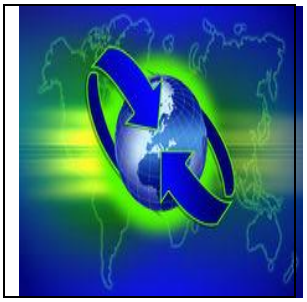

Assessment of the Socioeconomic Impacts of Gurara Dam on the Host Communities of Kaduna State Nigeria

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Abstract

Gurara dam located within two local governments in Kaduna state that shared boundary with the Federal Capital Territory was constructed to boast socioeconomic activities in the Federal Capital Territory. Contrary to the target objective of Gurara dam, it is also obvious that dam comes with great consequences. Thus, the socioeconomic impacts of Gurara dam on the host communities were assessed. The objectives were to: assess the positive socioeconomic impacts of Gurara on the host communities; assess of the negative socioeconomic impacts of Gurara on the host communities and to compare the positive and negative socioeconomic impacts of Gurara on the host communities. Survey of five hundred (500) households was conducted using questionnaire and stakeholders' consultation. Purposive and systematic sampling technique, were used for the study. Data collected were analyzed using mean and percentages. Result shows that over fifty per cent (50%) affirmed that there have been outstanding, increments in irrigation farming and dry season farming which have also translated to improvement in their livelihood. In terms of negative impacts, involuntary displacement, public health risks, loss of farmland, community dispersal, land use modification, increase in erosion and flooding are well pronounced as they all had over ninety per cent (90%) recognition by respondents. The positive impacts outweighed the negative impacts. It was concluded that the operation of the dam has had significant positive and negative socioeconomic impact. It was recommended that the dam management board should set up grievance redress committee to address outstanding issues regarding displacement, resettlement and compensation.

Keywords: Dam, Socioeconomic Impacts, Irrigation, Host Communities, Resettlement

Introduction

Dam construction globally is a mechanism to improve the socio-economic activities and livelihoods of the host communities. Dams are constructed for many socio- economic purposes. For instance, dam maybe constructed to block the flow of a river, stream, or other

water way. Some dams divert the flow of river water into a pipeline, canal or channel. Others raise the level of inland water ways to make them navigable by ships and barges. Many dams harness the energy of falling water to generate electric power. Dams also hold water for drinking and crop irrigation. In summary dams generally serve the primary purpose of retaining water (Abgede and Oladejo, 2010, 2011).

Dam construction is a typical example of development project that justified the position of possibilism theory. The view of the possibilists is that man can determine whatever use to put the environment base on his advances in technology (Semple, 2011). Though, man through technology have defy nature through dam construction and bring water to dry land. Consequently, provide perceived needs for water and energy and as long-term, strategic investments, which have many additional benefits (Mahab-Ghods, 2000). Some of these additional benefits are typical of all large public infrastructure projects, while others are unique to dams and specific to particular projects (Naik and Oster, 2009). Regional development, job creation, and fostering an industry base with export capability are most often cited as economic considerations for building large dams (Salami and Sule, 2010; Oyedotun, 2011; Usman and Ifabiyi, 2012). Other reasons include creating income from export earnings, either through direct sales of electricity, or by selling cash crops or processed products from electricity-intensive industries such as aluminum refining.

The socioeconomic impacts of dam can be positive or negative. Dam can have positive impacts on the host community- like improved welfare, resulting from new access to irrigation water, improved fishing upstream (SANDRP, 2012). Dams and their corresponding reservoir generally are designed to be multipurpose structures. People, who support the construction of dams and reservoirs, point out that reservoirs may be useful for recreational activities and generating electricity as well as providing flood control and

ensure a more stable water supply (WHO/UNICEF, 2014). Despite these perceived advantages of dam, it is also obvious that dam comes with great consequences on the environment and socioeconomic activities of the host communities. These adverse impacts of dam include: displacement of people, loss of land, loss of wildlife and permanent adverse change of river ecology and hydrology. Thus, many people today are vehemently against turning remaining rivers into reservoirs (Carney, 2018).

Thus, it has attracted the attention of researchers, government and non-governmental organizations to study the impacts of dam on the host communities. Therefore, several findings have been made by earlier researchers in the subject of dam and its impact on the host communities. Uses of dam have been outlined to include hydropower generation, irrigation, human consumption, industrial use, aquaculture and navigability with negative impacts like resettlement, decline in downstream fishing due to flood control (Tchotsoua, Mouss and Jean-Marie, 2008; Salami and Sule, 2010; Oyedotun, 2011).

According to Adebola, Garba, I.K.,Ahmed Muhammed, and Kudu *(*2014) posited that social impacts can be direct such as cultural trauma of involuntary resettlement, or the result of a cascade, where environmental impacts generate economic impacts, and these in turn causes social impacts. For example the impacts of changes in a river's flooding patterns reducing fish populations downstream of a dam, affecting the economic return from fishing and causing increased levels of out-migration of fishermen. Social impacts can also be local to the dam site (Adams, 2000). World Commission on Dams (WCD) states that large dams have had significant adverse effects on cultural heritage through the loss of cultural resources of local communities and the submergence and degradation of plants and animal remains, burial sites and archaeological monuments (Tahmiscioglu, Anul, Ekmeci, and Durmus, 2004).Campbell-Hyde (2012) studied environmental and social issues of the Three Gorges Dam (TGD), the largest in history, constructed in China. In terms of social,

the author stated that the dam has displaced many socioeconomically vulnerable communities already, putting strain on the social fabric of the area and, in the process, drawing our attention to issues of structural violence.

Mudzengi (2008) assessed the socio-economic impacts of the construction of sand dam in the Mazungunye area of Bikita District of Zimbabwe. The goal of the study was to see whether up scaling of the sand dam technique to other parts of Kenya and other countries is feasible. The assessment of the effectiveness of the sand dams in terms of their hydrological properties (water storage) and their socio economic impacts on communities. The author concluded that sand dam has both positive and negative socio-economic impacts in the Mazungunye area. He recommended among other things that the beneficial economic impacts of the dam can be enhanced by developing local irrigation schemes.

WCD report published in November 2000, shows that 60 per cent of the world's rivers have been affected by dams and diversions, with their construction leading to the displacements of some 40-80 million people worldwide. In Nigeria, more than 250 communities lose their homes and farmlands annually to the flooding of hydroelectric dams in Niger, Kwara, Kogi and Kebbi States. Moreover, research conducted by the Society for Water and Public Health Protection (SWAPHEP) on Ojiramin dam in the Edo state of southern Nigeria, shows that the impact of small dams is similar to that of large dams. The research studied the Okhoro and Ojirami dams and their effects on host communities, the authors investigated the purpose and processes involved in the choice, as well as design and construction of the dams in the state. It was reported that on 30th August 1980, the Ojirami dam failed and inundated the Akuku and Enwan communities. The failure according to the report was mainly due to technical breakdown and negligence on the part of the dam official on duty. It was noted that, no alarm was installed to give warning to local officials and communities when the water exceeded its limit in the reservoir. The flood destroyed

more than 180 houses in the Akuku community and many people lost their houses and other properties worth millions of naira (Ogbeide, Uyigue and Oshodin, 2013).

Adebola *et al.*, (2014) carried out a survey of some randomly selected downstream communities of Jebba dam namely Gungu, Gana, Fanga, Bele, Bere, Gaba and Baru communities. Using structured interview they found that "downstream communities have been neglected in dam construction planning process in Nigeria. The research result showed that the Jebba dam has negative effect on settlements downstream. About 5% of the houses in each of the villages have been displaced and the value of land has also depreciated by 20%. Farming and fishing in various communities have been affected due to land appropriation, flooding and soil erosion. Only Gungu and Gana are connected to electricity supply while road accessibility is very poor in all the villages except Gungu and Gana." The authors emphasized that the impacts of these changes are magnified by changes in the flow pattern of the River Niger downstream that is caused by the operations of the dam.

Tchotsoua *et al.*, (2012) concluded that while many have benefited from the services which the Lagdo dam provides, its construction and operation have had considerable negative societal and environmental consequences. The adverse effects on populations include displaced families, host communities where families are resettled, especially those downstream of the dam, whose livelihood and access to resources are affected in varying degrees by altered river flows and ecosystem fragmentation.

Lawal and Nagya (1999) stated that the occurrences of flood at Mokwa, Rabba and its environs in 1997 and 1998 destroyed properties worth over five hundred million naira and submerged several houses, farmland and crops. In line Lawal and Nagya (1999), Bolaji (1919) lamented that the havoc caused by the flooding of the lower Niger in 1998 and 1999 also has its effect on social services to the people of the area. For example schools in about 32 and 52 villages were submerged in the flood of 1988 and 1999 respectively.

Abanyie, Boateng, Akurugu, Ampofo and Zango (2015) assessed the impact of Vea dam in the Upper East Region of Ghana on the livelihood of surrounding communities, by gathering opinions of residents concerning agriculture, fishing, toilet facilities etc. Result showed that almost all of them (99.32%) thought the construction of the dam has improved agriculture. Some of the people (92%) also stated that Irrigation Company for the Upper Regions (ICOUR) and Ministry of Food and Agriculture (MOFA) personnel have improve their knowledge in irrigation farming techniques and agriculture in general.

Usman, and Ifabiyi, (2012) analyzed the socio-economic dimensions of the operational impacts of Shiroro hydroelectric power generation dam in the lowland areas of middle river Niger in Nigeria. The paper observed that more than thirty years since the conception and impoundment of water at Kanji over river Niger a number of actions or inactions capable of altering the socio-economic profile of the riparian communities around the lowland areas of middle river Niger in Nigeria have taken place.

Ogbeide *et al.,* (2013) found that the positive impacts of dam on the communities to include increase in the volume of fish caught when compared with before the dam fishing outcome, and provision of employment at the dam site. Ujoh, Ikyernum and Ifatimehin,(2012) also noted "that the construction of dam has reduced poverty among the surrounding rural communities by providing employment: in the form of fishing, irrigation farming and sale of inputs, increased crop production, improved water supply both quality and quantity and enhanced dry season farming. These have been perceived to reduce rural-urban migration in the communities which is associated with unemployment and poverty. In addition to the direct impacts, the dam has induced the construction of roads, electricity and other infrastructure.

Though, existing literature shows that dam have significant socioeconomic impacts on the host communities and the findings of Ahmed (2016) portray environmental

deterioration due to the construction and operation of Gurara dam. This suggests possible socioeconomic distortion, however only Magaji (2012) has carried out the socioeconomic impacts of Gurara dam. The work of Magaji in 2012 indicated that establishment of the dam has brought some social amenities or facilities like schools, hospital, roads, markets and telecommunication networks to all the affected communities and beyond. However, the study was not able to compare the negative and positive impact of Gurara dam to the host communities. Thus, there is the need for further study to determine whether the positive impacts outweighed the negative impacts of Gurara dam.

Therefore, this study is to compliment the report of Magaji (2012). The objectives of the study were to: assess the positive socioeconomic impacts of Gurara on the host communities; to assess the negative socioeconomic impacts of Gurara on the host communities and to compare the positive and negative socioeconomic implications of Gurara on the host communities.

Materials and Methods

The area under study is Gurara Dam Project, the entire project area cuts across Kachia and Kagarko Local Government Areas (LGAs) in Kaduna State and Bwari Area Council of Nigeria's FCT, of approximately 150 km2 with the pipeline route inclusive (Figure 1). The Gurara dam,2000 hectares irrigation pilot perimeters fall within Latitude 090:32'N to 090:48'N and Longitude 070:29'E and 070:49'E. The Pipeline takes its route from the upper Gurara dam in Kachia Local Government Area (LGA) of Kaduna State, traverses Kagarko LGA of Kaduna State and Bwari Area Council of FCT to Lower Usuma Dam with a corridor of 60m wide and 75km in length (Environmental Impact Assessment (EIA) Report of the Gurara Multipurpose Dam Project, 2004.

Survey of five hundred (500) households was conducted using questionnaire survey, observation, stakeholders' consultation and focus group discussion. Purposive and systematic sampling technique, were used for the study. Purposive sampling was used to select ten (10) communities namely: Kadah, Akama, Igo, Doka, Peyi, Jigo, Yelwa, Doupe, Pena and New Akwana for household survey. The selection of these ten (10) communities out of twenty-six (26) affected communities in Kagarko and Kachia Local Government of Kaduna State were based on the degree of impact in the communities. For representativeness, sampling considered the household spatiality. Thus, systematic sampling technique as probability sampling method was used to select households sampled. As a result, three household intervals were used in household selection. Data collected were analyzed using descriptive statistics such as mean and percentages.

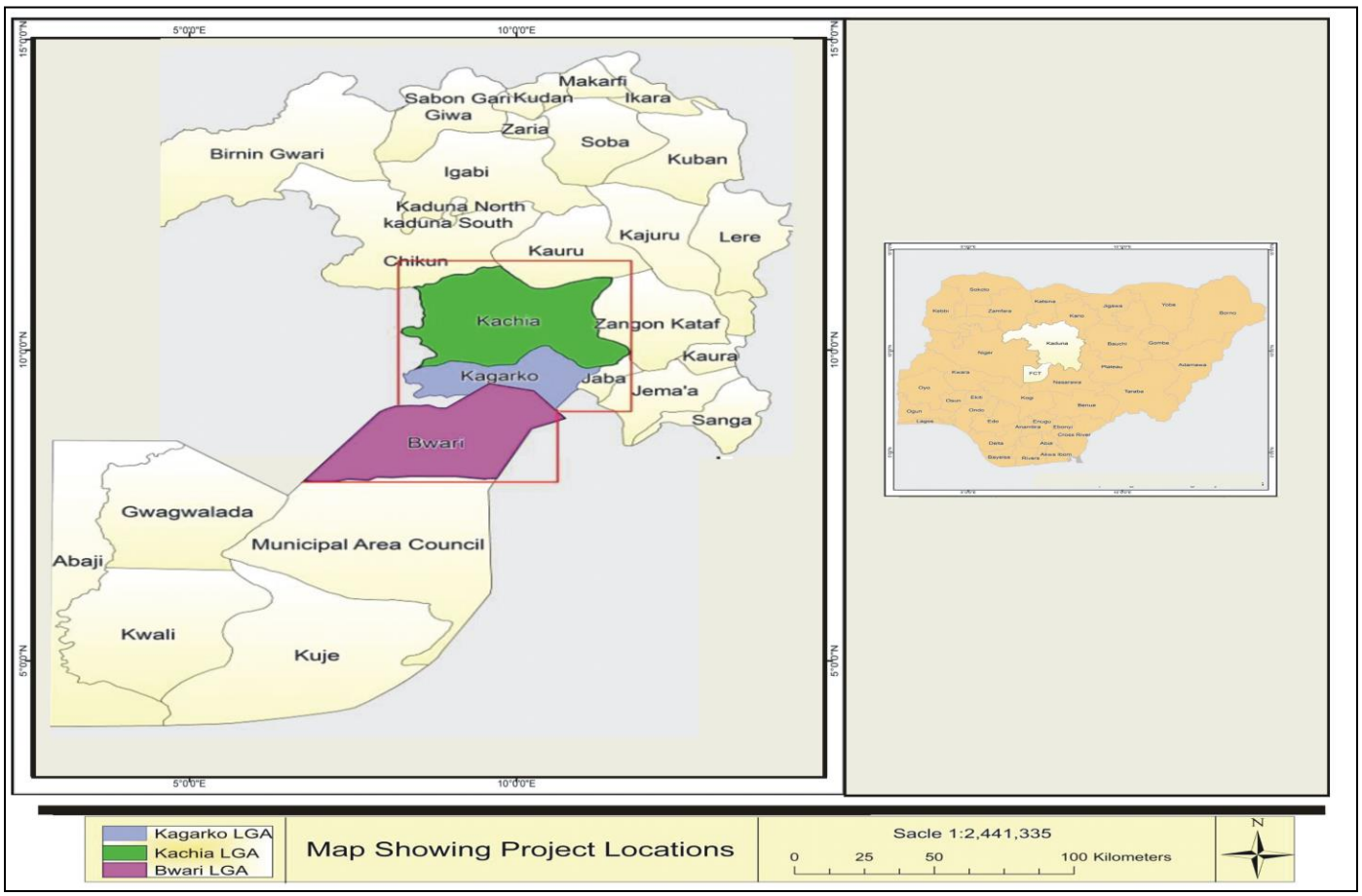

Figure 1: The Study Area

Source: Environmental Impact Assessment (EIA) Report of the Gurara Multipurpose Dam Project, 2004

Result and Discussion

The Positive Socioeconomic Impacts of Gurara Dam on the Host Communities

Finding from stakeholders consultations shows that the completion of water transfer component of the multipurpose dam project and seven water transfers recorded since the operation of the dam has had significant positive socioeconomic impact in terms of potable water supply, electricity generation and increased cropping intensity that had increased the agricultural output of the farming populace. Table 1 present affirmations of these and other positive impacts by the members of local communities who responded to questionnaire.

Table 1: Frequency of Positive Impacts of Gurara Dam

Which of these are the Positive Socioeconomic impacts of Gurara Dam	**Frequency**	**%**
Increased irrigation farming	353	70.6
Increased food production and food security	256	51.2
Increased farming activities during the dry season	373	74.6
Improved livelihood	351	70.2
Improved electricity supply	29	5.8
Creation of viable business opportunities to fishermen	265	52
Stimulation of socioeconomic activities and the emergence of local markets	378	75.6
Job creation, improved livelihood and poverty reduction from improved economic opportunities	256	51.2
Provision of varied transport infrastructure and social amenities.	265	53
Increased access roads and new opportunities of exchange with other communities	270	54
Improve access to health facilities.	45	10
Mean	**258.3**	**51.65**

Table 1 present the respondents' affirmation of positive impacts of Gurara Dam, it shows on average that over fifty per cent (51.65%) affirmed positive (Yes) on the positive impacts of Gurara Dam. Positive impacts such as increased irrigation farming, increased farming activities during the dry season, improved livelihood and Stimulation of socioeconomic activities all had over seventy per cent (70%) recognition by the respondents. Other positive impacts such as job creation, improved economic opportunities,

provision of varied transport infrastructure and social amenities were also recognized by over fifty per cent 50%. The impact on electricity and health facilities had only 5.8% and 10% affirmation respectively. It can be deduced that majority of the respondents have positive view that Gurara dam: increase irrigation farming, increase dry season farming, improve socioeconomic activities and livelihood, reduce poverty, create viable business, job opportunity, improve access to health facilities and electricity supply.

Negative Socioeconomic Impacts of Gurara Dam

The most significant negative socioeconomic impacts identified following the analysis of household questionnaires and consultations at different levels are linked to the following major issues:

i. Involuntary displacement

ii. Public health risks

iii. Loss of farmland

iv. Environmental degradation

Table 2 present affirmations of these and other negative impacts to the host communities.

Table 2: Negative Impact of Gurara Dam

Socioeconomic Impacts	Frequency	%
Involuntary displacement	489	97.8
Public health risks	487	97.4
Loss of farmland	500	100
Loss of cultural heritage	458	91.6
loss of economic trees	456	91.2
Reduction in agricultural products	56	11.2
Community Dispersal	487	97.4
Land Use Modification	489	97.8
Increase in erosion and flooding	498	97.8
Mean	**434.55**	**85.55**

Table 2 present the frequency distribution of the negative impacts of Gurara Dam, it shows that over eighty-five per cent (85%) of respondents recognized the negative impacts of Gurara dam. Problems such as: Involuntary displacement, Public health risks, loss of (farmland, cultural heritage, economic trees, economic trees), community dispersal, land use modification, increase in erosion and flooding are well pronounced as they all had over ninety per cent (90%) recognition by respondents (Plate 1-2). Thus, it is quite obvious that most of the respondents affirmed that the Gurara dam project has some negative socioeconomic effects on the host communities of the Gurara dam. Previous studies have also reported negative socioeconomic effects of dam on the host communities (Adams, 2000; Tchotsoua *et al.*, 2012; Adebola *et al.*, 2014). Tchotsoua *et al.*, (2012) similarly concluded that while many have benefited from the services which the Lagdo dam provides, its construction and operation have had considerable negative societal and environmental consequences. Adebola *et al.*, (2014) found social impacts such as cultural trauma of involuntary resettlement.

Plate 1: Soil Erosion and Land Degradation at the Study Area.
Source: Field Work (2018)

Plate 2: Soil Erosion along the Pipeline Root at the Study Area.

A follow up interview with the respondents shows that the people are no longer living together as they were before the dam creation. People were move from their settlements to other places quite different from their former settlements, and had to start a new life, making life a little difficult for some of them. They lost almost all their economic trees, agricultural land, cultural heritage ancestral lands/homes and some other valuables. The relocation, influx of migrants and impoundment of the reservoir and other changes that accompanied the dam construction and operation also posed serious public health risk. There is significant recognition of both negative and positive impacts of Gurara dam, and effort was made to examine whether the positive impacts outweighed the negative impacts. This was done using basic indices such as changes in the accessibility of social facilities and change in income and livelihood (Tables 4 & 5).

Table 4 shows percentage affirmation of changes in the accessibility of social facilities such as access to clean water, healthcare, school, worship centre, road, electricity and telecommunication facilities. It shows on average that majority (72.43.%) affirmed

Table 4: Changes in the Accessibility of Social Facilities

Parameters	**Improved**	**Deteriorated**
Access to borehole water	100	0
Access to Educational Facilities	50	50
Access to healthcare facilities	70	30
Access to worship places	90	10
Access to tarred road	100	0
Access to electricity supply	10	90
Access to telecommunication	87	13
Total	**72.43**	**27.57**

improvement in access to social facilities while 27.57% affirmed deterioration in social facilities after the dam construction. Therefore, the positive impacts outweighed the Negative impacts in terms of social facilities. However, there are variations among the affirmations to these social facilities, for example all the respondents (100%) affirmed that there are improvements in access road and clean water following the dam construction (Plates 3-4).

Plate 3: Road Constructed Following the Dam Project to link the Dam with FCT

Plate 4: Water Supply for the Pastoral Settlement Near the Dam

Improve access to worship centre, telecommunication and health care facilities were also well recognized as they had 90%, 87.0 % and 70% affirmation respectively while overwhelming 90% affirmed deterioration in access to electricity.

Table 5 present respondent's affirmation of changes in income and livelihood. It shows that majority (66.25%) affirmed improvement in income and livelihoods while 33.75% affirmed that income and livelihood declined. Therefore, the positive impacts outweighed the Negative impacts in terms of income and livelihoods.

Table 5: Changes in Income and Livelihood

Parameters	Improved (%)	Declined (%)
Income Level	60	40
Income from Primary source	59	41
Income from secondary source	55	45
Savings/Investment	60	40
farm activities and output	90	10
job opportunity	60	40
Access to Market	85	15
Access to Goods and services	100	0
Economic Activities	90	10
Total	**66.25**	**33.75**

All the respondents affirmed improve in access to goods and services which is a reflection of improved access road. Ninety percent (90%) affirmed improve in farming and other economic activities.

This report is in line with the conclusion of Magaji (2012) that the establishment of Gurara dam has brought some socio-economic facilities like schools, hospital, roads, markets and telecommunication networks to the affected communities. It also corroborate the position of SANDRP, (2012) that dam have positive impacts on host communities "like improved welfare, resulting from new access to irrigation water, improved fishing upstream" Moreover it was able to show that the positive socioeconomic impact of the Gurara dam on host communities outweighed the negative impacts. It also agreed with Ujoh *et al.*, (2012) "that the construction of dam has reduced poverty among the surrounding rural communities by providing employment: in the form of fishing, irrigation farming and sale of inputs, increased crop production, improved water supply and others.

Conclusion

The data from the survey showed that the socioeconomic impact of the Gurara dam had both positive and negative impacts. The operation of the dam has had significant positive socioeconomic impact in terms of potable water supply and increased cropping intensity and agricultural output of the farming populace. Though the positive impacts outweighed the negative impacts, there are outstanding negative impacts; the most significant negative socioeconomic impacts are linked to the following major issues: involuntary displacement, public health risks, loss of farmland and environmental degradation.

Recommendations

Base on the findings, it was recommended as follows:

i. The dam management board should set up grievance redress committee to address outstanding issues regarding displacement, resettlement and compensation.

ii. The management should ensure active participation of aggrieved communities in re-establishing solutions and implementing them.

iii. Stakeholders should solve the problems created by implementing the environmental and social management plans set in the EIA like: Proper compensation for land take, forestation of unused area and proper flood and erosion control to minimize loss of farmland and environmental degradation.

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