THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Perceptions of Crop Farmers on the Effects of Land Management Practices in Northern Guinea Savanna of Agroecological Zone of Kaduna State, Nigeria

Adedapo J. O.
Lecturer, Department of Horticulture and Landscape Technology,
Federal College of Forestry Mechanization, Afaka, Kaduna, Nigeria

Abstract:
The broad objective of this study is to assess the perceptions of crop farmers on the effects of land management practices in selected rural areas in the northern guinea savanna of agro ecological zone of Kaduna State. Purposive sampling technique was employed in collecting data from three hundred and eighty (380) rural farmers with structured questionnaire administered. The data were analyzed using descriptive statistical techniques such as frequency tables, mean and percentages to summarize the data. The study revealed that socio- economic characteristics such as age, gender, educational status, farming experience, farmland size and land ownership had influence on the farmers' choice of practices being adopted. The study also identify these common land management practices as mulching, irrigation, organic manure, fertilizer application, and agro-forestry, where 53% of the farmers adopted fertilizer application and 29% of total sample practiced organic manure application. The Farmers perceived five land management practices had positive effects on the environment and farm productivity; these are cover crop, crop rotation, irrigation, organic manure and fertilizer application. Therefore, the study concluded that the farming population is ageing and that is adversely affecting the choice of best practices due to lack of education and knowledge to adopt the best land management practice and also the choice of land management practices had great significant difference both negative and positive on environment and farm productivity in this agro-ecological zone of Kaduna State. The study recommended that agricultural extension programmes should be encouraged to boost the famers' knowledge in adopting the most appropriate practices for different socio-economic and environmental problems.

Keywords: *Perception, crop farmers, effects, land management, environment, productivity*

1. Introduction

A unique characteristic of rural societies in many developing countries is the almost total dependence on agriculture for livelihood. In Nigeria for instance, rural communities are completely agrarian in nature with crop farming, fishing, or livestock keeping being the major occupation of the majority. Since almost all rural households depend directly or indirectly on agriculture, and given the large contribution of the sector to the overall economy, agriculture is a key component of growth and development (IFPRI, 2007). As a major source of income, agriculture plays a significant role in rural and economic development process (Thirtle, Irz, Lin, McKenzie- Hill and Wiggins, 2001).

Land is the major resource for the livelihood of rural dwellers. In Nigeria, a typical villager recognizes land in its entirety. According to Fabiyi (1990) land, to the farmer, is home and work place and shares it with the entire biotic complex. As important as land is to farmers' livelihood, Adekoya (1997) observed that subsistent farmers are faced with a lot of challenges in access and ownership of land resources. Dixon (1995) arranged problems of access and ownership of land resources under three headings; economic obstacles such as capital need and financial incentives; social conditions which include land tenure, availability of infrastructures and educational level of farmers; and ecological consideration such as limited knowledge of inputs and sustainability of some systems.

There are several factors responsible for land degradation, which include cultivation of lands that were originally marginal (such as superficial soils and land with steep slopes), crop rotations that are too close, mining agriculture, and the absence of soil and water conservation practices (Gough and Yankson, 1997; Kufogbe, 1996). Also, overgrazing of livestock, inappropriate land use practices due to absence of coherent and enforceable land use policies, breakdown of traditional enforcement mechanisms for conserving common property, as well as the use of inappropriate technologies by small scale farmers for cultivating land are all responsible for land degradation. Indeed, the rate of land degradation is on the increase, and poses a threat to food security in the sub region (Hudson, 1987; Dregne, 1990).

Land degradation also has important implications for climate change mitigation and adaptation, as the loss of biomass and soil organic matter releases carbon into the atmosphere. The consequences of continuing land degradation are severe, with repercussions, not only for the welfare of individual rural households, but also at the community, district, national, sub-regional, regional and global levels (Woodfine, 2009).

The extent of land degradation in Nigeria is presently alarming. This occurs on different scales and dimensions and no part of the country can be entirely excluded. Also, compared with some other African countries, the country is blessed with abundant land resources, which are capable of indefinite regeneration over a given period of time if the prevailing management practices are conducive. The management issue cannot be taken for granted, given that these resources constitute the productive base for the Nigerian agriculture, upon which the livelihoods of many rural and urban households depend (FGN, 2004).

Agricultural soils in the northern guinea savannah zone, maintain their fertility due to tight cycling of nutrients between vegetation and soil; if this cycle is broken through forest destruction, nutrients are likely to be rapidly lost, which results in an impoverished soil (Hamilton and Bensted-Smith, 1989). Soil degradation is a major contributor to nutrient losses, because most of the scarce soil nutrients in the tropics are in the top 5-10 cm of the soil (Nkonya, Pender, Jagger, Kaizzi, and Ssali, 2004). The soils have a low water holding capacity due to a low content of small soil particles. High temperatures favour rapid decomposition of organic residues; thus organic inputs are needed to avoid erosion. Steep lands are more sensitive to rapid soil degradation through runoff (Hellin, 2006).

It is based on these observations that this study intends to assess the perception of crop farmers on the effects of some land management practices in northern guinea savanna of agro-ecological zone of Kaduna state, Nigeria. With these specific objectives: describe the socio-economic characteristics of farmers, identify different land management practices, assess the perception of farmers on the effects of land management practices on the environment and also to assess the perception of farmers on the effects of land management practices on the farm productivities.

2. Methodology

2.1. Study Area

The study was conducted in Chikun Local Government Area which is one of the local government areas located in northern guinea savanna of agro-ecological zone of Kaduna state. It is geographically located between latitude 10^{o} 33'N to 10^{o} 37'N and Longitudes 7^{o} 10' E to 7^{o} 14' E (see Figure 1). It is situated some 50km north west of Kaduna Township along Kaduna-Lagos express way. The area is bounded by Igabi Local Government Area to the east, Kaduna metropolis to the South east and north and Birnin- Gwari to the west. (Nwadelor, 2001). The area being located in the interior part of Nigeria experiences continental climate. It is characterized by wet and dry seasons orchestrated by the movement of the inter-tropical Convergence Zone. The dry season in the area begins in early November and lasts till April while the wet season starts from May and ends in September. The length of rainfall varies from 150 days to 190 days with an annual rainfall ranging between 1500mm and 2000mm. The temperature is high throughout the year with the peak in March and April (37^{o}c), while the mean annual temperature varies between 24^{o}c and 28^{o}c. Humidity is constantly high (above 60%) at mid-day and close to 100% at night during the rainy season, relative humidity is low ranging between 20% and 40% in January rising to between 60% and 80% in July (Ati, 2006).

The study area falls within the basement complex of central Nigeria and the soil type is derived from the weathering of the rocks. The area consists mainly of lateritic rocks, the soil of the area can be classified as ferruginous tropical soil (Nwadelor, 2001). The soils are typically red-brown to red-yellow tropical ferruginous soils. Some areas are richer in kaolinitic clay and organic matter, very heavy and poorly drained which are characteristics of vertisols (Bello, 1993). The modified vegetation zone on the northern Guinea savannah, is a land described as wood land vegetation with relatively interspaced and short scattered trees within which are thick bushes and shrubs. The vegetation cover consists of the following native or indigenous species of Isoberlina doka, Monotes kerotingu, Vapaca togoensis, Parimarie curratelli folia etc. Some of the exotic species include; Eucalyptus rudis, Mangifera Indica, Pinus cocara. Some of these species serve as agroforerstry practices which is one of land management practices in the study area.

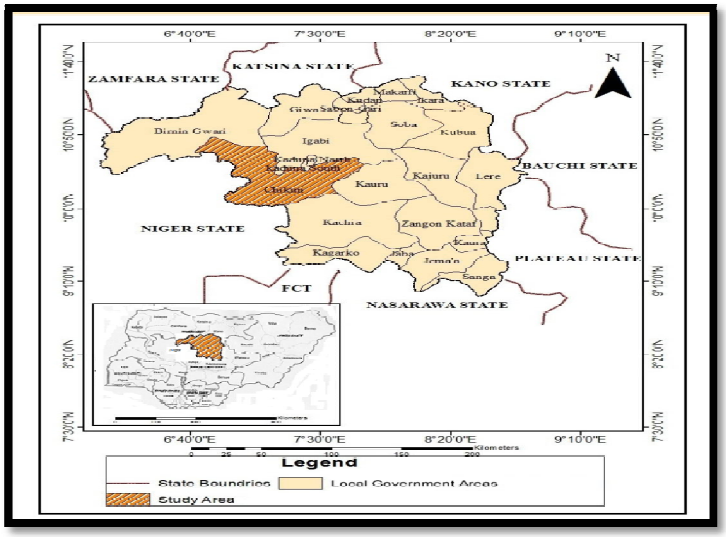

Figure 1: Map of Kaduna State Showing the Study Area

2.2. Methods of Data Collection and Data Analysis

Reconnaissance survey was conducted to make enquiries from the farmers on the various land management practices in the study area. The farmlands were visited to identify different types of land management practices adopted by the farmers in the study area and also types of crops grown.

The study was carried out through field observation, personal contact with the rural farmers by means of questionnaire administration. This aided the study to acquire more information to achieve set objectives in the study area.
The study area is made up of seven (7) localities. The rural ares are Buruku Ung Majidadi, Buruku Ung Makama, Dandaladima, Ung Galadima, Buruku Gari, Ung Magaji, Buruku Afaka Afforestation. The population of the study area has been estimated to be seven thousand, four hundred and eighty-Nine, 7,489 (NPC, 1991) while the projected population to 2019 has been estimated to be fifteen thousand two hundred.
Purposive sampling was used to select the respondents from each of the seven localities in the study area for administration of questionnaire. Since the research study is purposely targeted at the farmers in the study area, the actual population of the farmers in Kaduna State has been given to be 47.2% of the total population, which would amount to 7175. This is according to Department of Research and Statistics in the Ministry of Economic Planning (NPC, 1991).
The data derived from the survey was statistically analyzed through the use of both descriptive and inferential statistical methods.

3. Results and Discussion

3.1. Socio-Economic Characteristics of the Respondents

Table 1 revealed that about 88% of the farmers are between 20 - 60 years of age, implying that they are in active age brackets. The mean age is 44 years and this has implication on the availability of family labour and productivity of the labour because age has a direct bearing on the availability of farm labour and the ease with which sustainable land management practices are adopted. This fact is in agreement with Raufu and Adetunji (2012), that age of farmers has direct bearing on the availability of farm labor and the ease with which improved sustainable land management practices are adopted.

The sex distribution of the farmers depicted more males (100%) than females. This result conforms with the cultural setting in the study area, an area which is predominantly Muslims and women are in Purdah (their religious beliefs make them to be indoors more often).

Most of the farmers (65%), have Quranic education. Those with primary and secondary education are 12% and 19% respectively. The remaining 4% have tertiary education. This is expected to have significant impact and ability of farmers to effectively adopt better land management practices. This result is in agreement with the findings of Abdulazeez *et al,* 2014 that, education influences the adoption land management practices positively.

Years of farming experience is one of major factors that contribute to the effective land management in this type of occupation. From Table 1, most of the farmers sampled have been in farming practice for more than 20 years, (67%). While 18% have between 6 – 10 years of farming knowledge, 9% have between 11 – 15 years of farming experience. Only 2% have just spent less than 5 years on the farm which indicated the mean farming experience to be 18.8 years.

The farm sizes of the respondents are fairly large. This is owing to near absence of farmland on plain terrain and bushes and forest undergrowth. Soil is also easy to work, as a result, wide expanse of land is put under cultivation. Majority of the respondents have farm sizes ranging between 2 and 7 hectares per farmer. A total of 44% of the respondents have farm size ranging between 2 and 4 hectares, while 17% of the people have farm size between 5 and 7 hectares. Seventeen percent (17%) have total farm land between 8 and 10 hectares, 16% have above 10 hectares and 6% of the farmers have below 2 hectares of land. This value gives a mean farmland size of respondents to be 5.9 ha of land per farmer. This corroborates with the findings of Abdulazeez *et al, (*2014) that this factor is necessary because the farmland size determines the types of land management practiced. Some land management practices such as fallowing are known to require more land area. Inadequate land area may therefore pose a problem in the adoption of such practices.

Land is the most important and vital resource for the productivity of the rural populace. Access to it is fundamental in rural system for the satisfaction of most of the basic needs. Table 1 shows the type of land ownership system among the respondents. About 48% of the farmers sampled personally owned the land while 34% hired the land, and only 18% of the farmers either rent the land or borrowed from the community head. The ownership structure conforms to the findings of Abdulazeez *et al,* (2014) which is important as farmers may not be willing to expend effort towards sustainable land management practices on land temporarily held by them. This group of people are those whose farmlands are not quite productive or those with large number of families, whose farmlands are not large enough to support their food requirement.

Sources of labour used by the respondents were also investigated during the field survey. Most farmers, 81%, depended on family and hired labour force. The use of hired labour is necessitated by two factors. Firstly, the land under cultivation has to be fairly large before adequate food to feed the family is ensured. Also, married women do not normally participate in farming activity and therefore more hands must be employed. However, 9% people depended solely on family labour. This group complained of having no money to hire labour for farm work, and only 10% could afford to hire labour for their farming activities, and this also has to do with the types of crop planted and farm size.

Variable	Frequency	Percentage (%)
Age Group		
Below 20 Years	0	0
21 – 30 Years	53	14
31 - 40 Years	118	31
41 - 50 Years	95	25
51 – 60 Years	68	18
Above 60 Years	46	12
Total	**380**	**100**
Gender		
Male	380	100
Female	0	0
Total	**380**	**100**
Educational Level		
Primary	46	12
Secondary	72	19
Tertiary	15	4
Quranic	247	65
Total	**380**	**100**
Years of Farming Experience		
Less than 5 Years	8	2
6 - 10 Years	68	18
11 - 15 Years	34	9
16 – 20 Years	15	4
Above 20 Years	255	67
Total	**380**	**100**
Farm Land Size (Ha)		
Less than 2	23	6
2 – 4	166	44
5 – 7	65	17
8 – 10	65	17
Above 10	61	16
Total	**380**	**100**
Farmland Ownership		
Personally owned	182	48
Community	0	0
Hire	129	34
Rent	69	18
Total	**380**	**100**
Labour Supply		
Family Only	34	9
Hired Only	38	10
Family & Hired	308	81
Total	**380**	**100**

Table 1: Socio-Economic Characteristics of the Respondents
Source: Field Survey, 2019

3.2. Types of Land Management Practice in the Study Area

The types of Land Management Practices in the area are presented in Table 2.

From Table 2, many farmers perceived use of organic manure, organic fertilizer as good because they increase crop yields and improve soil fertility. Based on this reasoning, majority of the farmers used these practices much more than others.

The most common land management practices used by farmers in the study area therefore are as follows: mulching, cover crops, crop rotation, irrigation, application of organic manure, inorganic fertilizer, bush fallow, agroforestry. From Table 2, it was revealed that 53% farmers adopted application of inorganic fertilizer, followed by 29% that practiced application of organic manure, irrigation was done by 4%, while mulching and agroforestry were adopted by 2% and 4% respectively. Cover crop was practiced by 6% of the farmers while crop rotation and bush fallow were adopted by very few farmers in the study area. This also conforms to findings of Abdulazeez *et al,* (2014), which concluded that while it is desirable to apply various management practices, the respondents who did not include both fertilizers and organic manure in the land management practices can be said not to apply sustainable land management practices in production. This is because application of both fertilizers and organic manure constitute what is generally termed integrated land management system.

Land Management	Frequency	Percentage
Mulching	9	1.6
Cover Crop	32	5.7
Crop Rotation	11	1.9
Irrigation	24	4.3
Organic Manure	164	29.2
Inorganic Fertilizer	297	52.8
Bush Fallow	5	0.9
Agro forestry	20	3.6
Total	**562***	**100**

Table 2: Basic Land Management Practices in the Study Area
Sources: Field Survey (2019)
**Multiple Responses*

3.3. Farmers' Perceptions on the Effects of Land Management Practices

It was found that farmers perceived differently on the effects of land management practices on the environment and their farm produce based on the types of crops grown, soil fertility of the land and determinant factors for choice of land management practices, among others. Their perceptions on the effects on each of land management practices were scaled using five likert scales ranging from very poor to very good, a code was allocated to the scale from one to five accordingly while three is the midpoint of average scale point. Mean score of each of the land management practices was calculated, the mean score of any land management practice that falls below three has negative or poor effects on the environment or on the farm products while the mean point above three has good or positive effects on the environment or the farm products.

3.4. The Perceptual Effects of Land Management Practices on Environment

Farmer's Perception of the effects of farm management practices on the environment is given in Table 3. It was discovered from Table 3 that the land management practice that had very good effects on the environment, with mean point of 4.79 as considered by the respondents is fertilizer application. This is the inorganic manure that is readily available to farmers and has been commonly and regularly applied to their farmland and has not noticed any negative effects on the environment for so many years. The next practice is organic manure with mean point of 3.87; this also had been considered to have good effects on the environment. Another land management practices that have been considered to have positive effects are crop rotation and cover crop with mean point of 3.53 and 3.27 respectively. These are also being practiced by some farmers and have been discovered to have positive effects on the environment. The last one in this category that has positive effect with mean point of 3.02 is irrigation practice. It was also discovered from Table 3 that agroforestry, mulching and bush fallow fell below 3 point with 2.26, 2.23 and 1.93 respectively; these were considered to have poor effects on the environment as observed by the respondents.

Land Management	Frequency	Mean	Remarks
Mulching	380	2.23	Poor
Cover Crop	380	3.27	Good
Crop Rotation	380	3.53	Good
Irrigation	380	3.02	Good
Organic Manure	380	3.87	Good
Fertilizer	380	4.79	Good
Bush Fallow	380	1.93	Poor
Agro forestry	380	2.26	Poor

Table 3: The Perceptual Effects of Land Management Practices on the Environment
Sources: Field Survey (2019)

3.5. The Perceptual Effects of Land Management Practices on Farm Productivity

The effects of land management practices on farm productivities is presented in Table 4, As shown in Table 4, the effects of land management practices on the farmers' products, fertilizer application had very good effects on the farm yield of farmers with mean point of 4.81, the application of fertilizer over the years on the farm has been having tremendous improvement on their farm yields, which means it has not had any negative effects to the farmers on their produce. The next land management practice as shown in Table 4 is Organic Manure with mean point of 3.92, this also has very good effect on the farm yields, followed by crop rotation with average mean of 3.39, this also shows a good effect, while the practices of cover crop and irrigation also have positive effect on the farm produce with mean point of 3.21 and 3.20 respectively. However, the other three practices were considered to have poor effect on the productivities, these are agroforestry, mulching and bush fallow with mean point of 2.16, 2.04 and 1.81 respectively.

Land Management	Frequency	Mean	Remarks
Mulching	380	2.04	Poor
Cover Crop	380	3.21	Good
Crop Rotation	380	3.39	Good
Irrigation	380	3.20	Good
Organic Manure	380	3.92	Good
Fertilizer	380	4.81	Good
Bush Fallow	380	1.81	Poor
Agro forestry	380	2.16	Poor

Table 4: The Perceptual Effects of Land Management Practices on Farm Productivity
Sources: Field Survey (2019)

4. Conclusion and Recommendations

Farmers' perception on the effects of land management practices is motivated by many factors. Socio-economic characteristics such as age distribution, sex distribution, educational status had bearing on the choice of land management practices adopted and sustainable land use. The study revealed that the farming population in the study area is ageing and that is adversely affecting sustainable land use because of lack of education. Educational status also had bearing on the choice of land management practices as 65% of the farmers only had informal education, which meant they did not have adequate information on the benefits and challenges of each of these land management practices. Ownership of land had influence on the choice of adopted practices as farmers may not be willing to expend effort towards sustainable land management practices on land temporarily held by them.

All the respondents were male, which conforms to the cultural setting in the study area, an area which is predominantly Muslims. The most practiced land management practices were application of inorganic fertilizer and organic manure. The study revealed that the farmers perceived fertilizer and organic manure as the best land management practices, which leads to increased farm productivities. But the farmers were faced with different environmental problems such as strong wind, pest and diseases, erosion which could be better controlled by different land management practices best suited to the problems. The farmers adopted the wrong practice for some of these problems, with the knowledge of application of organic manure and inorganic fertilizer being their most common land management practices. Strong wind could be better curbed by agroforestry, pest and diseases could also be better controlled by crop rotation, rather than fertilizer being adopted by the farmers as seen in the results.

The perception of the farmers on the effects of land management practices on environment and revealed fertilizer and organic manure as the best choices. In theory, agro forestry and organic manure have better effect on the environment, compared to fertilizer application, which could have negative effect on the environment in the long term.

Based on the findings of this study, the following recommendations were made:

- Agricultural extension programmes should be strengthened for more impact on sustainability of existing farming systems and farmers should be made to understand specific land management practices are best suited to different environmental problems.
- The study revealed that the farming population in the study area is ageing and that is adversely affecting sustainable land use. Government needs to intensify efforts at integrating more young school leavers into agricultural production within the currently institutionalized poverty alleviation programmes. Such programmes, if designed will not only go a long way in ensuring that vibrant youths gradually replace the old farmers, it will ensure conservation of natural resources because of the higher level of education already attained by these youths. Educational attainments become an importance issue here because the study showed that it enhances farmers' ability to use their land in a much more sustainable manner.
- There is need for government to subsidize or make available for free different tree seedlings to the famers to encourage practice of agroforestry, which is a very sustainable form of land management practices and also, has very good effects on the environment as a whole.
- There is urgent need for agricultural extension officers to make farmers understand how important the conservation of land and its resources are important to their sustainable livelihood. Most of these believe that land is only the soil, on which they cultivate and grow crops.
- Farmers should also be made to understand the emission of gases from unsustainable practices which contribute to greenhouses gases, which in turn leads to global warming and affects the livelihood of farmers and also affect beyond their farmlands.
- Sustainable agricultural practices need to be stimulated by further emphasizing improved production and reduced costs. Production benefits are the primary interest of land users, and have direct consequences for livelihoods in small-scale subsistence farming.

5. References

i. Abdulazeez, M. L., Omotesho, K. F., Adekola, O. F., Adekunle, D. (2014). Assessment of Land Management Practices in Food Crops Production among Small Scale Farmers in Kwara State, Nigeria. *International Journal of Agricultural Management and Development (IJAMAD), ISSN: 2159-5860.*

ii. Adekoya, A.E. (1997); An Analysis of Farmers Participation in Agro-forestry in Oyo State. Unpublished Ph.D Thesis of the Department of Agricultural Extension Services University of Ibadan pp15.27.

iii. Ati, O.F. (2006). Rainfall Characteristic in Drought- prone Sudano-Sahelian Zone of Nigeria. An unpublished Ph. D Dissertation Department of Geography, Ahmadu Bello Universuty Zaria.

iv. Bello, A.L. (1993). Kaduna State. In Udo R.K. and Mamman A.B. (eds) (1993). *Nigeria Giant in theTropics-State Surveys* Vol. 2. Lagos: Gabumo Publishers.

v. Dixon, R.K (1995); 'Agroforestry System; Sources or Sinks of Green House Gases'. Agroforestry 3(2):99- 116.

vi. Dregne, H.E. (1990). 'Erosion and Soil Productivity in Africa' in *Journal of Soil and Water Conservation,* 45 (4): 431-436.

vii. Fabiyi, Y.L. (1990); 'Land policy for Nigeria; Issues and Perspectives'. Issues and Perspectives'. *Inaugural Lecture Series* 99 OAU, Ile Ife.

viii. Federal Government of Nigeria (FGN) (2004): Nigeria: National Economic Empowerment and Development Strategy (NEEDS), FGN, Abuja.

ix. Gough, K. V. and P. W. K. Yankson. (1997). Continuity and Change in Peri-Urban Accra: Socio- economic and Environmental Consequences of Urbanisation. Final Report to the Danish Council for Development Research.

x. Hamilton A.C. and Bengsted- Smith, R. (1989). Forest Conservation in the East Usambara Mountains, Tanzania IUCN, Gland and Cambridge Pp 392.

xi. Hellin, J. (2006). Better Land Husbandry, From Soil Conservation to Holistic Land Management. *Journal Science Publishers*, Enfield and Plymouth. Pp 325.

xii. Hudson, N. W. (1987). Soil and Water Conservation in Semi-Arid Areas. FAO Soils Bulletin No. 57, Rome.

xiii. IFPRI (International Food Policy Research Institute). (2007). The role of agriculture in development: Implications for sub- Saharan Africa Research Report 153.

xiv. Kufogbe, S. K. (1996). Urbanisation and Changing Patterns of Land Use in the Peri- Urban Zone along the Airport. Ayimensah transect of Accra, Ghana. (Our Common Estate: The Royal Institute of Chartered Surveyors, London.

xv. Nkoya, E, J. Pender, P. Jagger , D. Sserunkuuma, C. kaizzi and H. Ssah (2004); 'Strategies for Sustainable Land Management and Poverty Reduction in Uganda.' Research Report No 133*, International Food Policy Research Institute,* Washington, D.C. 136 p.

xvi. NPC (National Population Commission). (1991). Nigeria Population Census, Kaduna Sate. Department of Research and Statistics, Ministry of Economic Planning, Main Secretariat Complex, Independent Way, Kaduna, Nigeria.

xvii. Nwadelor, J. I. (2001). An Assessment of Spatio- Temporal variabilities of Deforestation for Sustainable Forestry Development; A case study of Afaka Forest Reserve. A paper Presented at the International Conference on Spatial Information for Sustainable Development held at Nairobi, Kenya 2- 5 October, 2001.

xviii. Raufu, M.O., Adetunji, M.O. (2012). Determinants of Land Management Practices among Crop Farmers in South-Western, Nigeria*. Global Journal of Science Frontier Research Agriculture and Biology.* Vol. 12 Issue 1 Version 1.0 January 2012.

xix. Thirtle, C., Irz, X. Lin, L. McKenzie-Hill, V., & Wiggins. S. (2001). Relationship between changes in agricultural productivity and the incidence of poverty in developing countries. DFID Report 7946.

xx. Woodfine, A. (2009). Using sustainable land management practices to adapt to and mitigate climate change in Sub-Saharan Africa- Resource Guide Version 1.0, TerrAfrica, Regional Sustainable Land Management.