

Effects of Livelihood Strategies on Sustainable Land Management Practices among Food Crop Farmers in Imo State, Nigeria

Ефекти стратегија преживљавања на одрживо управљање земљиштем између хране, усева и пољопривредника у држави Имо, Нигерија

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Abstract

This study explored the nexus between livelihood strategies of food crop farmers and adoption of sustainable land management practices for sustainable land management and food security policies. To achieve this, questionnaire were administered to one hundred and twenty food crop farmers from the three agricultural zones of the State who were selected through multistage random sampling effort. An analysis of their responses with the use of descriptive statistics and logit regression revealed that there are five broad categories of livelihood activities which food crop farmers in Imo State, Nigeria engaged in. These include crop production, livestock production, extraction activities, wage employment, and petty trading. Food crop farmers adopt multiple LMPs for crop production which include agronomic practices, soil management practices, conservation practices, and structural and mechanical erosion control practices. Food crop farmers' livelihood strategies had significant impact on the adoption of sustainable land management in the area. The study therefore recommends that in pursuing food security policy and programmes, as well as sustainable land management programmes, government should consider the livelihood activities of farmers.

Keywords: Livelihood strategy, sustainable land management practices, logit regression, Imo State, Nigeria.

Introduction

Land is an important resource in farming (Babalola and Olayemi, 2013), and a major resource for the livelihood of the poor (Raufu and Adetunji, 2012). Agricultural intensification has been adopted as a key livelihood strategy that rural households pursue in order to achieve livelihood security (Ellis, 2000). Livelihood can only be seen as sustainable when the poor are capable of coping with stresses and shocks, and most importantly when the livelihood activities provide benefits without undermining the natural resource base on which they rely (World Bank, 2005 and DFID, 2002). Hans *et al.* (2003) argued that livelihood strategies can be a useful and quantifiable concept especially when exploring land and soil conservation measures. Conservation practices and investments need to be appropriate for the production system, agro-ecological conditions, and the livelihood strategy.

The most pressing challenge of Nigerian agriculture in the new millennium is how it can meet the food need of an ever-bourgeoning population in the face of the myriads of social, cultural and economic problems that negates sustainable land management (Fakoya *et al.*, 2007). As defined by the TerrAfrica partnership (2006), sustainable land management practices (SLMP) is the adoption of land use systems that, through appropriate management practices, enables land users to maximize the economic and social benefits from the land while maintaining or enhancing the ecological support functions of the land resources (FAO, 2009). The more years a farmer puts to cultivating a particular parcel of land could influence the choice of and the ability to use SLMP (Awoyinka *et al.*, 2009), and farmers' tenancy security on land owned and cultivated could determine the choice of SLMP used on the farm for increasing agricultural productivity (Gebmedhin and Swinton, 2003). Sustainable intensification of agriculture which entails the use of agricultural practices that are economically and environmentally sustainable, offers a useful approach to tackling food in security facing the world as the result of increase in population and environmental degradation which have long term effect on agriculture globally. Nigerian policy makers have now come to understand that sustainable management of land is a prerequisite for providing enabling environment for agricultural development, which is pivotal towards ensuring that the basic need of man (food) is adequately available, accessible and affordable for the growing populations (Federal Government of Nigeria, 2004).

Moreover, amidst high level of risk and uncertainty characterizing Nigerian agricultural sector, rural farm households are faced with issue of

diversifying their source of livelihood as a means of reducing the negative impact that any single (farming) income source has on their welfare. There has been an increased recognition among researchers in the past that Nigerians diversify their livelihood activities including on – farm (crop, livestock, fisheries) and off – farm activities for a sustainable livelihood (Bryceson, 2002, Ellis, 2000). Barrett *et al.* (2001) explained that exploiting these off – farm opportunities could offer a pathway out of poverty for the rural poor. It has become apparent, however, that agriculture on its own often cannot provide the means of escaping poverty for the majority of the rural poor (Ellis, 2000). As a result, farming households engage in multiple livelihood activities such as trading (marketing or adding value to commodities), small scale business enterprises (carpentry, radio and bicycle repairs) and processing of agricultural goods and arts and craft (weaving, mats and basket making) in order to supplement earnings from agriculture to cope with increasing vulnerability associated with agricultural production (Ekong, 2003; Matthews-Njoku and Adesope, 2007), as well as to enable them to generate an adequate and secure standard of living; and as a result of this struggle to survive and improve their welfare, off-farm and non-farm activities have become an important component of livelihood strategies among rural households in Nigeria (Adepoju and Obayelu, 2013).

In the past, researches on soil conservation technologies adoption in Nigeria have been carried out (Aromolaran, 1998; Adeoti and Adewusi, 2005; Fakoya, 2000; Igbozurike *et al.*, 1989; 1992). These studies have established the influence of socioeconomic, institutional and farm determinants of soil conservation adoption. However, the results of these studies have no bearing for programme targeting, which livelihood framework recognizes. Livelihood strategy variables are also important policy relevant variables in the implementation of sustainable land management practices policy (Jansen *et al.*, 2006a; 2006b; Nkoya *et al.*, 2004). There are empirical researches on sustainable livelihoods and non-farm income diversification (Adato and Meinzen-Dick, 2002; Adejobi, 2004; Ajala, 2006; Babalola and Olayemi, 2013), however, these studies have not linked livelihood strategies of the farming households to adoption of sustainable land management practices in Imo State. While several literatures have carried out impact of livelihood strategies on sustainable land management practices, no studies in Imo State, Nigeria have carried out impact of livelihood strategies and sustainable land management practices.

Methodology

The study was carried out in Imo State, Nigeria. The State shares common boundaries with Abia State on the east and northeast, Rivers State on the south, and Anambra State on the west and northwest. The State lies between latitudes $5^{\circ}45'N$ and $6^{\circ}35'N$ of the equator and longitudes $6^{\circ}35'E$ and $7^{\circ}28'E$ of the Greenwich Meridian. It has a total land area of about 5,067.20 km² (Ministry of Lands Owerri, 1992). It is also delineated into 27 local government areas. The population of the state is 3,934,899 persons with many subsisting in farming (NBS, 2007). Multistage random sampling and convenient sampling techniques were adopted for the selection of respondents for this study. Ten Local Government Areas (LGAs) were randomly selected from the State. In each of the LGAs two communities were randomly selected. In each of the communities, four farmers were randomly selected. In all, ten LGAs, twenty communities, and eighty farmers formed the sample for this study. The main tool for data collection was the questionnaire. Data collected were analysed using descriptive statistics, Herfindahl analytical index, and binary logit model. The level of livelihood diversification was determined using the Herfindahl index. The income diversification index used in the study was defined as the inverse of the Herfindahl index as adopted by Idowu *et al.* (2011):

$$D = \frac{1}{\sum s_i^2} \quad \dots \dots \dots (1)$$

and

$$s_i = \frac{Y_i}{Y} \quad \dots \dots \dots (2)$$

$$Y = \sum Y_i \quad \dots \dots \dots (3)$$

Where; D = Level of income diversification

S_i = Share of income source i in farmer's total income

Y_i = Total income from source i (Naira)

Y = total farmer's income from all sources (Naira)

The Farmer with most diversified income will have the largest values of D. While those with less diversified income will have the smallest values of D. Least diversified household (those depending on a single income source). D takes on its minimum value of 1. The higher the number of income source (s) and/or the more evenly distributed the income share, the higher the value of D.

The effects of livelihood strategies on sustainable land management practices were achieved using binary logistic regression technique. The logit regression model used for analysing the effects of livelihood strategies on sustainable land management practices (SLMP) is specified as follows:

The implicit model of the regression is $Y_i = \log(p/1-p) = f(X_1, X_2, X_3, X_4, X_5, e)$.

Where:

p is the probability while $(1 - p)$ is the corresponding odds, and the logit of the probability is the logarithm of the odds.

Where; Y_i = Adoption of SLMP (Dummy variable; adopted = 1, not adopted = 0)

i = Sustainable land management practices (SLMP)

These are defined as follows:

1. Structural/mechanical erosion control practices
2. Agronomic practices
3. Soil management practices
4. Conservation practices

Any respondent who reported the adoption of a practice was coded 1 and 0 otherwise.

X_1 = Total income from crop production (Naira)

X_2 = Total income from livestock production (Naira)

X_3 = Total income from extraction activities (Naira)

X_4 = Total income from wage/salary employment (Naira)

X_5 = Total income from petty trading (Naira)

e = error term.

Results and discussion

Livelihood Strategies of farmers in the area

Table 1 presents the multiple responses and distribution of farmers according to livelihood strategies. Table 1 showed that 96.25% of the respondents engaged in crop production, livestock production (85.50%), extraction activities (36.25%), wage employment (55%) and petty trading (88.75%), as livelihood strategies in the area. It was found that the major livelihood strategies in the area were crop production, livestock production and petty trading. This entails that farmers in the area have better means of sustaining their livelihoods.

Table 1: Distribution of farmers according to livelihood strategies

Livelihood strategies	Frequency	% Distribution
Crop production	77	96.25
Livestock production	68	85.50
Extraction activities	29	36.25
Wage employment	44	55.00
Petty trading	71	88.75

Source: Field Survey, 2015

Sustainable Land Management Practices in the area

Table 2 presents the multiple response and distribution of farmers based on the sustainable land management practices in the area.

Table 2: Distribution of farmers based on the sustainable land management practices

Land management practices	Frequency	% Distribution
Structural/mechanical erosion control		
i. Terraces	16	20.00
ii. Contour bund	58	72.50
iii. Ridges across slope	67	83.75
Agronomic practices		
i. Multiple cropping	78	97.50
ii. Mulching	80	100.00
iii. Crop rotation	30	37.50
iv. Cover cropping	55	68.75
v. Strip cropping	20	25.00
Soil management practices		
i. Compost	80	100.00
ii. Farm/green manure	77	96.25
iii. Use of inorganic fertilizer	76	95.00
Cultivation practices		
i. Minimum tillage	9	11.25
ii. Conventional tillage	80	100.00

Source: Field survey, 2015

Table 2 showed that in structural/mechanical erosion control, 20% of the farmers practiced terraces, 72.50% practiced contour bund, and 83.75% constructed ridges across slope; in agronomic practices, 97.50% practiced multiple cropping, 100% mulched their farm land, 37.50% practiced crop rotation, 68.75% planted cover crops, while 25.00% adopted strip cropping. On the other hand, 100% of the farmers applied compost, 96.25% applied farm/green manure, and 95% used inorganic fertilizer as their soil management

practices, while 11.25% and 100% practiced minimum tillage and conventional tillage respectively. This is an indication that farmers in the area adopt practices they can sustain given the various livelihood sources.

Level of Livelihood Diversification in the area

Table 3 showed that 10% of the farmers were not diversified. This implies that the livelihoods of these set of farmers depend on a single income source which was farming. It was found that 70% of the respondents were moderately diversified, indicating that they depend on two income sources. The results also showed that 20% of the farmers were highly diversified, indicating that their livelihood depends on more than two income sources. This means that farmers in the area have other means of livelihood to support their daily needs and wants. It could also mean that they can manage the risk and uncertainties associated with farming since they have other livelihood means.

Table 3: Level of Livelihood Diversification in the area

Level of Diversification	Frequency	% Distribution
Not diversified (D = 1)	8	10.00
Moderately diversified (D>1<2)	56	70.00
Highly diversified (≥ 2)	16	20.00
Total	80	100.00

Source: Field survey, 2015

Effects of livelihood strategies on sustainable land management

Table 4 shows the estimated results of the binary logit analysis of the effects of livelihood strategies on sustainable land management practices in the area. Results show that the Likelihood Ratio Chi Square values for each logit regression is statistically significant ($P < 0.01$). This indicates that all the models had good fit to the data. Consequently, the interpretation of the binary logit result indicates the following:

The coefficient of crop production was significant and had positive influence on structural and mechanical erosion control practices, agronomic practices, conservation practices, and soil management practices. This is an indication that increase in crop production is more likely to increase the

adoption of structural and mechanical erosion control practices, agronomic practices, conservation practices, and soil management practices in the area.

The coefficient of livestock production was significant and had positive influence on agronomic practices, conservation practices, and soil management practices. This implies that increase in livestock production is more likely to increase the adoption of agronomic practices, conservation practices, and soil management practices. This could be stemmed from the additional income generated which will then be used to purchase agrochemicals and other farm inputs.

The coefficient of extraction activities was significant at 5% and had positive influence on conservation practices. This is an indication that increase in extraction activities is likely to increase conservation practices.

Finally, the coefficient of petty trading was significant at 5% and had positive influence on agronomic practices, soil management and conservation practices. This is an indication that increase in own-business is less likely to increase agronomic and soil management practices, and conservation practices.

Table 4: Binary logit estimates of the effects of livelihood strategies on sustainable land management practices in Imo State

Variable	Structural/mechanical erosion control	Agronomic practices	Soil management practices	Conservation practices
Crop production	0.003 (2.43)**	0.002 (2.27)**	0.015 (2.15)**	0.007 (1.85)*
Livestock production	0.003 (0.77)	0.007 (2.53)**	0.017 (2.55)**	0.015 (2.31)**
Extraction activities	0.003 (1.45)	0.002 (1.25)	0.009 (1.48)	0.007 (2.18)**
Wage employment	0.007 (0.57)	0.001 (1.13)	0.002 (1.08)	0.0002 (0.51)
Own-business	0.003 (1.36)	0.008 (2.32)**	0.0017 (2.15)**	0.0014 (2.11)**
Likelihood Chi square	84.60***	69.65***	67.92***	74.23***
Number of observations	80	80	80	80

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level; Field Survey, 2015

Conclusion and recommendations

The study concludes that most farmers engaged in crop production, livestock production, extraction activities, wage employment and petty trading, as livelihood strategies in the area. It is concluded also that in structural/mechanical erosion control, farmers practiced terraces, contour bund, and constructed ridges across slope; in agronomic practices, farmers practiced multiple cropping, mulched their farm land, and planted cover crops; while most farmers applied compost, farm/green manure, and used inorganic fertilizer as their soil management practices, with conventional tillage. Most of the farmers were moderately diversified, indicating that they depend on two income sources. Finally, livelihood strategies have significant influence on the SLMP. The study therefore recommends that in pursuing food security policy and programmes, as well as sustainable land management programmes, government should consider the livelihood activities of farmers. Programme intervention in natural resource conservation needs to focus on detailed characterization and identification of SLMPs that are both farm-and farmer-specific. In particular, specific programmes should be designed for various SLMPs that meet the peculiar needs of various categories of farmers.

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