International Journal of Advanced Studies in Ecology, Development and Sustainability
Vol. 3, No. 1 January, 2015 ISSN HARD PRINT: 2354-4252 ONLINE: 2354-4260
© www.internationaljournal/Journals/advanced-ecology-dev-sustainability-vol.4No.1
ASEDS: 015:2:4

SOCIO-ECONOMIC BENEFITS OF AGROFORESTRY PRACTICES IN SOUTHERN KADUNA-NIGERIA

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Abstract

The study examined socio-economic benefits of agro-forestry practices in Southern Kaduna, Nigeria. The data were collected from 307 practitioners using multistage sampling technique. Composite index level of living standard (CILLS) was used to analyse the data. The result after the adoption of agro-forestry practice ranged from 3.81 in Kaura Local Government Area to 5.21 in Jema'a Local Government Area. The relationship between the socio-economic indicators and the (CILLS) was positive and significance at 5% level of significant. The number of independent variables found to be significant on local government basis ranged from 3-5 (Income, School, health care centre, road and water).

Keywords: *Socio-economic benefits, Agro-forestry and Production.*

Background to the Study

The improvement of the socio-economic condition of the rural populace is one of the challenges of the Nigeria National Development Programme. This is a realistic indicator of the willingness of government in the overall development of the country. Furthermore, it is not surprising that there are increasing consensus ideas among economists and development practitioners who view development of forestry sector desirable not only on social welfare grounds, but also as a strategy capable of achieving faster overall growth of the economy of a nation. It is therefore economical to establish forest plantation through agro-forestry system (Arifalo, 2010). This is based on the fact that the hope of expanding the land area, especially in the densely populated areas is limited and agriculture growth in these areas will have to rely mainly on increased productivity of land (Ogar, 2007).

Zira (2013) noted that agro-forestry has a rich history of development and has been practiced in some parts of the world since over 100 years ago. As a programme, it is directed specifically to peasant farmers to redirect the current trends in land usage and management. Several traditional farming systems have evolved all over the world. They include components of agro-forestry but this has never been considered in that light by farmers who utilize them. Arifalo (2010) viewed agriculture and forestry as traditional competitors for land and accordingly, land allocation for each tends to be mutually exclusive. The relationship between them even becomes greater when it is realized that some crops are trees while some forest trees produce non-wood materials for human use.

Agro-forestry is generally practiced with the intention of developing a more sustainable form of land use that can improve farm productivity and the welfare of the rural community. Farmers adopt agro-forestry practices to increase their economic stability and to improve the management of natural resources under their care. The immense agricultural and environmental potential of agro-forestry has been the main reason for the adoption among farmers in most developing countries, especially in Sahara and Sub-Saharan Africa where productivity is low and more marginal lands are increasingly being brought under cultivation (Place et al., 2008).

In Nigeria, the national concerns to combat environmental degradation and those emanating from poor agricultural practices (deforestation, soil erosion) have received a lot of attention in which agro-forestry has been suggested as one of the solutions (Nabilla, 1984; Owusu, 1993, Kwesigal et. al., 2005). Its technologies were introduced in several parts of the country in 1977 by the then Agro-forestry unit of Ministry of Agriculture and other individuals. Examples of the introduced technologies are alley cropping, woodlot, shelterbelt and windbreaks as well as fruit trees on cropland. However, technology transfer and adoption has not been very easy in the country as a result of several existing barriers, which have not yet been fully overcome. Some of the barriers that militate against agro-forestry adoption include lack of adequate knowledge on agro-forestry practice, inadequate credit facilities, non-availability of farm inputs and socio-cultural factors (Lele, 1989; Tripp, 1993).

Forest resources depletion and the increasing demand for forest products by the rural people who depend on forests for livelihoods have widened the gap between the demand and supply of forest products in Kaduna State. Seeking alternative options to increase the supply of forest products to support rural livelihoods have become a fundamental concern for policy makers and planners. As part of efforts to address the situation the state government directed its attention to agro-forestry farming that has the potential to provide food for rural livelihoods and biodiversity conservation (KADP, 2008). Since the introduction of agro-forestry by Kaduna State Government, there has

been no research to evaluate the socio – economic benefits of the practice in the southern part of the State. With this background, this study sought to evaluate the Socio-economic benefits of agro-forestry practices in Southern Kaduna.

Methodology

Study Area

The study was carried out in the southern part of Kaduna State. It covers a land area of about 37,872km2 which lies between latitude 9o N and 10o151N of the equator and between longitude 7o001 and 9o001E of the Greenwich meridian. The study area shares boundaries with Nassarawa State, Niger State, Plateau State and Abuja (Kaduna State Statistics Book, 1996). The dominant drainage system is predominately tributary to River Niger via Kaduna and Gurara Rivers. Some areas in the extreme north of Jema'a and South of Kaura Local Government Areas are drained by River Benue via Okwa and Mada Rivers. (Kaduna Development plan, 2008)

The vegetation lies within the Southern Guinea Savannah. Its type has largely been disturbed by human activities, changing it gradually from primary forest to a secondary forest, depriving the area of its valuable tree species and other forests products. Tree species found in the forest include, Parkia biglobosa, Terminalia catapa, Tectonia grandis and Gmelina aborea, Zira (2013). The plains are gently undulating and mainly developed on granites and gneisses with subordinate migmatites and Schist's. In some areas there are extensive accumulations of unconsolidated deposits. The soil is deep and well drained with predominant fine texture and developed basement complex rock. (Kaduna Development plan, 2008).

The climate is characteristic of Southern Guinea savannah. It has two seasons; rain and dry seasons. The rain season is between May to October and dry season is between November to April. The mean annual rainfall ranges from 1300 mm to 1700 mm. The annual mean temperature is 25 oC and humidity 63%. (Kaduna Development plan, 2008) The population of the Southern part of Kaduna State according to the 2006 population census stand as 2,587,900, using 3.18% growth rate as allowed by the National Population commission, the projected population of Southern Kaduna stand at 3,163,967 (2013 projection), therefore by the year 2018 the Southern Kaduna population would stand at 3,575,443. Farming is the main economic activity in the study area. Over 70 % of the active populations are farmers. The increased demand for land has led to shortening of fallow periods and consequently severe degradation of the farm. (Kaduna Development plan, 2008.

Sampling Techniques

A multi-stage sampling technique was employed in selecting the practitioners. The first stage involved using the list of agro-forestry practitioners obtained from the reconnaissance survey conducted in 2008 by Kaduna State Agricultural Development Project (KADP) as reveals in

Table 1. The second stage was the selection of three Local Government Area (LGAs) from southern part of Kaduna namely: Jema'a, Kaura and Zangon Kataf on their predominant role in agro-forestry farming. The third stage involved the selection of four communities each from the selected LGAs known for agro-forestry farming and accessibility and the fourth stage, thirty percent of the farmers were randomly selected from each of the 12 communities which constituted 319 practitioners out of 1,064 practitioners in the study area. A pretesting of the questionnaire was done in two communities in each Local Government Area before the actual enumeration. A structured questionnaire was used to obtain information from agro-forestry practitioners in the study area

Data Analysis

The analytical tools that were used for the attainment of the research objective were Composite Index Level of Living Standard (CILLS) and Multiple Regression Model. It was used to measure the socio-economic benefits of the practitioners. The composite index level of living standard of the agro-forestry farmers was computed using Sigh and Dhillon 1986 model. The detail of the model is as follows: the socio-economic indicators (Income, health, school, road, water and electricity)

Where:

(i) 3 Good, (ii). 2 Fair (iii). Poor

The total of these scores was calculated for each indicator, for each local government area for all the sampled local government areas. The average of the total scores (known as location quotients) for each local government area and for all the sampled local government areas were determined. The average scores were inputted into Singh and Dhillon model for the measurement of socio-economic well being of the agro-forestry practitioners.

The model consists of location quotients. The locations are the ratios of the average scores of the socio-economic indicators for each local government area to that of the entire sampled local government areas. The sum of the location quotients gives the composite index level of living standard for each local government area. The detail is stated as follows:

$$= \frac{ICi}{ICe} + \frac{Hci}{Hce} + \frac{Sci}{Sce} + \frac{Rdi}{Rde} + \frac{Wti}{Wte} + \frac{Eli}{Ele} = \sum LQs \frac{ICi}{ICe} + \frac{Hci}{Hce} + \frac{Sci}{Sce} + \frac{Rdi}{Rde} + \frac{Wti}{Wte} + \frac{Eli}{Ele} = \sum LQs$$

Where:

CILLS = Composite index level of living standard
IC = Income
Hc = Health care centre
Sc = School
Rd = Road
Wt = Water
El = Electricity
i = Individual Local Government Area under study
e = Entire Local Government Area under study

LQ LQ s = Location quotients

The higher the CILLS the higher the socio-economic well being and vice verse. The range of the values from 0- 4.99 implies low standard of living, 5.00 – 6.99 represents moderate standard of living while 7.00 -10.00 implies high stand of living.

Relation between composite index level of living standard and social Indicators

The relationship between calculated index of living standard and socio-economic indicators were determined using multiple regression models (Ogunleye, 2002; Ogwumike, et al. 2005). The computed composite index of living standard was the dependent variable while the socio-economic indicators were the independent variable. Data was fitted to four functional forms of regression equations in order to select the lead equation. The four functional forms are linear function, quadratic function, Semi logarithmic function and Double log function: (Cobb-Douglas production function). The transformation of the function gives:

$$Y = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + U_i$$

Where:

Y = Composite index level of living standard
X1 = Income
X2 = Health Care Centre
X3 = School
X4 = Road
X5 = Water
X6 = Electricity
b0 = Intercept term
b1-b5 = Regression coefficient
U = Error or random disturbance term

Result and Discussion

Agro-forestry practice has played a major role in the socio-economic development of the farming communities and their environs. The socio-economic benefits of agro-forestry practice in Southern Kaduna was measured using composite index level of living Standard developed by Singh and Dhillon (1986) as presented in Table 2.

The table reveals that the composite index level of living standard in Zangon Kataf Local Government Area before the adoption of agro-forestry was 2.21 and after the adoption, composite index level of living Standard of the practitioners (CILLS) was 5.02. Kaura Local Government Area had (CILLS) of 2.06 before the adoption of agro-forestry practice and 3.81 after the adoption of the practice and in Jema'a Local Government Area the composite index level of living standard was 2.91 before the adoption and 5.21 after the adoption of the practice.

The finding reveals that the living standard of the practitioners in Zangon Kataf and Jema'a local Government Area were low before the adoption of agro-forestry practice and moderate after the adoption of the practice, while that of Kaura local Government was low before and after the adoption but with fair improvement in their social well being. The implication of the result is that due to the increase in agro-forestry production in the study area, the state government provides social amenities for the social upliftment of the respondents in the study area. This agrees with the findings of Zira (2013) that infrastructure provisions such as road, electricity, school, health centre, and water to the rural dwellers are the responsibility of the government for the transformation of the rural communities.

Relationship between the socio-economic indicator and composite index level of living standard of the practitioners (CILLS)

The result of the regression analysis in Zangon Kataf Local Government Area as revealed in Table 3 indicated that out of the six independent variables, Income, health, school and road were significant and were positively related to CILLS at 5% probability, while water and electricity were not significant, but they were positively related to CILLS. This implies that there was increased in income of the practitioner and the major contribution of the Kaduna State Government to the Local Government Area was in the area of provision of health care centre, school and road. The positive and non-significant relationship of the variables such as water and electricity reveals that the state government may have contributed in these area, which are however not significant yet.

The result of the regression analysis for Kaura Local Government Area (Table 4) shows that out of the six independent variables used in the study, three of the variables (Income, health and road) were statistically significant at 5 % level; water and school were positively related to CILLS but were not statistically significant. Electricity had negative sign and was not statistically significant.

This implies that there was increased in income of the practitioner, health care centre (0.749) and road (0.738) had significant relationship at 5 %. This suggests that health care is a function of CILLS and that the state government made a significant contribution in the area of health care centre to the local government area, this is to ensure that the practitioners are healthy.

Road also had a positive sign and significant at 5 %, the road constructed by the State government serve as a channel for easy transportation in the study area. Other independent variables that had positive or negative sign with no significant relationship simply mean that the state government had made little or no contribution to these areas in the Local Government, which include school, water and electricity.

In Jema'a Local Government Area (Table 5), the regression shows that out of the six independent variables used in the study, five of variable (Income, health care centre, school, road and water) were statistically significant at 5% while electricity was positively related to index of living standard, however, not statistically significant. This result implies that due to the increase in agro-forestry productivity, the state government is motivated to provide health care centre, schools, roads and water to improve the socio-economic well being of the local government area. Electricity was not significant. This does not mean that it was neglected; it means that the rate of power supply is not regular to the local government area.

Result of composite index level of living standard showed that the highest CILLS (5.21) was recorded in Jema'a Local Government Area while the least (3.81) was recorded in Kaura Local Government Area. The result of the relationship between the social indicators and index of living standard in the study area reveals that the level of social well being in Kaura Local Government Area is low and moderate in Zangon Kataf and Jema'a Local Government Area, this is as a result of the inconsistency in social facilities in the study area.

Conclusion

The introduction and adoption of agro-forestry practices in the study area has increased the income of the practitioners, these has made the state government to provide social amenities for the socio-economic upliftment of the farmers and transformation of the rural communities in the Southern Kaduna.

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Appendix

Table 1: Selected Local Government Areas and Locations of study

Selected Local Government	Community	Sample Frame	Sample
Zangon Kataf	Jankasa	100	30
	Tsohon Gidan	64	1 9
	Angwa Gaya	124	37
	Gora	68	20
Kaura	Malagum	67	20
	Agban	72	22
	Biniki	64	19
	Tum	142	43
Jema'a	Tuduwada -Kaningkon	100	30
	Godo godo	123	37
	Gidan Waya	98	29
	Angwa Masara	42	13
Total		1064	319

Source: Field Survey, 2013.

Table 2: Composite Index Level of Living Standard of Agro-orestry Farmers

Local Govt. Area	Before Adoption	After Adoption			
		2009	2010	2011	2012
Zangon Kataf	2.21	4.11	4.27	4.69	5.02
Kaura	2.06	3.42	3.54	3.74	3.81
Jema'a	2.91	4.71	4.88	5.09	5.21

Source: Field Survey, 2013.

Table 3: Estimate of Parameters for Zangon Kataf Local Government Area.

Variable	Coeff. Var.	F. val	R^2	Adjusted R^2
Constant	0.535**	1.961	0.553	0.144
	(0.712)			
Income	0.387			
	(0.129)			
Health	0.478**			
	(0.225)			
School	0.734**			
	(0.259)			
Road	0.613**			
	(0.254)			
Water	0.341			
	(0.492)			
Electricity	0.051			
	(0.329)			

Source: Field Survey, 2013. ** =Significant at P ? 0.05; NS= Non significant; values in Parentheses are the t-values

Table 4: Estimate of Parameters for Kaura Local Government Area.

Variable	Coeff. Var.	F. cal	R^2	Adjusted R^2	
Constant		0.321	2.081	0.572	21.790
		(0.626)			
Income		0.405**			
		(0.137)			
Health		0.749**			
		(0251)			
School		0.139 NS			
		(0.073)			
Road		0.738**			
		(0.286)			
Water		0.133			
		(0.074)			
Electricity		0.027			
		(0.139)			

Source: Field Survey, 2013. ** =Significant at P? 0.05; NS= Non significant; values in Parentheses are the t-values