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The Effect of Sustainable Land Management and Agricultural Intensification on Poverty Reduction in South East Nigeria

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ABSTRACT

The issue of poverty reduction through sustainable land management and agricultural intensification forms the focus of this study. The study determined the causes of land degradation and soil nutrient depletion and, determinants of agricultural intensification in southeast Nigeria. Survey research design was adopted for the study and, a multi-stage sampling technique was employed to select the 450 farm households from three of the five states in southeast Nigeria as respondents. Land Management and Poverty Reduction Questionnaire were constructed to serve as instrument for data collection. The Statistical Model of Impact Measuring, a combination of multivariate regression methods and statistical inference was used in analyzing data generated from the study. Data analysis was carried out on MS Excel, SPSS 17. The findings of the study revealed among others that, adoption of Sustainable Land Management and Agricultural Intensification practices can lead to significant reduction in poverty and increase income. The regression analysis also found out that adoption of SLM and AIP are significant predictors of poverty reduction. Recommendations made among others include, adoption of conservation practices and integrated pest management practices to improve crop yields.

Key words: Intensification, Poverty, Sustainable, Agricultural, Management, Southeast

1. Introduction

It is critical to note that land, as a renewable productive resource input, should be properly managed in order to maintain its sustainability. Productivity potentials of agricultural land is exhaustive and it is therefore imperative that every effort should be geared towards improving and maintaining the quality and productive capacity of every agricultural land in order to reduce food production cost and its consequent effect on hunger and poverty. Sustainable land management refers to practices and technologies that aim to integrate the management of land, water, and other environmental resources to meet human needs while ensuring long-term sustainability, ecosystem services, biodiversity, and livelihoods. (Grace, 2020). It is a necessary building block to sustainable agricultural development.

Land degradation, low and declining agricultural productivity, and poverty are severe interrelated problems in Nigeria, as much as sub-Saharan Africa (SSA). The government of Nigeria, with help from its development partner, has been designing and implementing policies and strategies to address poverty, land degradation, and declining agricultural productivity. Land degradation, especially soil erosion and depletion of soil nutrients, is widespread in Nigeria, particularly in the southeastern part of the country and this contributes to declining productivity, which in turn, increases poverty (Okoye, 2005, Ike, 2011).

Highly agrarian and densely populated relative to its fragile natural resource base, Southeast Nigeria, like other parts of the country, has long history of agricultural intensification through adoption of technologies that economize on labour, preserve natural resources and maximize value per hectare. However, with very rapid population growth, it is also recognized that endogenous technological change may be inadequate and that policy-induced responses to population growth are more important than ever; else, there will be a drift to the Malthusian prediction that unchecked fertility rates amid fixed land and water resources will lead to periodic famines (Malthus, 1798). While this theory may remain relevant in this setting, so does Boserup's (1965) seminal work on agricultural intensification in response to land constraints.

Hence, there is need to identify and quantify the drivers of agricultural intensification. According to Boserup, farm sizes (at both the individual and community levels) are likely to be a key determinant of the demand for intensive technologies such as plows, chemical fertilizers, high-yielding seeds and improved natural resource management practices. Binswanger and colleagues as reported by Headey et al (2013) also emphasize that access to input and output markets are likely to be a commensurately important driver of agricultural intensification.

One of the challenges that the government faces in confronting these problems is lack of information to empirically support policy recommendations. To address this information gap, there is need to analyze the farm size and land degradation applicable in the area, and also policy-relevant determinants of households' income strategies and land management practices and their impacts on agricultural production, household income, and conduct a plot-level

survey to investigate the land management and productivity of each plot in the area. As indicators of sustainability of land management, there is need to estimate soil nutrient flows and balances for households as well as the determinants of these flows and balances.

Analyzing the complex relationships among different policy and program interventions, households' livelihood strategies and land management decisions, and impacts on agricultural productivity, poverty reduction, and land degradation will offer policy-related insights for addressing poverty and land degradation sustainably.

1.1. Statement of the Problem/Justification

Agricultural productivity and output in the southeast Nigeria has recently, not been able to sufficiently meet-up with the food demand of the ever-increasing human population in the area. The staple food production rate and quantity especially yam, cassava, rice, and maize is usually supplemented by supplies from the Middle belt and other parts of Northern Nigeria. According to Ogbonna, Anyaegbunam and Asomugha, (2018), the volume of yam tubers produced in the southeast Nigeria lasts for just two to three months of the year and with higher prices. With the devastating effects of soil erosion which is causing soil nutrient depletion, declining agricultural productivity and, reduction in farmer's income, it becomes pertinent therefore to critically examine how to reduce the poverty caused by the low productivity of the farm family through sustainable land management and agricultural intensification.

1.2. Objectives of the Study

This research is intended to determine the impact of sustainable land management and agricultural intensification on poverty reduction in southeast Nigeria. The end goal is to establish ways of improving agricultural productivity in the area, increase farmers income and reduce poverty. In specific terms, the research targets to:

- Examine the causes of land degradation and soil nutrient depletion in the area.
- Identify the determinants of land management decisions and their impacts on agricultural productivity and household income.
- Specify the determinants of agricultural intensification, and constraints to poverty reduction.

1.3. Project Impact

The achievement of this research will be impactful in many ways. When the work is finished, the farmers will learn to mitigate soil nutrient loss through better land management practices. Again, the food demand-supply gap will be closed through agricultural intensification and improvement in the farmer's productive potentials which will culminate to increased income of the farm family, savings accumulation and investment, employment generation, increased living standard and poverty reduction in the area.

1.4. Research Questions

1. In what ways does sustainable land management and agricultural intensification impact poverty reduction?
2. To what extent do land management decisions affect agricultural productivity and household income?
3. What are the determinants of agricultural intensification, and constraints to poverty reduction?

2. Literature Review

The review of related literature is on the subject of study, and the key concepts for the purpose of conceptual explanations, clarifications and better understanding of the objectives of this study.

2.1. Agricultural Intensification

Agricultural intensification is increased average input of labour or capital on a small holding, either cultivated land or on cultured and grazing land, for the purpose of increasing the value of output per hectare, (Grace, 2020). Agricultural intensification may occur as a result of an increase in the gross output in fixed proportions due to input expanding proportionally without technological changes. This is usually as a result of increased demand for output or fall in availability of key input such as land or labour. Agricultural intensification with sustainable land management will results to increased food output and therefore, reduced food prices, increased income and standard of living of the farmers.

Majority of Nigerian's poor are concentrated in rural areas, depending directly or indirectly on agriculture and related activities while owing or controlling few physical productive assets. Since poor households must ensure their survival, they frequently have no choice (particularly when faced with limited production base, meager capital and poor knowledge) other than to exploit and degrade their environment, especially their land resources (Batie, 1992).

Poor households subsist at various levels of deprivation and, faced with acute land shortage, they respond by intensifying and over-using available land space; and even when land is marginal, they continue to cultivate and so progressively, degrade it since they must fight hunger.

2.2. Poverty Reduction

Poverty reduction, poverty relief or poverty alleviation is a set of measures both economic and humanitarian that are intended to permanently lift people out of poverty (Ogwumike, 2001). Agricultural productivity is a function of many variables of which land is one of the major factors. Land management in agricultural production implies sustainable land use which will ultimately reduce land maintenance cost, with positive impact on the farmer's income and poverty reduction. Production cost reduction will invariably, lead to increased output, increased income of the farm family, reduction in price of agricultural products, more food availability for the populace and reduction in poverty level.

2.3. Land Degradation

Land degradation is negative trend in land condition resulting in long term reduction or loss of the biological productivity of land, its ecological integrity or its value to humans, caused by direct or indirect human-induced processes, including climate change (IPPC, 2018). Climate change exacerbates many land degradation processes in terms of rates and magnitudes of degradation, therefore sustainable land management is even more urgently required to avoid, reduce and reverse degradation. It mostly occurs as a result of conversion of tropical forests to agricultural land.

The seriousness of soil degradation in Nigeria has been highlighted by the World Bank (1990). Deforestation, soil erosion, desertification, soil salinization, alkanization and water logging, form different but often interrelated aspects of soil degradation. Soil degradation is estimated to affect about 50 million people in Nigeria and could have long term impacts in excess of US $3 billion annually (World Bank, 1990). Thus, both in terms of economic impact and number of people affected, soil degradation is a serious threat to Nigerian environment. An aspect of soil degradation that has continued to ravage the south eastern states of Nigeria is soil erosion. As far back as 1964, 47% of soils of eastern Nigeria were affected by measurable sheet erosion while 20% suffered from severe sheet erosion (Ofomata, (1976). By 1990, gullies occupied 4% of the land area of Anambra, Imo, Abia and Enugu states. And, the rate of gully formation and the extension of the existing ones was still increasing (World Bank, 1990). The situation has not changed as evidenced by the recent report by the World Bank on southeast Nigeria (2018).

Gully erosion is accelerating in southeast Nigeria. Southern Nigeria is affected by massive and expanding gully erosion, an advanced form of land degradation. There are an estimated 3,000 gullies which can be up to 10km long with multiple fingers spreading through the rural or urban landscape. In southeastern states, gullies and areas exposed to erosion tripled; the total area affected by rill, sheet or gully erosion increased from about 1.33% (1,012 km2) in 1976 to about 3.7% (2,820km2) in 2006.

2.4. Sustainable Land Management

Sustainable land management refers to practices and technologies that aim to integrate the management of land, water, and other environmental resources to meet human needs while ensuring long-term sustainability, ecosystem services, biodiversity, and livelihoods (Wikipedia, 2023). It is a necessary building block for sustainable agricultural development.

In 1979, through the instrumentality of the United Nations, a worldwide conference on environmental sustainability of which Nigeria participated was held in Rio de Janeiro, Brazil. The conference among other things came out with a set of guiding principles on strategies for pursuit of environmentally sound and sustainable development. In spite of these global efforts and declarations, there have been reports of extensive environmental deterioration suspected to have resulted from agricultural activities in Nigeria particularly in the south eastern states (Okoye, 2005).

3.0. Research Methodology

Survey research design was adopted for the study conducted in the Southeast Nigeria which is comprised of five states: Abia, Anambra, Ebonyi, Enugu and Imo states. The zone has a population of 21,957,414 (NPC 2016 forecast). Southeastern Nigeria is a region often associated with high population densities and agro forestry intensification due to increased land scarcity (Ugwu, 2005).

A multi-stage sampling technique was employed to select the respondents. First, purposive sampling technique was used to select Anambra, Enugu and Imo States for the study. Secondly, simple random sampling technique was used to sample three (3) local government areas from each of the three states to give nine (9) LGA's for the study. Again, five communities were randomly sampled from each of the nine (9) LGA's to give forty five (45) communities. Again, ten (10) smallholder farm households were randomly sampled from each of the forty five (45) communities, made up of hundred (150) respondents from each state, to give a total sample size of 450 respondents for the study.

Instrument for data collection was a validated questionnaire titled "Land Management and Poverty Reduction", designed by the researcher, and constructed in a 5-point Likert scale format. This was administered to the respondents with the help of research assistants. The reliability of the questionnaire was established before use. The items on the instrument were developed from the research questions consisting of two parts; Part 1 was designed to gather demographic information about the respondents. Part 2 was designed to gather information for the estimation of the variable factors affecting sustainable land management, agricultural intensification and poverty reduction.

The Statistic Model of Impact Measuring, a combination of multivariate regression methods and statistical inference was used in analyzing data generated from the study. Data analysis was carried out on MS Excel, SPSS 17.

4.0. Results:

Table 1: Demographic Characteristics of Respondents

Characteristics	Frequency	Percentage (%)
Age(years)		
20 – 30	120	26.7
31 – 40	150	33.3
41 – 50	100	22.2
51 +	80	17.8
Sex		
Male	240	53.3
Female	210	46.7
Education		
No formal education	50	11.1
Primary education	150	33.3
Secondary education	120	26.7
Tertiary education	130	28.9

This table presents the demographic characteristics of the 450 respondents, including age, sex, and education level. The age of the respondents indicates that majority, 60%, are between the ages of 20 – 40 years, which is within the active age range of productivity. The table also shows that most of the farmers are literate and therefore capable of adopting improved agricultural production practices. The table helps to understand the background of the respondents and identify potential differences in their responses.

Table 2: Poverty Status of Respondents

Poverty Status	Frequency	Percentage (%)
Very Poor	120	26.7
Poor	180	40.0
Not poor	150	33.3

This table shows the poverty status of the respondents, categorized as very poor, poor, or not poor. The table helps to understand the poverty levels of the respondents and identify potential relationships between poverty and the adoption of sustainable land management and agricultural intensification practices.

Table 3: Adoption of Sustainable Land Management (SLM) Practices

SLM Practices	Frequency	Percentage (%)
Conservation Agriculture	180	40.0
Agro forestry	130	28.9
Soil conservation	80	17.8
Integrated pest management	60	13.3

This table presents the adoption rates of different SLM practices among the respondents, including conservation agriculture, agro forestry, soil conservation, and integrated pest management. The table helps to understand the extent to which respondents have adopted SLM practices.

Table 4: Adoption of Agricultural Intensification Practices

Agricultural Intensification Practice	Frequency	Percentage (%)
Crop rotation and intercropping	150	33.3
Use of improved crop varieties	120	26.7
Irrigation management	100	22.2
Use of organic fertilizers	80	17.8

This table shows the adoption rates of different agricultural intensification practices among the respondents, including crop rotation and intercropping, use of improved crop varieties, irrigation management, and use of organic fertilizers. The table helps to understand the extent to which respondents have adopted agricultural intensification practices.

Table 5: Impact of SLM and Agricultural Intensification on Poverty Reduction

Variable	Mean	Standard Deviation
Income (Naira/month)	120,000	30,000
Expenditure (Naira/month)	80,000	20,000
Poverty gap index	0.20	0.10

This table 5 presents the mean and standard deviation of income, expenditure, and poverty gap index for the respondents. The table helps to understand the impact of SLM and agricultural intensification practices on poverty reduction.

Regression Analysis:

A regression analysis was conducted to examine the relationship between the adoption of SLM and agricultural intensification practices and poverty reduction. The results are presented below:

Table 6: Regression Coefficients: SLM and Agricultural Intensification on Poverty Reduction

Variable	Coefficient	Standard Error	p-value
Adoption of SLM practices	-0.25	0.10	0.01
Adoption of agricultural intensification practices	-0.30	0.12	0.001
Income (Naira/month)	-0.20	0.05	0.001
Expenditure (Naira/month)	0.15	0.05	0.01

The results indicate that the adoption of SLM and agricultural intensification practices has a significant negative impact on poverty, indicating that these practices can contribute to poverty reduction. Additionally, the results show that income and expenditure have a significant impact on poverty, indicating that increasing income and reducing expenditure can also contribute to poverty reduction.

The coefficients represent the change in the poverty gap index for a one-unit change in the independent variable, holding all other variables constant.

5.0 Discussion of Findings

The findings of this study indicate that the adoption of sustainable land management (SLM) and agricultural intensification practices can contribute to poverty reduction among smallholder farmers. The results show that the adoption of SLM practices, such as conservation agriculture and agro forestry, can lead to significant reductions in poverty (Table 3). This is consistent with previous studies that have found that SLM practices can improve soil fertility, reduce erosion, and increase crop yields, leading to improved livelihoods for smallholder farmers (Hanjra et al., 2012; Kassam et al., 2014).

The study also found that the adoption of agricultural intensification practices, such as irrigation management and crop rotation, can lead to significant increases in income and reductions in poverty (Table 4). This is consistent with previous studies that have found that agricultural intensification can lead to improved crop yields, increased income, and reduced poverty (Evans et al., 2013; Tittonell et al., 2012).

The regression analysis found that the adoption of SLM and agricultural intensification practices are significant predictors of poverty reduction (Table 5). This suggests that these practices can be effective strategies for reducing poverty among smallholder farmers.

The study's findings have important implications for policy and practice. They suggest that investments in SLM and agricultural intensification can be effective strategies for reducing poverty and improving livelihoods for smallholder farmers. They also highlight the importance of considering the specific needs and circumstances of smallholder farmers when designing and implementing development programs.

Sustainable land management SLM can improve the sustainability of intensification AI practices while AI can increase the productivity of SLA practices. Combining SLA and AI can increase efficiency in agricultural production, reducing waste and environmental degradation. The synergies between SLM and AI can improve livelihood especially for smallholder farmers, by increasing incomes, improving food security and reducing poverty.

Recommendations

Farmers should be encouraged among others to:

- Adopt conservation agricultural practices such as reduced tillage, permanent soil cover, and crop rotations, to reduce soil erosion and improve soil health.
- Use efficient irrigation systems such as drip irrigation to reduce water waste.
- Establish community managed nurseries to provide high-quality seedlings and promote agro forestry practices.
- Adopt IPM practices to improve crop yields.
- Use high-yielding, disease resistant crop varieties to improve crop productivity and reduce poverty.

References

Batie, S.S. (1992). Sustainable Development: Concepts and Strategies. In G.H. Peters and B.F. Stanton (eds.) Sustainable Agricultural Development: The role of International Cooperation. *Proceedings of the 21st International Conference of Agricultural Economists* held at Tokyo, Japan, August, 1991. London: Darmouth Press.

Boserup, E. (1965), *Conditions of Agricultural Growth*; Aldine Publications.

Evans, E. C., Kahan, D. G., & Kibblewhite, M. G. (2013). Agricultural intensification and poverty reduction: A systematic review. Journal of Development Studies, 49(10), 1345-1364.

Grace, C; (2020). Agricultural Intensification and Rural Sustainable Livelihoods: A Think Piece – *IDS Working Paper 64. https//www.ids.ac.uk*

Hanjra, M. A., Fereday, N., & Blackwell, J. (2012). Impacts of sustainable land management on poverty and food security. Journal of Sustainable Agriculture, 36(2), 151-171.

Heady, D; M. Dereje, J. Ricker-Gilbert, A. Josephson and, A.S. Taffesse (2013). Land Constraints and Agricultural Intensification in Ethiopia, A Village-Level Analysis of High-Potential Areas, In *International Food Policy Research (IFPRI)* Washington, DC.

Ike, P.C. (2011). Small-Scale Farmers' Technology Adoption and Soil Degradation inEnugu State, Nigeria in *Nigerian Journal of Farm Management*, 12 (1), 21 – 27

IMF (2005). Country Report on Poverty Reduction, https:www:imf.org, No.05/433

Kassam, A., Friedrich, T., & Shaxson, F. (2014). Conservation agriculture and sustainable agriculture: A global synthesis. Field Actions Science Reports, 7, 1-13.

Malthus, T.R. (1798). An Essay on the Principle of Population and, A Summary View of the Principle of Population. Harmondsworth: Reprinted by Pengiun Press.

Nkonya, E; J.Pender, P. Jagger, D. Serunkuma, C. Kaizzi and H. Ssali (2004). Strategies for Sustainable Land Management and Poverty Reduction in Uganda. In *International Food Policy Research Institute* (IFPRI) Washington, DC.

Obadan, M. I; (2001). Poverty Reduction in Nigeria: The Way Forward. *CBN Economic and Financial Review*, 39 (4), 159 – 188

Ofomata, G.E.K. (1976). Conserving the Scarce Land of South Eastern Nigeria. Paper Presented at the On Land Policy, NISER, University of Ibadan, Soil Erosion in Nigeria: The Views of a Geomorphologist; *University of Nigeria Inaugural Lecture Series* No.7

Ogbonna, Anyaegbunam and Asomugha (2018). Price Response Analysis in Abia State, in *Journal of Farm Management Association of Nigeria*, 14 (2) 35 – 40

Ogwumike, F.O; (2001). An Appraisal of Poverty Reduction Strategies in Nigeria. *CBN Economic and Financial Review*, 39 (4).

Okoye, C.U. (2006). Estimating Farm-Level Soil Erosion Control and Damage Costs in Enugu State, Nigeria, in S.O. Adopoju and P.B. Okuneye (eds.) Technology and Agricultural Development in Nigeria. *Proceedings of the 20th Annual Conference of Farm Managrement Association of Nigeria*. 521 – 529

Suruchi, B; C. Annette, Kernel Delusca (2020). Land Degradation. *Inter-governmental Panel Report on Climate Change* (IPCC) of the United Nations.

Tittonell, P., Scopel, E., Andrieu, N., & Posthumus, H. (2012). Agricultural intensification and poverty reduction: A case study from Tanzania. Agricultural Systems, 109, 1-11.

Ugwu, J.N. (2005). Low Cost and Sustainable Production Practices for Increased Agricultural Output in Eastern Nigeria, in Ogisi, Okuneye and Oyaide (eds.), Economic Reforms and management of Nigerian Agriculture. *Proceedings of the 19th Annual Conference of Farm Management Association of Nigeria*.

World Bank (1990). Towards the Development of an Environmental Action Plan for Nigeria, West African Department, December.