitation of the fish species is encouraged. The farming products and the different fish species are taken to Bwari and its environs for sale. This practice aids the flow of micro-economic system in the area.

However, after the construction of the dam, the occupational trend of the inhabitants of the area took a sharp turn from the cultivation of crops and fishing to a more severe environmental degradation practice such as fuel, wood gathering and bush burning because tree are available. Of great concern is the fact that, apart from the construction of the artificial pond with block administrative units in the area that takes care of water treatment. There have not been any solution or programme from the Government whatsoever on how to solve the problem of flooding and degradation of the environment. Though the road leading to the dam has been tarred just to make the reservoir accessible. This is because that road terminates around the reservoir.

On community basis, the inhabitants normally enlighten each with the little knowledge they have about the protection of the environment. However, there have not been any awareness campaign on this issue, and this is because the primary aim of the dam is to supply water to Abuja and its environ, other problems were overlooked or neglected.

Conclusively, the dam area is good production area for food and cash crops for Abuja that is occurring at a rapid rate. Hence appropriate aid is required from Government and Non-Government Organization (NGO) to encourage this development. It must be noted that this project work has not been able to emphasize the impact of the dam on both upstream and downstream of the reservoir. This will be taken care of in subsequent studies. The reason for this is due to lack of adequate data and especially imageries.

## CHAPTER SIX

### 6.0 CONCLUSION AND RECOMMENDATIONS

This study has shown that there is vital and indispensable role being played in the development of region of influence and concern. These influences or tools or mechanisms are appropriate for regional growth. The effect of dam is felt especially in the aspect of transforming the life of the surrounding dwellers to a better living conditions and standards. Such better living conditions include the social and economic aspect of life of the people. The physical environment is also transformed as search for farm and space increases along side the increasing influx or migration of people from various villages resulting from a "pulling force" or "centripetal force".

By inference, the impact created by Usuma dam and its immediate environment cannot be over emphasized, the study has revealed that impact is significantly commendable as the location of dam has caused a mass influx of farmers and fishermen from various localities who earn, bring and spend within the study area.

Socio-economic, socio-cultural and physical impacts has been experienced in stages since the inception of he dam despite the remarkable positive impact created by the dam, a stain of negative impact was observed or noticed, although the size is so scant that the positive impact over shadow it.

The siting of the dam at its present location has been a welcome idea by the inhabitant of the area as they benefit a lot on their farm as a result of the dam. It also increases their fishing yield.

## 6.1 Recommendations

Based on the findings of this study the socio-economic impact of Usuma dam on the settlement and the inference arrived at, it will be most appropriate at this climax to recommend with regards for future or further direction.

1. An appeal should be made to the relevant authorities that, whenever a dam is to be constructed, the socio-economic consideration should be primary to others.
2. There should be an increased awareness on the disastrous effects of some indiscriminate acts such as bush burning, fuel wood collection etc.
3. The introduction and initiation of new system and new people has lead to a change and transformation of the cultural life style of the indigenes. In fact it is most obvious that the effect will fall on the inhabitants, at this point it becomes inevitable that a proper orientation is organized through enlightenment campaign for the virtually ignorant inhabitant about the importance of the dam and benefits derived from it. This should be taken note of, in future occurrence so as to avoid damage of the dam facilities and degradation of the environment through bush burning, wood gathering etc.
4. Specifically for the study area, health and basic infrastructures should be properly taken care of, and this will ensure adequate development in the area.

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## QUESTIONNAIRE ON SOCIO-ECONOMIC IMPACT OF USUMA DAM ON THE SETTLEMENT

1. Name:.....
2. Sex:.....
3. Age:.....
4. Residential Address:.....
5. You have lived here for:
  - (a) Less than 5 years
  - (b) 5-10 years
  - (c) 11-16 years
  - (d) 16-20 years
  - (e) above 20 years
6. What was your occupation during the pre-dam period?
7. What is your present occupation
8. Has your yield in production increased or decreased?
9. Has the dam brought in any increase in the number of residents?
10. Is there any degradation brought about by the construction of the dam? (Yes or No)
11. Has there was any farmland or settlement destruction? (Yes or No).
12. Does the population of people increase or decrease in your locality. (Yes or No).
13. Are there schools in your locality? (Yes or No).
14. Occupation of men.
15. Occupation of women.
16. Occupation of the young.
17. Are there hospitals in your locality? (Yes or No).
18. Does the yield of fish increased after the creation of the dam? (Yes or No).

19. Has there being any governmental intervention (Yes or No)
20. If yes, what strata of government?
21. Has there being any NGO intervention?
22. If yes, what was their commitment.
23. Has there being any awareness campaign? (Yes or No)
24. If yes, what kind of awareness campaign.