

Effects of Kiri Dam Construction on the Economy of Lower Gongola Basin of Shelleng Local Government, Adamawa State, Nigeria

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ABSTRACT

This survey aims at examining the effects of the Kiri Dam construction on the economy of Lower Gongola Basin of Shelleng Local Government, Adamawa State, Nigeria. Kiri Dam was constructed in 1982, at Kiri, some kilometers upstream of its confluence with the River Benue at Numan. Two hundred and fifty copies of structured questionnaire were administered on the respondents. Simple percentage and student t-test were used for data analysis. Multi-stage sampling technique was used to select respondents for the study. Remote sensing of two dates analysis (1976-1994) were processed and change detection was analyzed. The result revealed that the farmers do not benefit from the project, this is because according to the farmers, the Dam has taken away over farmland, grazing areas and other areas used for economic activities. In addition the quill birds are now common in the areas due to the presence of the Dam which fed on grains of cereal crops and consequently forced farmer to cultivate cottons. However, fishes were not in abundant as used to be before the Dam construction. The T-test showed drastic decrease in the farm sizes. From the result above, it is concluded that, the economic activities and well being of the people in the area is disrupted. Hence, the community should be given adequate irrigational facilities and sensitized on fishing skills and equipment to enable them effectively utilize the reservoir.

Keywords: Dam, Irrigation, farming, Environmental, Lower Gongola

INTRODUCTION

Recently, the demand of the growing population for electric power supply and economic development has led to the initiation of large scaled river basin development. Hence River Gongola was dammed at Kiri under the auspices of the upper Benue River Basin Development Authority. It was formally initiated by Savanna Sugar Company but it is now under the control of Upper Benue River Basin Authority (UBRBDA). Savanna Sugar company is however, still the greatest user of the Dam where the water is used for irrigating sugar cane plantation. Salau (1986) reports that the construction of the Dam displaced over twenty thousand people. The Dam

was constructed in 1982, at Kiri, some Kilometers away up streams of its confluences with river Benue at Numan. The Dam land area is 134km². Just like most Dams in Nigeria, its main aim is for providing water for irrigation, fishery and transportation among others. The present study was formulated to investigate the environmental and economic impact of Kiri Dam. This is because little or no comprehensive research has been carried out so far to appraise the environmental and economic problems associated with the Dam, particularly the Kiri Dam. Hence, there is no significant variation in the size of farm land holdings before and after the construction of the kari Dam.

METHOD

This study adopts the survey research design. The study area consist of five settlements; Kiri, Tallum, Banjiran, Prokayo-Lakumna and Shelleng. The data obtained from this works are basically from the primary and secondary sources. The primary sources involve the use of questionnaire, field observation and interactive interview, while the secondary source involve the climatic and hydrological records as well as remote sensing images. The distribution of copies of the questionnaire between the sampled villages was carried out using special technique proportionally known as:

$$\frac{n_h}{N} \times n$$

Where

n_h = the number of respondents in sampled villages

N = the total population of the individuals in the Sampled villages

N_h = the population of the individuals in the village

n = the total number of the questionnaire to be distributed among the villages.

The data used for this study were analyzed using different statistical techniques. These include both descriptive and inferential statistics. Descriptive statistics used include the use of simple percentages and measure of central tendencies. Under the inferential statistics, Student T-test was employed to test the differences in farm sizes as well as crop output before and after the Dam construction. In all, a total of 250 copies of questionnaire were administered in the study area. These were shared in the ratio 41:24:56:39:90 for the five communities. Multi-statge sampling technique was applied in selecting the respondents from each of the five settlements chosen for the study.

Table 1: Population and sample sizes of the respondents

Settlements	Population	Sample	Farmers	Fishermen	Civil servants	Business	Small scale industrialists
Kiri	3570	41	13	9	8	7	4
Tallun	2111	24	9	6	4	3	2
Banjiran	4842	56	16	93	11	9	7
Purakayo	3404	39	11	9	11	5	3
Shelleng	7784	90	32	17	24	15	11
Tatal	21,711	250	72	134	58	39	27

Source: Field survey, 2007 and 2013

RESULTS AND DISCUSSION

Changes detection in the Dam Catchment area: Plates 1 and 2 are landsat MSS sub-scene and spot sub scene respectively of Kiri Dam Area. The Landsat image was taken in 1976 while spot image was acquired in 1994, about 18 years later; a critical observation of the two images reveals some changes in the nature and composition of the area under study. The 1976 images show that, the river had narrow bank with low water volume, the basin had relatively dense vegetation cover of about 250,000 square kilometers of trees and the vegetation and small flood plain area of about 2000 hectares with a lot of slit deposit throughout the bank of the river. On the other hand, the second image reveals a situation quite different from the first one. There is a wider floodable bank, covering extensive areas, with large volumes of water especially at the upper area of the Dam. The downstream has water only at the river channel and the volume is relatively low.

Impact of the Dam on the Environment: The study reveals that the construction of Kiri Dam has resulted in the depletion of the geographical scene of the region. For instance, the former dense vegetation cover and major fertile farmland of the catchment area has been submerge and lost under the impounded water, this is because the projects involved large scale alteration and utilization of technology which disrupt the eco system and land uses, which has been extended to the marginal lands which is evidence that it occupied significant farmlands. It is believed that, poverty and deteriorating condition of the rural areas could be attributed to the neglect and lack of commitment to rural areas (Wallace, 1980) in contrast, responses from the inhabitants of the Kiri Dam has indicated that, the Dam instead of improving the economic lives of the people, it subjected them to poverty and hardship conditions. Though, Kiri Dam project has introduced specialized crop production in areas where mixed cropping had been the basic features of farming, yet the specialized crop production involves alteration of cash crop like sugar cane, tomaoes, and cotton among others at the expense of foods crops. In addition, the problems of quell birds have been very severe due to the damage caused on cereal crops at the milky stage. This has seriously affected farmers' productivity and income. According to an interview with a blacksmith," Taklum is a market center for grain crops. Here, more than ten trucks or lorries used to load bags of guinea corn in every market day. But now the problems of flood disaster coupled with the effects of quell birds on crops, has destabilized the farming system of the community". The farmers have reported to cotton cultivation to avoid the effect of quell birds on their crops or abandon farming completely. This resulted to poor harvest at the end of farming seasons in the area.

Land use pattern and crops cultivated before and after the Dam construction: Before the construction of Kiri Dam, the immediate communities used to observed traditional agricultural practices, which largely depend on rain fed agriculture, varieties of cereal crops including guinea corn, maize, rice etc were cultivated. With

the construction of the Dam in 1982, some of these have been altered and new usage introduced. For example, water reservoir of the Dam is being used by fisher men for fishing and navigation. Unfortunately, the people are not quite familiar with the irrigation farming, the only good and profitable farming along the Dam. At present, there is about 400 hectares of flood plain land under the Upper Benue River Basin Development Authority in the area for the farmers to develop and make use of it. The study reveals that only 50 hectares were utilized. This is because the local farmers are not interested in it for simple fact that, they are not familiar with the irrigation system and there are no incentives to encourage them to venture into it. Unfortunately, these ponds have been engulfed by the Dam water. Worst still, the Dam now harbors large numbers of dangerous water animals like hippopotamus, water pythons and crocodiles. These animals constitute threats to both man and the farms. For instance, it is on records that the hippopotamus destroys farm crops from time to time. They also constitute threats to fishing expedition. Downstream of the Dam is where irrigated agriculture seems to be having bumper harvest of foods and vegetable crops like rice, maize, okro, tomatoes and pepper, which are cultivated with little or no fertilizer.

It can be seen on tables 5 and 6 that there are some changes in the pattern and types of crops grown in the area before and after the construction of the Dam. For instance, crops like sweet potato, cotton, tomatoes and pepper were introduced after the construction of the Dam. Most of these crops are grown by the river banks; they are grown by irrigational methods. The general reduction in crop productivity as seen on table 6 is as a result of the decrease in farm sizes of the farmers. Fifty five per cent of the respondents reported as harvesting between 11-20 bags (50kg) of guinea corn while 5% have between 1-10 bags before the Dam was constructed. In addition, the harvest of the farmer drastically dropped by 37%. Farmers are therefore left with sharing the remaining pieces of land which resulted in high farm fragmentation. This, coupled with increase in population reduced the farm sizes holding of the farmers.

Tables 7 and 8 respectively demonstrate the average farm holding of peasant farmers in the study area before and after the Dam was constructed. It can be clearly seen that, there are significant differences in the sizes of the farm lands of the farmers before and after the construction of the Dam. For example, 42% of the respondents had less than 1 hectare farm holdings before then, but this percentage changed to 54% after the Dam came to be, meaning that more people now have smaller farm holdings. The average land areas cultivated in hectares by the respondents in each of the areas is presented on table 9. The *T* test statistical result indicates that there are great and significant differences between the farm sizes before and after the Dam was constructed. The *T* test was carried out at 5% level of significant with the 3b degree of freedom. The null hypothesis had to be rejected. This means that there is a significant change in the size of farm land holdings before and after the construction of the Dam.

Seasonal Flow Variation and Fish Distribution in the Dam: The interview

conducted with the leaders of fishermen revealed that the first peak of fishing activities occur at the beginning of the rainy season in the Month of May to July when the water level starts rising and fishes move to their breeding ground. The second peak of fishing activities occurs at the end of the rainy season in the Months of October to February when the gates of the Dam have been close in September and the water level have dropped, at both upstream and downstream. This makes it impossible for their fishing equipment to reach the bottom of the water. During these two peaks sustained quantities of fish are caught per day. The estimated quantity of fish caught per day by fishermen is shown on table 10. The respondents (46%) report that they make a catch of 15-30kg of fish per day, while 33% and 21% make catches between 31-60kg and above per day.

Majority of the respondents also reported that, they use to make more catch before the Dam was constructed as shown on table 11. In addition, the table slightly shows more than 40% of the respondents reporting that they make less catch now than before. This goes to confirm that there has been reduction in the quantity of fish harvested in the area as result of the Dam construction. There should be other factors like increases in the sizes of population which determine the volume of fish caught. However, the respondents believe that the Dam is the major causative agent.

Table 2: Report causes of environmental degradation

Factors	Kiri	Tallum	Banjiram	Purakayo	Shelleng	Total	%
				Lukumna			
Dam Construction	13	11	23	40	40	108	43.2
Deforestation	18	7	18	17	17	71	28.4
Farming Activities	17	4	9	23	23	48	19.2
Others	3	2	6	10	10	23	9.2
Total	41	24	56	90	90	250	100

Source: Field survey, 2013

Table 3: The impact of the Dam on land productivity

Reponses	Kiri	Tallum	Banjarin	Purokayo	Shelleng	Total	%
				Lukumna			
Yes for positive impact	25	15	37	22	62	163	64.8
No for positive impact	16	9	19	17	27	88	36.2
Total	41	24	56	39	90	360	100

Source: Field survey, 2013

Table 4: Yield of some major crops in bags (50kg) per hectare before the Dam was constructed

Yield in 50kg bags per hectare	Kiri	Tallum	Banjarin	Purokayo	Shelleng	Total	%	
				Lukumna				
Guinea Corn	1-10	22	20	22	27	21	112	44.8
	11-20	28	30	27	24	29	138	55.2
Maize	1-10	24	21	25	28	26	124	49.6
	11-20	26	29	25	22	24	126	50.4
Rice	1-10	13	24	21	17	24	109	43.6
	11-20	27	26	29	33	26	141	56.4
Cotton	1-10	29	21	24	25	24	103	43.2
	11-20	21	29	26	25	26	147	56.8

Source: Field survey, 2007

Table 5: Yield of some major crops in bags (50kg) after the Dam Construction

Yield in 50kg bags per hectare		Kiri	Tallum	Banjarin	Purokayo Lukumna	Shelleng	Total	%
Guinea Corn	1-10	32	29	30	33	35	159	62.8
	11-20	18	21	20	17	15	94	37.2
Maize	1-10	21	30	28	24	23	116	63.4
	11-20	15	10	13	14	15	67	36.6
Rice	1-10	19	24	22	16	18	99	64.4
	11-20	10	13	11	19	12	55	35.7
Cotton	1-10	27	29	30	27	22	135	65.0
	11-20	15	17	17	14	10	73	35.0
Potato	1-10	0	0	0	8	12	20	100
	11-20	0	0	0	0	0	0	0
Tomato	1-10	2	0	2	6	6	16	100
	11-20	0	0	0	0	0	0	0
Pepper	1-10	2	0	0	6	8	16	100
	11-20	0	0	0	0	0	0	0

Source: Field survey, 2013

Table 6: Land size Cultivated in hectares before the Dam was constructed

Land sizes in Hectares	Kiri	Tallum	Banjarin	Purokayo Lukumna	Shelleng	Total	%
< 1	20	21	22	22	20	105	42.0
1-2	11	10	9	12	14	56	22.4
3-4	12	11	12	10	10	55	22.0
>5	7	8	7	6	6	34	13.6

Source: Field survey, 2007 and 2013

Table 7: Land cultivated after the Dam was constructed

Land sizes in Hectares	Kiri	Tallum	Banjarin	Purokayo Lukumna	Shelleng	Total	%
< 1	27	29	26	29	23	134	53.6
1-2	13	10	14	14	17	63.2	27.2
3-4	8	7	7	5	8	35	14.0
>5	2	4	3	2	2	13	5.2

Source: Field survey, 2013

Table 8: Average farm sizes before and after the Dam

Settlements	Farm sizes before	Farm sizes after
Kiri	4.1	1.9
Tallun	3.8	1.4
Banjiran	3.5	1.4
Purakayo Lakumna	4.6	2.2
Shelleng	4.9	2.3

Source: Field survey, 2007 and 2013

Table 9: T test result of the Differences between farm land before and after

	N	Mean	Standard deviation	Standard error of mean
Before	5	4.18	0.51	0.23
After	5	1.84	0.38	0.17

Source: Field survey, 2007 and 2013

Table 10: The estimated Value of fish in (Kg) harvested by fishermen per day in Kiri area

Volume of fish (Kg)	Kiri	Tallum	Banjarin	Purokayo Lukumna	Shelleng	Total	%
15-30	18	12	26	19	39	114	45.6
31-60	14	7	17	12	32	82	32.8
61 and above	9	5	13	8	19	54	21.6
Total	41	24	56	39	90	250	100

Source: Field survey, 2013

Table 11: Abundance of fish caught now as against the former values

Abundance of fish	Kiri	Tallum	Banjarin	Purokayo	Lukumna	Shelleng	Total	%
Less now	17	11	27	16		29	99	39.6
More now	16	8	12	13		37	86	
No difference	8	5	17	11		24	65	
Total	41	24	56	39		90	250	

Source: Field survey, 2013

CONCLUSION

The study focuses on investigating the impacts of Kiri Dam on the immediate environment and economic lives of the inhabitant. It has been established that the Dam has impacted mostly negatively on the environment and the economy. This is because the farmers' farm lands have been taken over by the Dam. The inhabitants had to resettle in the first place, thereby subjecting them to a lot of inconveniences and loss of property. Foreign birds and animals are now common in the area imposing various sorts of threats and intimidations to food security. The Dam is most advantageous only to Savanna Sugar Company, Numan. This is because; it draws virtually all its water for irrigation from it. Environmental components have also been tempered in a great way. Hence, the community should be given adequate irrigational facilities and sensitized on fishing skills and equipment to enable them effectively utilize the reservoir.

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