Original Research Article

CONSTRAINTS TO AGRICULTURAL PRODUCTIVITY IN KAINJI LAKE NATIONAL PARK, NIGERIA

ABSTRACT

The aim of this research paper is to evaluate constraints to agricultural productivity in Kainji Lake National Park (KLNP). Simple randomized design was employed to select three communities/villages from each of the five districts of KLNP. This research was carried out between January to December, 2011. The national park comprises of 5 districts, out of which three communities were sampled, 40 copies of questionnaires were administered at each of the 3 villages, which made a total of 600 copies of questionnaires administered, The harvested data for this research were analysed using both descriptive and inferential statistics, stepwise multiple regression was adopted to identify the contribution of agricultural constraints to the total food production in the study area. The highest duration of farming year in the villages across all districts depicted was 11-15 years at 35.8%, while the least farming year duration was 20 years and above at 4.6%. The size of randomly selected farmlands in the villages in all the districts revealed that the farm sizes less than 1 acre had the highest usage at 30.5% while the farm sizes with least usage was above 5 acres at 16.44%. At the sampled communities, maize is the most commonly cultivated crop, while cassava, yam, cowpea, guinea-corn, groundnut were commonly cultivated on few of the farmlands. Among the constraints, high cost of human labour had the highest regression coefficient (R^2) at 0.82, high cost of transportation had R^2 at 0.80, inadequate extension services had R^2 at 0.78, lack of funds and credit facilities had 0.72 R^2 value, lack of modern farming equipment had R^2 value of 0.60 while poor marketing had the least R^2 value at 0.58. The crops cultivated in the comunties surrounding the KLNP are cassava, groundnut, guinea-corn, maize, millet and soya beans.

There is high level of agricultural constraint in the Kainji Lake National Park which commensurate negative effect on the survival of the surrounding communities. The land use is key to resource sustainability in Nigeria as majority of it's citizens require land for agricultural productivity. This requires urgent intervention to mitigate the livelihood of these communities to avoid over-exploitation and further anthropogenic impact on KLNP for it's conservation and sustainability.

KEYWORDS: Agriculture productivity, agricultural Constraint, Conflict, Degradation

1. INTRODUCTION

Agriculture occupies more than one-third of the World's land area and it is the leading cause of habitat destruction on a global basis, be it on traditional/ small scale commercial systems. Malthus theory, in

1826 says that the size and growth of the population depends on the food supply and agricultural methods, but Boserup's theory opposes this by saying that the agricultural methods depend on the size of the population. Malthus states that in times when food is not sufficient for everyone, the extra people will have to die. However, Boserup (1996) states that in times of pressure people will find ways to increase the production of food by increasing workforce, machinery and fertilizers among others.

Constraint refers to a reduction on the degree of freedom of the elements of a system exerted by some collection of elements, it can also be defined as a limitation on the variability of change in the kind of such elements (Jon and Matteo, 2013)

Human demographic growth has caused increased demand for natural resources (Oramah, 2006). In Africa, most people depend directly on these resources for their livelihood. In Nigeria like many other developing countries, majority of the population depends on agriculture for food, personal needs and income (FAO 2006).The relationship between agricultural practices and environment has been relatively stable and favorable, but it has in recent times been disturbed by anthropogenic forces, leading to serious environmental degradation.This varies from country to country and Nigeria is not an exception. Sekitoleko (1993) reported that any agricultural activity that upsets the natural ecosystem and the extent to which it is disturbed depends on the nature, intensity and duration of such activity. She further described the activities in categories, which are land/soil degradation, drainage, over harvesting and burning of wetlands, pollution of water bodies, land and air, overfishing and encroachment of protected area.

Conflict between agriculture and environment quality is a challenge to mankind for survival. Conflicts may also arise when people who traditionally use natural resources around them are either controlled or forbidden on such resources (Norton-Griffths, 1996). Biodiversity conflict according to O' Leary and Bingham (2003) occur when there are fundamental and ongoing differences amongst parties concerning value and behaviour as they relate to the environment. In addition, conflicts are situations where people deliberately, with or without knowledge of the consequences of their actions destroy biodiversity, particularly when they perceived a positive impact on their livelihood (Young et al., 2003; Young et al., 2005). For instance, decision to establish a park where cultivation and grazing is prohibited requires removal of some people who used these lands. There may not be peace because the local people would feel that they are being deprived of something that rightfully belongs to them. Such affected individuals should have been given the opportunity in the planning process or been offered access to some alternative resources that would substitute their traditional lifestyle.

Yoram and Heinrich, (1998) reported that about one-third of vertebrates have suffered either extinction or a drastic reduction in population because of human activities, whether hunting, agricultural practices, urban industrial development or poisoning. Although hunting was the main cause of several species extinction, habitat destruction has also been responsible for the disappearance of large numbers of species. The major natural resources, which include land, water, associated soil, plants and animals are of great importance to man. Most of the food comes from plants grown on the land or from animals, which themselves live by eating plants. Therefore, man's

survival depends on agriculture. Natural areas which shelter ethnic groups dependent on hunting, fishing, and food gathering preserve the heritage of human wisdom derived from a long association with nature, such as the use of wild plants and animals for medicinal purposes.

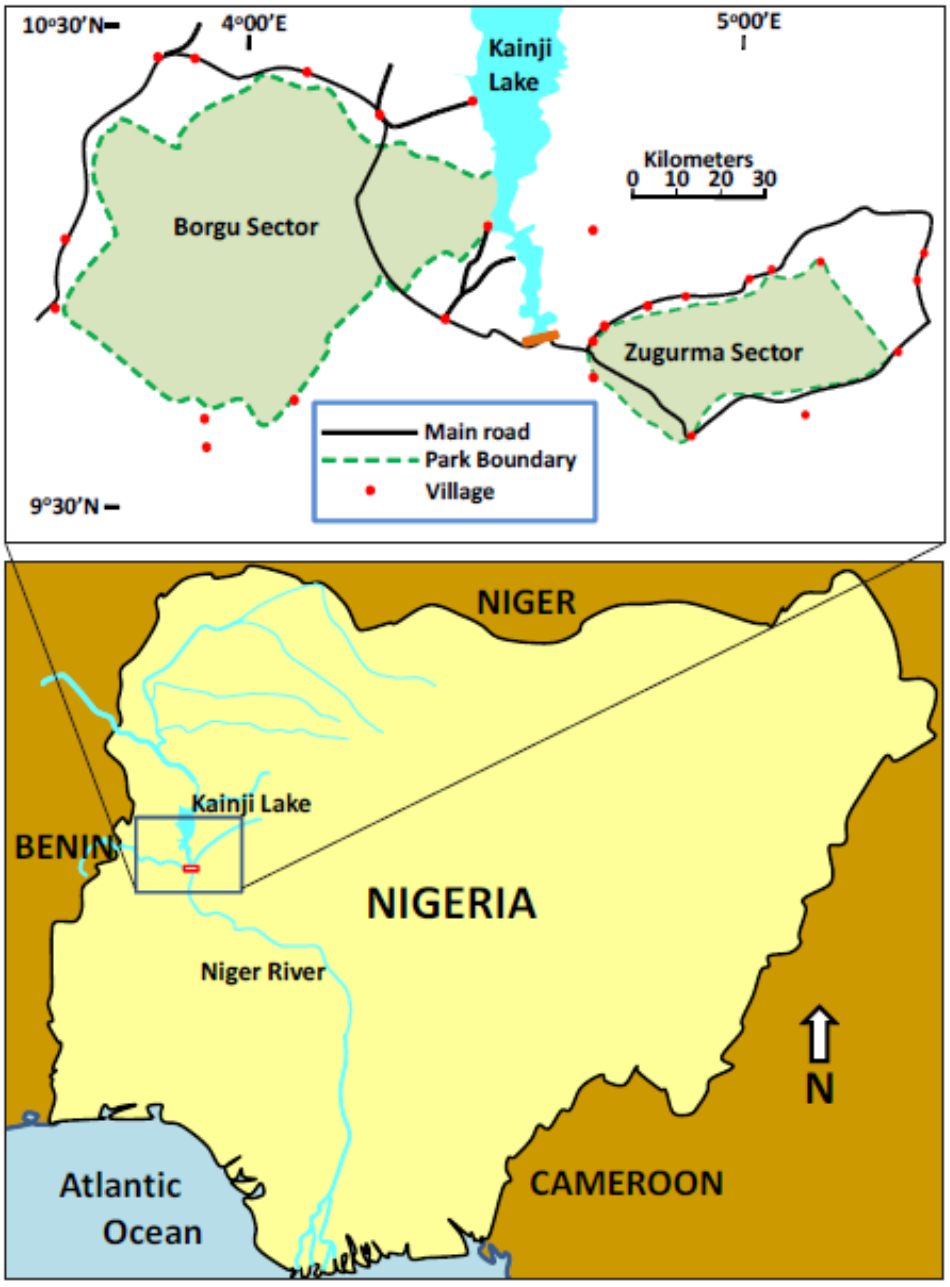
There is high level of agricultural constraint in the Kainji Lake National Park which has resulted in negative effect on the survival of the surrounding communities. Hence, this research was targeted at enumerating the types and levels of constraints to agricultural productivity in the Kainji Lake National Park.

Table 1: Population of selected villages in the five districts of Kainji Lake National Park, Nigeria

District	Villages	Population
Wawa	Gada Olli	10,050
	Sabon Kadi	5,000
	Leshibe	2,500
Babanna	Kubli	6,000
	Kwasure	4,000
	Garuji	693
Zugurma	Patiko	4,000
	Muliya	3,500
	Faje	4,200
Kemeji	Tenebu	3,000
	Nanu shugaba	6,000
	Bezira	2,800
Dekala	Gulbi	2,000
	Benya	3,580
	Bezhi	2,500
TOTAL		**59,823**

Citation: Global Environmental Facility (GEF) World Bank Assisted Project. Zone Communities as at 26th June, 2009.

Plate 1: Map showing Kainji Lake National Park, Nigeria



Citation: Amusa *et al.*, 2010

2.0 MATERIALS AND METHODS

Data was obtained from both primary and secondary sources. The primary source of data was of two types. First, questionnaires were prepared and used to collect information on agricultural practices and productivity from the residents around KLNP. Secondly, Field observation method was employed. The study area (KLNP) has a total population of about 59,823 (Table 1) as compiled by the Global Environmental Facility (GEF) World bank assisted project in June 2009.

2.1. The administration of questionnaires: A total of six hundred copies of questionnaires was administered in all the five districts, forty questionnaires were administered at each of the three villages in each districts, Five districts were examined totalling fifteen villages in all. (40 questionnaires × 3 villages × 5 districts = 600 questionnaires) to determine the demographic characteristics and duration of cultivation of farmlands in each districts. (Table 2) (Hammond and Mccullagh,1978).

2.2. Field observation: The size of randomly selected farmlands in three villages from each of the five districts were measured (Bellow 1 hectare, 1-2 hectares, 2.5-5 hectares and above 5 hectares) Table 3. The types of crops cultivated was also observed (Plate 1 and 2).

Simple Randomized Sampling technique was employed in selecting the villages from each district. Three communities were sampled from each district. Data obtained were analyzed using both descriptive and inferential statistics.

A stepwise multiple regression was adopted to identify the contribution of agricultural constraints to total food production in the study area (Olawepo. 2010). For this study, our dependent variable Y is the total acre cultivated and total food production in tonnes, while the independent variables 1-6 are the constraints. Thus, our equation could be written as:

$Y = a + b_1X_1 + b_2X_2\text{-------}b_n X_n + e$

Where Y = acre

a = Intercept

b_1, b_n = parameter estimates

e = standard error

X_1 = Lack of modern farming equipments

X_2 = poor marketing

X_3 = High cost of human labour

X_4 = Inadequate extension services

X_5 = Lack of funds / credit facilities

3.0 RESULTS

3.1.1 Duration of cultivation of farmland

The duration of cultivation of the farmlands was determined from the questionnaires administered. Table 2 shows that 20.1% of the respondent spend less than five years on their farmland while 33% have been cultivating these farmlands between 5-10 years and 35.8% between 11-15 years respectively. Similarly, 6.4% of the respondents have been cultivating their farmlands between 16-20 years while 4.6% of the respondents have been cultivating on their farmlands for over 20 years.

Table 2: Duration of Cultivation on Farmland

Districts	Villages	Below 5 yrs	5 – 10 years	11 – 15 years	16 – 20	Above 20
Wawa	Gada Oli	8	6	12	3	1
	Sabon kadi	4	16	8	5	0
	Leshibe	2	14	6	2	3
Babanna	Kubli	6	12	8	2	1
	Kwasure	8	14	10	0	3
	Garuji	0	10	16	1	1
Zugurma	Patiko	2	16	12	0	1
	Muliya	4	8	16	3	2
	Faje	8	8	10	1	2
Kemije	Tenebu	10	6	12	3	0
	Nanu Shugaba	8	6	2	1	0
	Bezira	0	8	12	1	0
Deakala	Gulbi	6	12	8	4	2
	Benya	14	6	16	0	1
	Bezhi	8	2	10	2	3
Total		88 (20.1%)	144 (33.%)	156 (35.8%)	28 (6.4%)	20 (4.6%)

Citation: Field Data, 2011.

3.1.2. Size of farmlands in the communities

The size of farmlands which was determined by measurement revealed that in the five districts and across all the communities farmlands less than 1 acre in size was highest at 30.5%, Farm sizes between 1-2 acre had 26.7%, 2.1-5 acres farmlands has 26.3%, while farmlands with 5 acres and above had the least at 16.44% (Table 3).

Table 3: Size of farmland in the study area (Acre)

Districts	Villages	Size in Acres			
		Less than 1	1-2	2.1-5	Above 5
Wawa	Gada Oli	2	3	5	1
	Sabon kadi	3	4	3	2
	Leshibe	6	2	4	1
Babanna	Kubli	4	5	3	3
	Kwasure	3	2	4	2
	Garuji	7	6	4	3
Zugurma	Patiko	4	4	1	2
	Muliya	5	5	5	3
	Faje	3	3	4	4
Kemije	Tenebu	6	5	3	3
	Nanu Shugaba	5	4	4	2
	Bezira	4	3	6	3
Deakala	Gulbi	2	2	4	1
	Benya	5	6	3	3
	Bezhi	6	3	3	2
Total		**65**	**57**	**56**	**35**
Total (%)		**30.50**	**26.76**	**26.30**	**16.44**

Citation: Field Data, 2011

3.1.3. Crops Cultivated in the study area

The crops cultivated at the study area as reported from the field observation revealed that Maize was commonly cultivated in all the districts, Other crops which were cultivated at the study area include yam, cassava, groundnut, guinea corn, maize, millet Table 4, Plate 1 and 2). Others are vegetables fruits and soya beans.

Table 4: Types of crops grown in the study area

Districts	Villages	Crop specialization
Wawa	Gada Oli Sabon kadi Leshibe	Sorghum, Groundnut, Rice, Maize and Cowpea
Babanna	Kubli Kwasure Garuji	Yam, Maize, Guinea-corn, Cassava, Groundnut and Vegetables
Zugurma	Patiko Muliya Faje	Yam. Guinea-corn, Cowpea, Maize, Groundnut and Cassava
Kemeji	Tenebu Nanu-Shugaba Bezira	Cotton, Rice, Maize, Guinea-corn, Groundnut and Cassava
Dakala	Gulbi Benya Bezhi	Guinea-corn, Millet, Maize, Yam, Cowpea and Cassava

Citation: Field Data, 2011

3.1.4. Stepwise multiple regression results of the agricultural constraints

To measure the contribution of each of the constraints to the variation in the total agricultural productivity in the study area, the multiple regression model (Table 5) shows that a strong positive relationship exists among the variables tested. From the regression table, it is observed that high cost of human labour (X_3) has the highest multiple regression coefficient (R^2) is the most felt constraint to increased food production, followed by high cost of transportation (X_6), inadequate extension services (X_4), lack of funds/ credit facilities (X_5), lack of modern equipments (X_1) and poor marketing (X_2) with the coefficient of determination (R^2) of 0.82, 0.8, 0.78, 0.72, 0.64 and 0.58 respectively (Table 5). Positive parameters estimates were observed for lack of funds, inadequate extension services and

high cost of transportation which depicts that they contribute to the dependent variable. The negative parameter estimates which were observed are poor marketing and high cost of marketing.

Table 5: Stepwise multiple regression results for the agricultural constraints

Agricultural Constraints	Parameter estimates	Standard Error	R	R^2	% Change	% Cummulative
Modern farming equipment	0.03	0.01	0.87	0.64	-	64
Poor Marketing	-3.21	0.41	0.65	0.58	-6	58
High cost of human labour	-2.92	1.02	0.90	0.82	24	82
Inadequate extension services	1.54	2.21	0.86	0.78	-4	78
Lack of funds/ credit facilities	3.09	1.29	0.77	0.72	-6	72
High cost of transport to urban centres	2.11	1.63	0.89	0.80	8	80

Citation: Field Data, 2011

Plate 2: Mixed Cropping Cultivation

Plate 3: Millet Cultivation

DISCUSSION

Agricultural constraints in Kainji Lake National Park has a profound impact on the survival of the communities located in the five districts of the park. This study was focused on the four objectives which are to understudy the duration of farming, the types of crops cultivated, the size of the farmlands and the types and rates of constraints affecting agricultural productivity in communities found in each districts of Kainji Lake National Park.

The duration of farming practised by the largest percentage of the sampled communities was least which existed between one to five years, this could be as a result of cultivating annual

(maize, yam, rice, groundnut, millet, guinea-corn), biannual and biennial crops majorly and the types of farming practised, while the highest duration of farming was observed to be twenty years and above which was practiced by the least percentage of the population.

The size of farmlands where crops are cultivated revealed that the highest percentage of the population cultivate on lands less than one acre, while the least percentage of the population cultivate on lands above five acres. This can be attributed to the lack of modern farming equipments and high cost of human labour in the sampled communities This is in agreement with the findings of Olawepo (2008).

The most felt constraints to agricultural productivity in KLNP is high cost of human labour this is as a result of majority of the farmers who do not have access to modern farming equipment still relying on human labour to carry out the farming activities such as weeding, tillage, planting and harvesting. High cost of transport to urban centres also had a profound impact on agricultural productivity, this is as a result of the bad road not encouraging the commuters and the high cost of transporting the agricultural products from the rural areas to the urban areas. Inadequate extension services in the communities targeted at improvement of agricultural productivity is of moderate concern, this was observed from the types of unimproved seedlings used for farming, agricultural practices that are not eco-friendly and pest management. Poor marketing is the least of the constraints observed in the communities this could be as a result of lack of acquired marketing skills, this findings corresponds to that of Fatulu, 2007; Tunde 2007; Yahaya, 2009).

4.0 CONCLUSION

The impacts of constraints to agricultural productivity has a profound effect on farmlands within Kainji Lake National Park (KLNP), with high cost of human labour having the most significant impact and poor marketing being the least constraint to agricultural productivity in the study area had a profound effect on the short duration of farming, types of crops cultivated in the farmlands and the overall size of farmlands used in agricultural practices in the communities, all of which has a reverberate effect on the standard of living of the local communities leading to poverty in the community which might be a threat to conservation and sustainability of the natural resources of Kainji Lake National Park.

5.0 RECOMMENDATIONS

- Modern farming equipment should be provided at subsidized rates by the government to encourage agricultural productivity among the farmers in the communities.

- Provision of short and long time loans for the farmers in the communities to combat the problem insufficient funds
- Farmers co-operative society should be established in order to encourage better marketing of the agricultural products
- Government should construct better roads for the ease of transportation and invite ore commuters to reduce cost of high transport.
- Creation of awareness by extension officers on improved agricultural practices should be encouraged

REFERENCES

1. Amusa T. O., Jimoh S. O., Aridanzi P. and Haruna M. (2010). Ethnobotany and conservation of plant resources in Kainji Lake National Park. www.ethnobotanyjournal.org/vol8/i1547-3465-08-181.pdf.
2. Boserup, E. (1996), Development theory: An analytical framework and selected application, *Population and Development Review*, pp. 505-515.
3. Ejidike B. N. And Ajayi S. R. (2012). Trends in wildlife conservation practices in Nigeria. International Journal of Biodiversity and Conservation Vol. 5(4), pp. 185-191, April 2013. http://www.academicjournals.org/IJBC. DOI: 10.5897/IJBC11.127
4. Food and Agricultural Organisation of the United Nations (2006). Unequal access to natural resources. www.fao.org/newsroom/en/news/2006/1000342/index.html.
5. Global Environmental Facility (GEF) World bank assisted project as at June, 2009, carried out at Kainji Lake National Park, Niger state, Nigeria.
6. Hammond R. and Mccullagh P.(1978) Quantitative techniques in Geography , Oxford University Press Limited. 113pp
7. Jon Umerez, Matteo Mossio. Constraint. W. Dubitzky, O. Wolkenhauer, K. H. Yokota. Encyclopedia of Science Biology, Springer, pp. 490-493, 2013, 978-1-4419-9863-7. <10.1007/978-1-4419-9863-7>. <halshs-00792440. https://halshs.archives-ouvertes.fr/halshs-00792440.
8. Malthus, T. (1826), *An Essay on the Principle of Population*, Cambridge University Press, edited by Patricia James (1989)
9. Norton – Griffiths, M. (1996) Property rights and the Marginal Wildbees: An Economic Analysis of Wildlife Conservation Options in Kenya. *Biodiversity Conservation.* 5:1557-1577.
10. O Leary, R. and Bingham, L. (2003) The promise and performance of environmental conflict resolution. Resources for the future. Washington D.C.
11. Olawepo, R.A. (2010) Determining rural farmers' income: A rural Nigeria experience. *Journal of African Studies and Development* Vol. 2(3), pp. 99–108
12. Oramah I. T. (2006). The effects of population growth in Nigeria. *Journal of Applied Sciences*. Volume **6**: 1335-1337. https://scialert.net/abstract/?doi=jas.2006.1332.1337.

13. Sekitoleko, V. (1993) Resolution of Conflict between Agriculture and Environment Protection in Uganda. *Nordic Journal of African Studies* 2 (2): 103-108.

14. Yoram, Yom-Tiv and Heinrich, M. (1998) Changes in the distribution abd abundance of vertebrates in Israel during the 20th Century. *The Zoogeography of Israel.* W. Junk Publishers.

15. Young, J., Nowicki, P., Alard, D., Henle, K., Johnson, R., Matouch, S., Niemela, J. and Watt, A.D. (2003) Conflicts between human activities and the conservation of biodiversity in agricultural landscapes, grasslands, forests, wetlands and uplands in Europe. *A Report of the BIOFORUM Project.* CEH, Banchory.

16. Young, J., Watt, A.D., Nowicki, P., Alard., D., Clitherow, J., Henle, K., Johnson, R., Laczko, E., McCracken, D., Matouch, S., and Niemela, J. (2005). Towards sustainable land use: identifying and managing the conflicts between human activities and biodiversity conservation in Europe. *Biodiversity and Conservation*, 14 (7): 1641-1661.