

ASSESSING RIVER BASIN SYSTEM POTENTIALS TO ENHANCE SUSTAINABLE IRRIGATION FARMING OPERATIONS AND MANAGEMENT IN NIGERIA

Oriola E. O.*¹ and Alabi M.O.²

1. Department of Geography and Environmental Management, University of Ilorin, Ilorin (NIGERIA)
2. Department of Geography and Planning, Kogi State University, Anyigba (NIGERIA)

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ABSTRACT

This paper examines the large scale irrigation schemes of a river basin system with a view to determine the potentials of the system for sustainable irrigation operation by adopting an effective operation management for their sustainability, enhance increased food production and eradicate poverty among the irrigation famers in our society. The large scale irrigation schemes under the Lower Niger Development Authority were examined and analyzed to determine their potentials in achieving the set objectives of food production and food sufficiency. Direct field observation of the two irrigation schemes was carried out and relevant data on irrigation infrastructures that facilitate crop production were harvested and simple descriptive statistics were employed because of the nature of the data. The two schemes were found to have adequate volume of water, cultivable land, capacity for expansion and prospect for increased productivity. However, the system has constraint of fund and inadequate and irregular maintenance of infrastructure. This implies that a better operational and maintenance strategy is required if the set objectives are to be achieved. The recommendation therefore is that a better operation and maintenance strategy such Public Private Partnership should be fully adopted for these type of projects, with this; the farmers are very likely to be better empowered under private investors operation and maintenance while the Government Agency (River Basin) serves as monitoring body for effectiveness and efficiency of the basin system.

Key Words : Irrigation, Operation, Management, River basin, System, Sustainability, Partnership, Maintenance

INTRODUCTION

A river basin is a complex system with various resources for developmental projects and programmes. This is the basis on which the Federal Government of Nigeria established 11 River Basin Development Authorities (RBDA) in the 70s. The 1979 River Basin Development Authorities Act established 12 river basins authorities within the countries four large river basins. The basin authorities spread across the 36 states of the Federation. According to Onwuamaeze, the mandate of the Basin Authorities were to provide water for irrigation and domestic water supply, improve navigation, hydro electric power generation,

recreation facilities and fisheries projects.¹

Others include engender plantation farming and encourage industrial complexes that could bring the private and public sectors in joint business partnership.

To achieve these set objectives, dams of varying sizes were constructed to impound adequate water for the various operations more importantly irrigation. A colossal amount of money was invested in the systems year in year out. For example, Federal Government in the 3rd and 4th development plans spent N778.1 million and N2.094 billion respectively on River Basin Development Authorities (R.B.D.As) alone. The objectives are yet to be met, Nigeria still spends billions of naira on food importation.

*Author for correspondence

For example, Nigeria spends more than \$2 billion annually to import 1.6 million tons of fish yearly. The country is also the highest importer of rice and wheat in Africa.²

The Basin Authorities suffer policy inconsistency, poor maintenance and neglect of facilities due to poor funding and most large scale irrigation projects are neglected and became moribund. A World Bank study revealed that enormous capital outlay of large scale irrigation schemes requires the adoption of a new paradigm which place emphasis on private investors and restricts government or its agency's role to monitoring.³

Conceptual framework

River basin as a system

A river basin can be described as a pragmatic unit that has all it takes for developmental process. It has both the natural resources of human capital which are the basics of integrated planning which can be in form of basin perspective instead of the a single project perspective. From such system it is very possible to have the benefits of harnessing all the potentials of structural; construction and engineering and the non-structural; agronomy, vegetative and soil management within the basin for ultimate success and gains.

For ultimate productivity of the system, it is important to recognize the participation and engagement of stakeholders in all the activities of the basin operations and management because 1. They have valuable knowledge, and 2. if they are involved in decision making they are more likely to support future decisions and implementation. The stakeholders are all those people who have an interest in river basin resource development, they include:

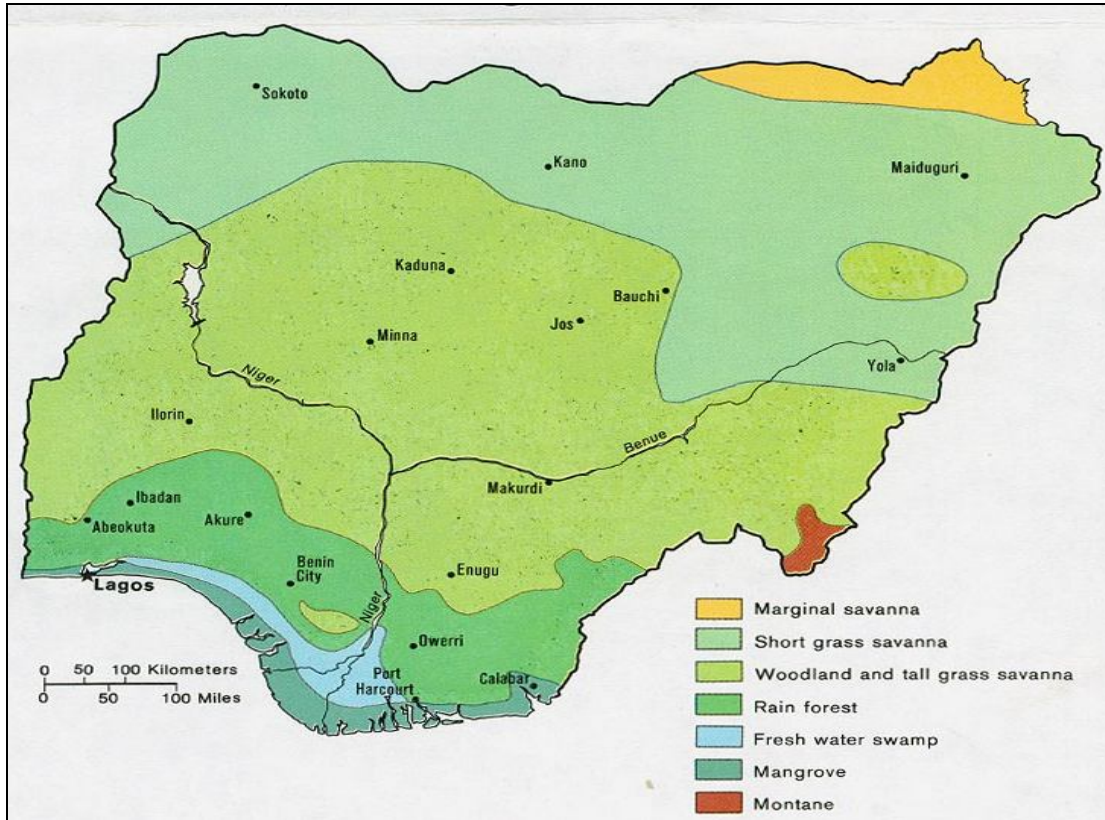
- Government MDAs at Federal, State and local levels
- River basin organizations or agencies
- Experts, both scientific and local
- Civil society groups
- Industry representatives
- Community representatives and community members

Nigerian : Physical setting

Nigeria extends between about latitude 4⁰ N and 14⁰ N of the Equator and 2⁰ E and 14⁰E of the Greenwich. According to Central Intelligence Agency, the land area is 910,678 sq. km with varied landscape.⁴ The south has the tropical rainforest; in the middle is the Savannah with grasses and flowers between trees and Sahel vegetation in the north with desert encroaching fast into the country (Fig. 1). C.I.A reported that thirty three percent of its land is classified as arable land, while 3.14 percent is on permanent crops, only 2,820 sq. km is irrigated.⁵ The climatic condition has not permitted full utilization of the vast land for agriculture because of the high degree of spatial and temporal variation in the amount and distribution of rainfall. The south has an annual rainfall ranging between 1,524mm and 2,035mm and concentrated within 8 – 10 months. The middle belt has between 508mm and 1,524mm annually and in the north it is less than 508mm annually and it falls for a period of 5-6months and less than 4months especially in the far north. The Temperatures are warm within 75 and 85 degrees Fahrenheit throughout the year.⁶

Nigeria is the most populous country in Africa, the recent population census released in 2006 gave the population of 140,003,542 and the United Nations estimate in 2009 was 154,729,000.

The Central Bank Governor, Sanusi Lamido Sanusi, stated that 70 percent of Nigerians were living below the poverty line at the Annual Microfinance Conference and Entrepreneurship Awards held in January 2011 in Abuja⁷, it is therefore necessary to work out strategies to holistically develop river basin system and make agriculture more productive and sustainable through effective and responsive irrigation practice more so when agriculture is the main occupation of the people. It employs not less than two-thirds of the population as more than 70 percent of the people live in rural areas. Agriculture contributes 42.2 percent to the total GDP in 2007 as observed by Oriola.⁸



Source :- Macmillan⁹

Fig. 1 : Natural vegetation of Nigeria

AIMS AND OBJECTIVES

This paper tries to examine the potentials of the large scale irrigation projects of the Lower Niger River Basin Development Authority (L.N.R.B.D.A) Ilorin as an epitome of River Basin Authorities in Nigeria, with a view to justify the adoption of the Public Private

Partnership initiative for their operations, maintenance and sustainability of the entire system.

METHODOLOGY

Currently there are 12 functioning River Basin Development Authorities in Nigeria (**Table 1**). This paper purposively selected the two large

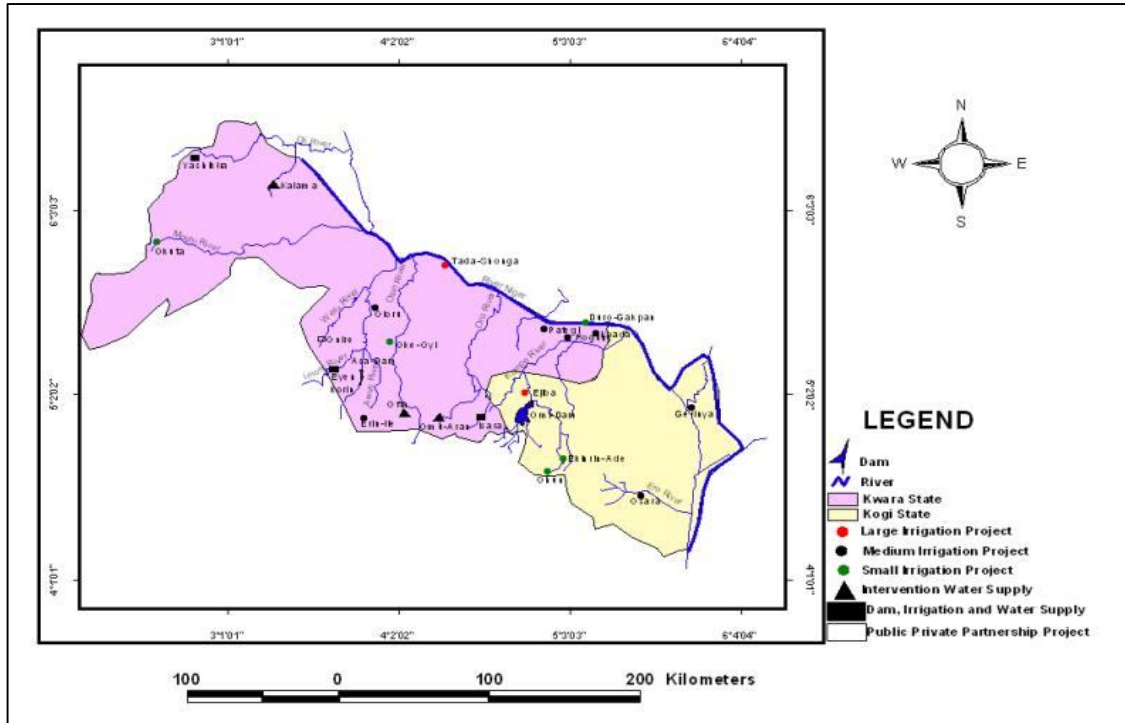
Table 1 : River basin authorities in Nigeria

S/N	Basin authority	S/N	Basin authority
1	Sokoto – Rima River	7	Anambra – Imo
2	Hadeja – Jamare River	8	Upper Niger River
3	Lake Chad	9	Lower Niger River
4	Upper Benue River	10	Ogun – Osun
5	Lower Benue River	11	Benin – Owena
6	Cross River	12	Niger Delta

Source : Adapted from F.G.N.(Official Gazette No.13 V 63,1976)

scale irrigation projects of the LNRBDA, Ilorin as epitome of such schemes in Nigeria. These projects are Shonga and Kampe Irrigation projects. Apart from being the only two large irrigation projects of the LNRBDA, Ilorin, their geographical location

also made them appropriate for this study. Shonga is in the dry Savanna vegetation of Kwara state with about 8 months of dry season and Kampe in the much wet season in the derived Savanna zone of Kogi state (**Fig. 2**).



Source : Lower Niger River Basin Development Authority, (2010).

Fig. 2 : Irrigation project sites of the lower niger river basin development authority, Ilorin

Description of the schemes

Shonga irrigation project

The Shonga irrigation scheme is located in the flood plain of River Niger between Shonga and Tada in Edu Local Government Area of Kwara State. This area is traditionally known for rice cultivation. The project is designed to lift water directly from River Niger through a network of canals. Consequently, twelve 24-inch hydroflo pumps of low heads and high volume suitable for lift-and-gravity irrigation were installed on the bank of River Niger. Seven-kilometer main canals and 192km distribution channels have been established in this area while 32,000 ha of cultivable land have been cleared for both irrigation and rain-fed farming activities. This is expandable to 5000ha at full operation but the authority needs N960million. So far only 250ha is put to active irrigation activity.¹⁰

Kampe irrigation project

Kampe irrigation Scheme is located around Omi village in Yagba west Local Government Area of Kogi state. It occupies a 4,100 ha expanse of irrigable land. Kampe has a Dam with impounding capacity of 250mill. Cubic

meters of water, a 39 kilometer length of main canal and about 300 kilometer of feeder and supplementary drainage system. The main canal is 29km and about 1000ha of irrigation land is available for effective and intensive irrigation activities.¹¹

Data collection

Pragmatic approach was adopted in harvesting data for this study through field observation of the two large irrigation schemes of the Lower Niger River Basin Development Authority, Ilorin. Data on basic infrastructure: irrigable land, irrigation equipments, fund for operation and participating farmers and human capital in general were harvested from both published and unpublished documents and various Technical Reports of the basin authority. For data validation, the project officers of the two projects were interviewed on the operations and various activities of the Basin Authority in general. The nature of the data required and collected for this investigation does not need rigorous statistical analysis, therefore, simple descriptive analysis; proportion and percentages were employed in analyzing and presenting the results.

RESULTS AND DISCUSSION

The result presented in the **Table 2** to **Table 6** show that water is abundant for irrigation activities in the two projects areas under investigation. The water from river Niger is readily available in abundance throughout the year. Similarly is the Kampe project with the dam at Omi dam impounding not less than

220mill cubic meter of water. About 190.8 mill m³ is readily available and accessible in the system but the project actually utilized 61.20mill. m³ and the ecological downstream user also demand for about 60mill m³. It is evidently clear that the dam has sufficient total water to cater for the water demand for various activities in the area and still left with annual water surplus.¹²

Table 2 : Available land for irrigation

Land area	Shonga	Kampe
Irrigable land Area	3,200 ha	4,100ha
Irrigate land	250ha	1000ha
% Irrigated	7.81	24.39

Source : Field Survey, 2010.

Table 3 : Land irrigated and number of participating farmers in the two schemes (2004-2010)

Farming seasons	Kampe					Shonga				
	Land area Irri(ha)	No. of part. farmers	% of land Cult.	Ave. ha / farmer	Exp. Ave. ha / Farmer	Land area Irri(ha)	No. of part. farmers	% of land Cult.	Ave. ha / farmer	Exp. Ave. ha / Farmer
2009/2010	92	460	9.2	0.20	2.17	38	22	15.20	1.72	11.36
2008/2009	100	630	10.0	0.59	1.59	40	45	16.00	0.89	5.56
2007/2008	94	510	9.4	0.18	1.96	15	10	6.00	1.5	25.00
2006/2007	105	710	10.5	0.15	1.41	12	8	4.80	1.5	31.25
2005/2006	70	440	7.0	0.16	2.27	28	20	11.20	1.4	12.50
2004/2005	85	505	8.5	0.17	1.98	28	35	11.20	0.8	6.58

Source : L. N. R. B. D. A. 2010

Table 4 : Fund availability for irrigation in the two schemes (2004-2010)

Farming seasons	Kampe				Shonga			
	Land area irrigated (in Ha.)	Fund required	Fund released	% of Fund released	Land area irrigated (in Ha.)	Fund required	Fund released	% of Fund released
2009/2010	92	#500,000	#231,000	46.20	38	#5,499,000	N. A	N. A
2008/2009	100	#630,000	#250,000	39.68	40	#5,697,550	#2,500,000	43.87
2007/2008	94	#550,000	#210,000	38.18	15	#2,731,673	#1,200,000	43.93
2006/2007	105	#600,000	#260,000	43.33	12	#800,000	#500,000	62.5
2005/2006	70	#520,000	#270,000	51.92	28	#1,700,000	N. A	N. A
2004/2005	85	#600,000	#265,000	44.16	28	#1,500,000	N. A	N. A

Source : L. N. R. B. D. A. 2010

Table 5 : State of irrigation equipments

Equipment	Kampe project			Shonga project		
	No	Condition	Remark	No	Condition	Remark
Tractors	6	Good	Not Adequate	6	Good	Not adequate
Excavators	1	Good	Not Adequate	1	Good	Not adequate
Load loader	1	Good	Not Adequate	1	Good	Not adequate
Pale loader	1	Good	Not adequate	1	Good	Not adequate
Grader	1	Good	Not Adequate	1	Good	Not adequate
Bulldozer	1	Good	Not adequate	1	Good	Not adequate
Planter	-	None	Not available	1	Good	Not adequate
Boom Sprayer	-	None	Not available	2	Good	Good
Duty Vehicle	-	None	Not available	2	1 Good	1 for Repair
Motorcycle	-	None	Not available	2	1 Good	1 for Repair
Irrigation Pump	-	None	Not available	4	2 Good	2 for Repair

Source : Field Survey, 2010.

Table 6 : Staff strength department and divisions

Department	Division	Number of staff
M.Ds Office		32
Finance and administration	Administration	179
	Finance & Account	
	Store	
	Gender and Human Right	
Engineering	Operation and Maintenance	174
	Construction	
	Hydrogeology	
Planning and design	Planning	34
	Investigation	
	ICT	
	Design	
Services	Agricultural Services	89
	Commercial Services	
	IWRM	

The available irrigated land of the two projects (7,300ha) at full operation is not being utilized adequately. In the two projects, only 17.12 percent is currently put into use at the time of this study. This is basically because of gross inadequate release of fund and inadequate and no provision of some irrigation equipments for the projects (Table 5). For instance, less than fifty percent of the fund required is often released every farming season in the last five years. Unfortunately the participating farmers do not have strong economic capacity that can effectively maintain the project efficiently. In the light of this, they can only cultivate small farm holds, the average farm size is less than 1ha at Kampe and at Shonga the average size

ranges between 0.8ha and 1.72ha (Table 3) this is higher. The low patronage of the schemes is perhaps because of the remoteness of the area which makes the project unattractive to the people. It is also evidently clear the available infrastructure at the schemes is not adequate for effective operation (Table 5).

The human capital is adequate, there are 508 employed to supply required services for the smooth efficiency and effectiveness of the Basin System. The employees spread across four basic departments, Planning and Design, Engineering, Services and Finance and Administration. However, the Engineering with operations and maintenance, construction

and hydrogeology in collaboration with agriculture and commercial services divisions pivot the system. These divisions have qualified and experience staff certified by government professional bodies. They are also exposed to regular training, workshops and conferences within and outside the country.

Functionality, survival and sustainability of basin irrigation system

In the system concept, all the component parts has to be readily and adequately available to perform their role for efficient and effectiveness of the system. In this study, inefficiency and ineffectiveness has been established: adequate fund is not available for the two projects.

Irrigation system has three basic functional parts; the government, the natural resource (water and land)/infrastructure and the farming community. The government in most cases provides the fund and infrastructures through her Irrigation Agency (River Basin Authorities) and other inputs, the people and farming community uses the provided infrastructures for farming activities and the natural resources of arable land area and water are natural endowment which the farming community interact with for desired output.

If the traditional irrigation systems survive based on the peoples` vested interest in their investment other modern irrigation systems particularly large scale projects can also be made viable by inducing the local people to invest in them. The people who are also stakeholder can be made to be more committed to the objectives, after all the sustainability of modern small scale irrigation projects still requires heavy government subsidy¹³.

However, since the economic base of the participating farmers is weak and the government is finding it difficult to fund the projects adequately, Private sector funding would be required for irrigation development, establishment and operation of service centers, vehicles and equipment, storage as reported by Oriola.

The Federal government would be responsible for oversight and quality assessment, setting standards and monitoring to ensure these are met. The private sector would build the head works, irrigation farms, service centers, and

provide machinery and equipment as well as operation and maintenance of the scheme. The expected role of LNRBDA would be to monitor the project and ensuring good relationship between the large and small-scale farmers. It would also act as facilitator in providing an interface between the private investors and the communities.^{14,15} The stakeholders including the participating farmers are the beneficiary. They utilize the provided infrastructure and services for sustainable agricultural activities within the Basin System. This strategy will revive and sustain irrigation activities in Nigeria.

CONCLUSION

The evidences from the study revealed that the two large scale irrigation schemes have adequate potentials within the system to produce enough food for the growing population in their area of operation. However, the system requires a strategy that would can transform agriculture and sustain food production to continuously meet the food demand.

Since irrigation is essential to the achievement of the present administration Agriculture Transformation Agenda, the state at which the irrigation systems are presently, cannot produce enough food for the growing population and more importantly, the Government funding of the schemes have been difficult and erratic, it is therefore necessary that all the resources in the River Basin Development Authorities must be efficiently deployed in order to attain the Transformation goals.

Privatization of the river basins to help ensure effective irrigation systems across the country is hereby recommended. The alternative will be full implementation of public private partnership initiatives for all large irrigation projects in the country recommended by Oriola is hereby reiterated. This will solve the problems of poor maintenance, and unreliable services inherent in government provided irrigation schemes.

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