THE IMPACTS OF DAMS ON THE ENVIRONMENT AND PEOPLE OF NIGERIA – OKHORO AND OJIRAMI DAMS IN EDO STATE AS CASE STUDIES

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CONTENTS

CHAPTER ONE

1.0. Introduction

The association which has existed between man and several rivers over the centuries is a function of the close dependence of man on water for life. His contact with major rivers of the world encouraged the definition and practice of various water management technologies such as dam constructions and crop irrigation which in turn contributed to development and the progress of civilization. In the process of using surface waters for development, man has interfered so much with streams, rivers and lakes that now they can hardly be described as natural.

It is no doubt that dams have contributed to the economic growth of many nations. The over 45,000 dams build round the world have played important role in helping communities and economies harness water resources for several uses. Dams are constructed to provide water for irrigated agriculture, domestic or industrial use, to generate hydropower and help control flood. An estimated 30-40% of irrigated land worldwide now relies on dams and that dams generate 19% of world electricity (World Commission on Dams, 2000). These services are being provided not without a cost being paid for them.

According to the WCD report, 60% of the world rivers have been affected by dams and diversions. The construction of dams has led to displacements of some 40-80million people worldwide, in China alone, according to official statistics, dams have displaced 10.2 million people between 1950 and 1990 (ADB, 1999b). Among projects involving displacements funded by the World Bank large dams account for 63% o f displacements (World Bank, 1996). Large dams have significant effects on cultural heritage through loss of local cultural resources, temples, shrines and sacred elements of the landscape, artifacts and buildings. The risk of submerging ancestral graves is the main reason the Himba people in Namibia opposed the planned Epupa Dam (Kinahan, 2000). The adverse effects on the health of local peoples living around dams due to environmental changes such as increased breeding of mosquitoes and other insect vectors from dam reservoirs have been documented. Ecological problems such as changes in water quality, channel morphology, aquatic flora and fauna, growth of aquatic weeds, spread of water-borne diseases and resettlement of people in river basins are rampart and have been documented (Ogbeibu,2002).

Inestimable and almost irreversible environmental degradations and colossal loss of lives and property due either to the outright failure of large dams, or dams management inadequacies – improper monitoring and management of flood regimes in the dams, near or complete absence of warning devices and short warning notices – remain the most devastating cause of flood disasters in Nigeria. More than 250 communities annually lost their homes and farmlands to the annual de-flooding of hydroelectric dams in Niger,

Kwara, Kogi and Kebbi states (The Newswatch (Lagos), 2001). It is on records that in 1999, property worth billions of naira were swept away by floods in Niger State. Over 40

persons were feared dead and more than 20,000 people were displaced by flood due to the failure of Tiga and Challawa dams in Niger and Jigawa states in August 2001. In Jigawa state, the flood submerged 18 out of 24 Local Government Areas of the state, claiming over 400 kilometers of otherwise arid land. More than one quarter of the state food production of the year and about 10 billion naira, representing the state total investment in agriculture was gone with the floods (The News, 2001).

1.1. Purpose and objectives of the Project

1.1.1. Purpose: The research is embarked upon to elucidate and establish the relationship that exists between Okhoro and Ojirami dams, and the host communities and the environment with a view to establishing by extrapolation the impacts of dams on the environment and the people of Nigeria.

There are three objectives that contribute to this overall goal of the research. They include:

- Investigate the purpose and processes involved in the choice, design and construction of the dams in the state.
- Study the social, economic, health and ecological impacts of the dams on the host communities.
- Find out the structural, institutional and policy frameworks put in place by the government to enable the host communities resist and cope with possible negative impacts of the dams.

1.2. Study Design

1.2.1. Study Area

Edo State lies roughly between longitude 06o 04'E and 06o 43'E and latitude 05o44' N and 07o34' N. It is bounded in the south by Delta State, in the west by Ondo State, in the north by Kogi State and in the east by Kogi and Anambra States. It occupies a land area of about 17,802 square kilometers. From the 1991 census the state had a population of 2,159,848.

Edo State has a tropical climate characterised by two distinct seasons: the wet and dry seasons. The wet season occurs between April and October with a break in August, and an average rainfall ranging from 150 cm in the extreme north of the State to 250 cm in the south. The dry season lasts from November to April with a cold harmattan spell between December and January. The temperature averages about 25 °C (77 °F) in the rainy season and about 28 °C (82 °F) in the dry season. The climate is humid tropical in the south and sub-humid in the north.

In the northern part of Edo State, the vegetation is mainly derived savannah and forest in the south. The Benin Lowlands used to be covered with a vast rain forest, but rubber plantations have displaced a lot of the original forests. The riverine communities in the south have mainly mangrove swamp vegetation.

There are two dams in Edo State- Ojirami and Okhoro. Ojirami Dam is located in Ojirami Community of Akoko Local Government Area in the northern part of Edo State. Geologically, the Ojirami area is a basement terrain. Okhoro Dam is located in Okhoro community in Ikpoba-okha Local Government Area near Benin City, the state capital. Both dams were designed for water supply.

1.3. Study Population

Table 1: Demographic Data

Total Population of Nigeria	126,635,624
Population of Edo State	2,159,848
Growth Rate	2.6 %
Percent Urban	43.1 %
Women	15-49%
Life Expectancy at Birth	51.1
Crude Birth Rate	39.7 per 1,000
Crude Death Rate	13.9 per 1,000
GNI per Capita (PPP)	$770
Physicians per 1,000 People	0.19

N.B: Population figures for the state were extrapolated from 1991 census figures and the Growth Rate.
Sources: Nigerian Population Commission, 2001 BUCEN - IDB-2000, 1999 World Bank/WDI-2001)

At the household and community levels, the study population (for the purpose of this study) will comprise adult men and women (18 years and above) and children (5 - 12 years). The social classification for the purpose of this study will be categorized into Classes A, B and C. Class A represents heads of household with income from US $1000 and above per annum; Class B are heads of households whose incomes are between US $500 and US $ 1000 per annum; Class C represents heads of households with income not more than US $ 500 per annum.

1.4. Sampling Methods

1.4.1. Sample Size

The sample size from Okhoro Community is 100 households and the sample size for Akuku Community is 50 households.

1.4.2. Sampling Procedure

Selection of the communities sampled was based on the location of the dams and the history of the affected communities. The entry points into the communities were traditional institutions and peer groups.

1.4.3. Data Collected

Data collected included household income, occupation, social class, prevailing health problems, ecological impact of the dams, the dependence of the dams and beliefs and custom which are indices of socio-cultural status. Other data include drainage system; water shed management, water supply options, and impoundment such as dams and irrigation systems, awareness level and culture-environment relationship.

CHAPTER TWO

2.0. Methodology

2.1. Survey

A Fundamental approach of the study was household and community surveys with interviewer-administered questionnaires, in-depth interviews, and group discussions. Questionnaires containing open-ended questions (short answer essay) were designed and administered to which subjects were asked to respond. This survey was used to assess opinions and experiences of the subjects on the objective of the study in the study communities. Questionnaires were designed with inputs from all personnel involved.

Visits were made to Okhoro and Ojirami communities (where the dams are located) and Akuku Communities, one of the affected communities when Ojirami dam failed in 1980. In Okhoro community, the community head, youths and women were interviewed. Subjects were chosen at random. In Ojirami, where one of the dams is located, in-depth interview was conducted with the staff of the dam and in a latter date with the Resident Engineer Mr. Charles Jayeola who was not present on the day of our visit. Two resident staff guided the research team. At Akuku Community, one of the communities affected by the inundation caused by the failure of Ojirami in 1980. Interview and group discussion were conducted with the members of the communities comprising of men, women and children though the community leader could not be reached. Again subjects were chosen at random.

Video camera, audio tape recorder and photographic camera were used for documentation during field work. Environmental anomalies and other ecological features of interest to the project were recorded in the field notebook of research personnel. Questionnaires were prepared and administered to Mr. Vincent Omoise, the Head of Engineering, Edo State Urban Water Board who provided information on the structure and capacity. An in-depth interview was also held with him to ascertain his views on the social, economic and ecological impacts of the dams on the people of the state.

CHAPTER THREE

3.0. Results

3.1. Socio-economic Status of Affected Communities

The average annual income of people in Ojirami, Akuku and Enwan communities is about US $ 500. The rural communities have a homogeneous social class, i.e., the social status of the people is not stratified as the income levels of all the members of the communities are virtually the same. In Okhoro community, the annual income ranges from US $750 - US$1500. Socio-economic stratification is obvious; many of the inhabitants work in Benin City, the state capital and their income is quite heterogeneous. 10% of the people belong to social class A, 30% belong to class B and 60% belong to class C.

3.2. Ojirami Dam

Ojirami dam is located in Ojirami Community in Akoko Edo Local Government Area in the northern part of Edo State of Nigeria. It is the first dam that was constructed in the state and was funded by the Federal Government of Nigeria. The foundation stone was laid on the 26th of March 1971 and was commissioned on the 20th of January, 1974 by Gen. Yakubu Gowon, the then Head of State. The dam was re-commissioned in 1982. The dam was constructed across River Onyami which flows into River Ose. Akoko Edo region is a basement terrain, with lots of exposed basement rocks of granitic origin. The people are mainly farmers and occasionally engage in fishing, though their fishing has been marred by the presence of the dam especially by people downstream. The depth of the water table is as low as ten meters due to the closeness of basement rocks to the surface.

The height of the dam is 3.9m with a storage capacity of 900,000 gallons. The main purpose of the dam is to supply water to the communities in Akoko Edo at an output capacity of 245m^3/hr. At the construction of the dam, it supplied water to sixteen communities in Akoko Edo which included Ojirami, Ojirami Petesi, Ojirami Afekunu, Dagbala, Uneme-Eturu, Akuku, Enwan, Igarra, Okpe, Ikao, Ugboshi, Okpilla, Ibillo, Uneme-Osu, Ojah and Osoro. At the time of our visit, the dam could supply water to only eight of the sixteen communities which include Ojirami, Ojirami Petesi, Ojirami Afekunu, Dagbala, Uneme-Eturu, Akuku, Enwan, and Igarra. According to the dam's Resident Engineer, Mr. Charles Jayeola, the reason for the drop in coverage is increasing demand by the inhabitants of the benefiting communities which has gone beyond projection. The officials of the dam that guided our team during the visit also attributed it

to mal-functioning of equipment. They claimed that the equipment at the booster stations supplying water to the affected communities was not functioning due to short supply of diesel.

3.2.1. Ecological Impact

As is the case with many regulated streams, Onyami River over which the dam is constructed is not allowed to flow naturally. According to the dam officials, the flood gate is locked most of the time during the dry season, because of the reduction in the volume of water flowing on the river channel. The down stream part of the river is starved of water, which consequently has marred fishing activities downstream. Respondents from Akuku community said bitterly that during the dry season fishing is only possible in the reservoir upstream of the dam and that fishing in the reservoir is more or less regulated. They also claim that fishing at the downstream is now seasonal being possible only during the raining season.

During the raining season, the flood gate is left open which according to the dam officials, is a strategy to prevent the dam from overflowing since the volume of water increases during this wet period of the year. The water is allowed to flow more constantly to the downstream part to control the volume of water in the dam reservoir.

3.2.2. Social Impact

Before the construction of the dam, the inhabitants of the communities where the Onyami River served depended on the river for water and aquatic food. The dam has made fishing seasonal. At the time of our visit, the dam supplied water to only eight communities reducing the coverage area to 50% of the initial coverage area when it was commissioned over two decades ago.

Ojirami dam failed in August 30th 1980 and inundated two communities- Akuku and Enwan. According to a dam official, one of SWAPHEP's team guides and which was corroborated by respondents from the affected communities, the failure was due to technical breakdown and negligence on the part of the dam official on duty. Three years before the flood, the electronic switch controlling the flood gate was out of function and was operated manually. Moreover, before then, no alarm was installed to give warning to the officials and communities when the water exceeded its limit in the reservoir. An alarm was only installed after the dam failure.

Many people in Enwan and Akuku communities lost their houses and other property worth millions of naira to the huge flood plunging the communities into serious housing problems. Those who once lived in their houses have been forced to relocate and now live in rented houses. It also led to the problem of overcrowding in many houses. The people say that up to 30 persons now live in houses meant for 10 persons. Although the flood did not directly lead to the death of any person at the time of the failure, yet, many persons have died due to the traumatic experiences occasioned by the flood. In Akuku,

as many as 185 houses were destroyed by the flood. Community respondents claim that government neither relocated nor resettled them. Government however gave the affected people food stuff and mats two weeks after the incident and never rebuild their houses. At time of the incident, Alhaji Shehu Shagari was the president of Nigeria and Prof.

Ambrose Ali was the governor of Edo state. The then governor awarded the contract to build ten houses to a contractor, the contractor built the houses to different stages, and none was completed and till date, the uncompleted buildings are there in the community.

Besides, the respondents say that having been deprived of their natural resources – the river – and having lost almost all their property to the flood, that government should provide them pipe-borne water, but, this is not the case. The communities pay so much to get connected to the main water supply. A few public taps seen during SWAPHEP's visit were not functioning.

3.2.3. Economic Impacts

Several hectares of farmlands containing cocoa trees, yams, maize, etc, were destroyed by the flood. Fishing is seasonal because of the dam; fishing can only be done in the raining season. Many families now have to spend so much money paying rent; such moneys would have been spent on other things when they still lived in their houses. Grocery shops were destroyed. A particular case mentioned was a very large shop belonging to Elisha Oloyoke that served many communities. The victim is now out of business and barely survives.

3.3. Okhoro Dam

Okhoro dam is located in Okhoro Community in Ikpoba-Okha Local Government Area near Benin City, Edo State of Nigeria. The dam was commissioned in 1977, funded by the Federal Government of Nigeria led by Gen Olusegun Obasanjo who was the military Head of States. Okhoro dam was constructed across Ikpoba River which flows into Ethiope River in neighboring Delta State. Edo region is a sedimentary terrain. The depth of the water table is about 120m.Okhoro community is a peri-urban area; hence, the people are mainly civil servants. A number of them are farmers and occasionally engage in fishing activities. However, their fishing activities have been greatly affected by the influx of sediments and solid wastes from the municipal drainage directed into the river from the Benin metropolis. Okhoro community also reveres the Ikpoba River because of its spiritual/religious importance to them.

The height of the dam is 8.0m. The storage capacity could not be ascertained at the time of this report. However, the output capacity is 91,000m^3/day. The main purpose of the dam is to supply water to Benin City and environs. According to Mr. Vincent Omoise, Head of Engineering Services, Edo State Urban Water Board, less than 40% of Benin City is currently being supplied water by the dam. The reasons for the short supply, are

irregular power supply, problems in the network of pipes, old and broken pipes, equipment going out of function and demand for water going beyond projection.

3.3.1. Ecological Impact

Okhoro dam is structurally different from Ojirami dam. There is no impoundment of the river; instead, the river is made to flow over an embankment into a reservoir. Meanwhile, SWAPHEP's team is yet to gain entrance into the dam site (awaiting official approval) for further analysis, which will allow for further description of the dam. High turbidity of

the water during raining season due to the drainage directed into the river very close to the dam has been identified by the dam official as a major problem being faced by the dam authority. This was corroborated by the Odion-owere (Community Head) of Okhoro and Princess Rose Ovonrhamwen, a daughter of the famous Oba Ovonrhamwen of Benin, who is also a priestess of the river.

The community respondents testified to the fact that the dam coupled with the drainage system causes a continuous sedimentation into the upstream portion of the dam, thus reducing the speed of the river and enhancing excessive growth of weeds on the river. In fact, one of the respondents said that a few streams, called Uhiamen in local dialect, flowed into Ikpoba River before the dam was constructed. The Uhiamen was their source of drinking water because of the clear water flowing from them. The community chief particularly declared that the Uhiamen was destroyed during the construction of the dam. Moreover, the water from the river is no longer clean enough for drinking. Certain fish species once found in the river have disappeared and fishing activities are reduced drastically.

3.3.2. Social Impact

The community chief (also corroborated by other respondents) said that government did not consult the community before the dam was constructed. The community leader lamented the loss of the community life which once existed before the dam. One part of the community is taken over by the dam and the offices and a thick bush has grown in that portion of the community leaving only one part of the community inhabited by the people. The two sides are separated by Okhoro Road. The respondents decried a situation where the other side of the road provides a hiding place for criminals and the community is extremely quiet – described as being like a grave yard. As is the case with the victims of Ojirami dam, the community respondents said that government did not give them any public tap. The community head said that he paid 40,000 naira a long time ago to connect pipe borne water to his house. The water supply is however, more regular than most parts of the Benin metropolis owing to their proximity to the dam. The community agrees that mosquitoes are usually abundant around rivers but reveal that the dam has caused an increase in the mosquito load in the area. According to the chief, the river has killed many children since the dam was commissioned. The last of such deaths, said he, were

two children of Eweka. Rose Ovonrhamwen believes that the dam hurts the river goddess; hence, constructing such a dam violates their religious rights and could explain some of the deaths that occur in the river.

3.3.3. Economic Impacts

Many farmlands containing very important crops such as rubber trees, cocoa trees, cassava, yam, maize etc., were destroyed. Government did not pay any compensation to them for the losses. Many of them now travel to distant places for farming activities. Although fishing was not a major source of livelihoods to the community, yet, a number of them depended on it for income besides, being a source of fish for food. The community leader said that their youths are not employed by government to work in the

dam. A youth interviewed however varied on this opinion. He said that about two of the members of the community are working as security men in the dam.

CHAPTER FOUR

4. O. Discussions and Conclusions

The impoundment and seasonal regulation of water flow in Ojirami dam constructed across Onyami River causes a lot of ecological degradation downstream. Stream regulation poses a threat not only to the aquatic habitat but also to the surrounding terrestrial environment. Damming has physical, chemical and geomorphological consequences on steams and rivers by altering the natural distribution and timing of flow. Stream regulation affects primary biological productivity of ecosystems including effects on riverine and riparian plant life on downstream habitats. It also alters the biological activities of aquatic fauna such as fish by blocking their migration. A river is a route by which spawners reach their breeding grounds and other fishes move to their preferred breeding site. An obstruction by dam can prevent upstream migratory fishes which have spawning and feeding in opposite sides of the dam. Furthermore, dam causes the modification of aquatic ecosystem leading to changes in biochemical cycle in the natural riverine system (WCD 2002). Reservoir interrupts the downstream flow of organic carbon, leading to emissions of greenhouse gases such as methane and carbon dioxide that contribute to climate changes (WCD 2002). The emission of greenhouse gases from reservoirs due to rotting vegetation and carbon inflow from the catchments is a recently identified ecosystem impact of storage dams (WCD Thematic Review)

Flow regime is the key driving variable for down stream aquatic ecosystem. Flood timing, duration and frequency are all critical for the survival of communities of plants and animals living downstream. Moreover impoundment may lead to a variety of downstream modifications of significance to its physico-chemical conditions and the stream biota. . It has long been recognized that as stream water is impounded in reservoirs, the water chemistry often changes before outflow in the dam. Ogbeibu (2002) pointed out that impoundment changes the quality water flowing downstream which particularly affects the biota

Influx of sediments and solid waste into Ikpoba River as observed in the study portends grave consequences for people and environment. There is increase in the inflow of allochtonous materials and detritus into the river channel from run-off which may accumulate in the reservoir. Sedimentation may increase in the reservoir which consequently will reduce the depth of the reservoir and raise the water level.

The impact of dams on people's livelihood, health, social systems and culture are not easily quantified and often not considered in the analysis of the benefits of dams. The direct benefits they provide to people are typically reduced to monetary figures for economic analysis and are not often recorded in human terms. According to the WCD

report, dams have negatively affected many people and societies and vulnerable groups are usually the poor local people.

4.1. Conclusions

The results show clearly that dams have very far reaching impacts on the environment and people of Nigeria. The two dams under study are commissioned for water supply purposes. They are small dams measuring them against the standard definition of large dams by ICOLD (International Commission on Large Dams), which is a height of 15m and beyond from the ground level.

Positively, the dams have contributed to the socio-economic growth of the state over the years. Access to clean water supply and its affordability are two panaceas for socio-economic development. The water rate of about 120 naira (US$1) per month per flat is quite affordable. Moreover, the dams have created job opportunities for the local people. It is important, though, to note that the two dams are performing below the required capacities and hence many people in the state (up to 60% of the population) are suffering from lack of access to clean water supply from the public corporation. Some wealthy individuals in the metropolis now own private boreholes and make brisk business out of it. People pay on the average 400 naira (US $3.17) per family per month to buy water from the boreholes. Besides, the water from such sources is not properly treated like that from the public service and people still trek long distances to get water for domestic use.

The negative impacts of the dams on the host communities are really enormous. The rivers ecosystems have been severely degraded; the livelihoods of the people are destroyed leading to increasing poverty. Nearly 85% of the people in these communities live below the poverty line of living on less than $1 per day; many of the victims of the Ojirami dam failure have been forced to relocate with most of their earnings lost without any compensation from the government. This is a violation of human rights and degradation of human dignity. Government did not involve the community in the processes of options assessments (which does not seem to have been conducted anyway), through to the implementation of the dam construction. Although the dam authorities claim that Environmental Impact Assessments (EIA) might have been conducted before commencing the project, no such documents have been given to SWAPHEP's research team, else, several questions would have been raised as to the technical competence of the company that prepared the EIA reports and whether or not the problems being faced were incorporated into the report as well as what measures were put in place to forestall unhealthy incidences like the ones described in this report.

Weighing the negative impacts of the two dams against the positive impacts as shown by the results of this study, it is apparent that the negative impacts out-weigh the positive impacts; hence, Okhoro and Ojirami dams in Edo State impact negatively on the

environment and people of Edo State and by extrapolation dams impact negatively on the environment and people of Nigeria.

4.2. Recommendations

We recommend that:

The Federal Government of Nigeria and the Edo State Government should commence a post-impact assessment of the dams on the host communities with a view to mitigating the existing impacts and effectively managing future impacts.

Government should resettle the victims of the failure of Ojirami dam, who have been rendered homeless for 23 years. Compensations should be paid to Okhoro, Ojirami, Akuku, Enwan and other affected communities who lost farmlands and other property to the construction of the dams.

The affected communities should adopt legal and constitutional means to seek redress from the government.

Government should not consider constructing any other dam in the state, but they should consider other environmentally friendly options such as rainwater harvesting technologies and indigenous/local water treatment systems to complement the water supply from the dams. They should sponsor researches into alternative water supply and ensure adequate water supply options assessments before embarking on any water project in the state. All such water project processes must be fully integrated, participative and must adequately centralize the specific needs of the people, hence, originating from the people.

Government should install effective warning devices in the dams and regularly maintain the dams.

Government should put in place a socio-economic empowerment programme for the host communities and flood victims of the dam. They should also put in place disaster reduction strategies for the state and these strategies must be translated into actions.

Civil society organisations at local and international levels should provide logistic and other support to the affected communities towards enabling them to embark on advocacy and the process of reconstruction/empowerment.

Private organisations, financial institutions, agencies of the United Nations and other development partners of Nigeria should provide financial and logistic support to the resettlement and empowerment process of the affected communities.

4.3. Difficulties in the Study

The research team encountered a number of difficulties during the course of the study. One of such was the unwillingness by government officials to release information on the dams to non-governmental organisation. There was a long delay of nearly six months to

get approval from the dam authorities for entrance into Ojirami Dam and up till now an approval is being awaited to gain entrance into Okhoro Dam. Inadequate funding for the project is also a major set back for the project.

4.4. Further Activities

SWAPHEP intends to incorporate the affected communities into the proposed civil society dialogue on the report of the WCD, to provide them the opportunity to present their testimonies to the civil society and hence the government. They will also be incorporated into the follow-up programme for the dialogue.

An advocacy follow-up programme is being worked on that will enable SWAPHEP to collaborate with the affected communities to seek constitutional redress for the communities and ensure socio-economic empowerment of the victims.

SWAPHEP will provide links with local and international organisations that are interested in the case with a view to strengthening capacity for effective policy lobbying and the empowerment of the people. This may involve presentation of testimonies in local and international forum

We will source funds to carry out similar researches in other parts of the country.

APPENDIX 1

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