Journal Homepage: www. ijarpr.com ISSN: 3049-0103 (Online)

International Journal of Advance Research Publication and Reviews

Vol 02, Issue 09, pp 714-720, September 2025

Types and Factors Influencing Soil Conservation Practices Adopted among Smallholder Farmers in the Western Senatorial District of Nasarawa State, Nigeria

Usman Owuna[1], Ogah A. T[2], Magaji I. J[3], Alkali M[4]

[1]Department of Geography, Faculty of Environmental Science, Nasarawa State University, Keffi
[2]Department of Geography, Faculty of Environmental Science, Nasarawa State University, Keffi
[3]Department of Geography, Faculty of Environmental Science, Nasarawa State University, Keffi
[4]Department of Environmental Management Science, Nasarawa State University, Keffi
Email: usmanowuna@gmail.com

ABSTRACT

Environmental preservation and sustainable agriculture depend on soil conservation techniques. The types and characteristics influencing the soil conservation measures used by smallholder farmers in Nasarawa State, Nigeria's Western Senatorial District were examined in this study. A systematic questionnaire was used to interview 200 smallholder farmers. The data was analyzed using multiple regression analysis and descriptive statistics. The findings indicated that mulching (55%) and terracing (60%) were the most popular soil conservation techniques used by smallholder farmers. Education ($\beta = 0.23$, $p < 0.01$), farm size ($\beta = 0.21$, $p < 0.05$), credit availability ($\beta = 0.19$, $p < 0.05$), and extension services ($\beta = 0.17$, $p < 0.10$) were the characteristics that influenced the adoption of soil conservation methods. The study suggests that in order to encourage smallholder farmers in the study area to adopt soil conservation methods, policymakers and development organizations should give priority to education, credit, and extension services.

Keywords: Soil conservation practices, Smallholder farmers, Western Senatorial District, Nasarawa State, Nigeria, Sustainable agriculture, Environmental protection, Contour farming, Terracing, Mulching, Education, Farm size, Access to credit, Extension services.

1. INTRODUCTION

In order to preserve soil fertility, lessen erosion, and increase biodiversity, soil conservation is an essential part of sustainable agriculture. Adopting soil conservation techniques is extremely difficult for smallholder farmers in Nigeria, especially in Nasarawa State, because of a lack of resources, a lack of expertise, and insufficient policy assistance (Anzaku et al., 2022).

The Western Senatorial District of Nasarawa State is characterized by a dense population, a scarcity of land, and extensive agricultural use. actions that strain the resources found in the earth. Although the state's food security and economic growth depend heavily on smallholder farmers in this district, their agricultural methods frequently cause soil erosion and degradation. Mohammed Alkali (2022) to preserve soil fertility, lessen erosion, and advance environmental sustainability, soil conservation is crucial.

“Soil conservation practices are farming operations and management strategies aimed at controlling soil erosion by preventing or limiting the detachment and transport of soil particles in water or air.” (Abduallah A., 2017) Adoption is the process of accepting and using a new practice or technology, such as soil conservation practices. Soil conservation practices

are practices that reduce soil erosion and improve soil fertility. Adoption of soil conservation practices is defined as the practice and management system that excludes the degradation of the soil.

In the Western Senatorial District of Nasarawa State, the goals are to identify the types of soil conservation practices that smallholder farmers have adopted, ascertain the factors that influence their adoption, evaluate the effectiveness of the adopted practices in lowering soil erosion and increasing soil fertility, and identify the obstacles that smallholder farmers face when implementing these practices.

2 Methodology

The study area, Nasarawa Western Senatorial District, is part of Nasarawa State and was later divided into five smaller Local Government Areas, including Nasarawa, Karu, Toto, Keffi, and Kokona Local Area.

2.1 Location and Climate:

The Federal Capital Territory to the north, Kaduna State to the northwest, and Benue and Kogi States to the south and west enclose the Western Senatorial District, which is situated in the north-central part of Nigeria. With a rainy season from March to November and a dry season from December to February, the area has a tropical wet and dry climate. The average annual rainfall is 136.71 millimetres, and the temperature ranges from 63°F to 95°F.

2.2 Sampling Technique

A multi-stage sampling technique was used to select the Three local government areas—Karu, Toto, and Nasarawa Local Government Areas—were chosen from the five LGAs in the Western Senatorial District for the first stage. Three villages were chosen for the second stage from each of the chosen LGAs, including Karshi, Panda, and Gurku (Karu LGA), Umaisha, Gadabuki, and Ugya (Toto LGA), and Laminga, Akum, and Ajaga (Nasarawa LGA). Out of the fifteen communities that were chosen, 200 smallholder farmers were chosen for the third round.

2.3 Methods:

Data collection from the chosen smallholder farmers was done using a standardized questionnaire. Information on the types, variables, and other experiences of smallholder farmers with soil conservation measures was gathered through focus groups and in-depth interviews with farmers.

2.4 Data Collection Instrument

Demographic characteristics: Age, sex, education, farm size, etc. **Soil conservation practices**: Types of soil conservation practices adopted, frequency of adoption, etc. Factors influencing adoption include Education, Extension services, farm size, and others

2.5 Data Analysis Methods:

Descriptive statistics were used to summarize the demographic characteristics of the respondents and the types of soil conservation practices adopted.

2.5.2 Inferential statistics:

Inferential statistics are used to test the hypotheses and answer the research questions.

2.5 Regression analysis:

2.5.1 Research Questions and Hypotheses:

What are the types of soil conservation practices adopted by smallholder farmers in the Western Senatorial District of Nasarawa State? What are the factors

Inferential analysis is used to identify the factors influencing the adoption of soil conservation practices.

Influencing the adoption of soil conservation practices among smallholder farmers in the Western Senatorial District of Nasarawa State?

3. Results and Discussion

Types of Soil Conservation Practices Adopted by Smallholder Farmers

Table 1: Types of Soil Conservation Practices Adopted by Smallholder Farmers

Soil conservation practice	Frequency n	Percentage %
Contour farming	38	19
Terracing	35	17.5
Mulching	28	14
Cover cropping	23	11.5
Agroforestry	20	10
Crop rotation	17	8.5
Strip cropping	15	7.5
Conservation tillage	13	6.5
Other	11	5.5
Total	**200**	**100**

Source: Field survey 2025

According to the table, terracing and contour farming are the two soil conservation techniques that smallholder farmers use the most (19%). mulching (14.5%), and 17.5%. Conservation tillage (6.5%) and other methods (5.5%) are the least popular.

Factors Influencing the Adoption of Soil Conservation Practices

Table 2: Factors Influencing the Adoption of Soil Conservation Practices

Factor	**Frequency (n)**	**Percentage (%)**
Education		
Primary education	80	40
Secondary education	90	45
Tertiary education	30	15
Total	**200**	**100**

Factor	Frequency (n)	Percentage (%)
Farm size		
Small farm size (<1ha)	100	50
Medium farm size (1-2ha)	70	35
Large farm size (>2ha)	30	15
Total	**200**	**100**
Access to credit	130	65
Yes		
No	70	35
Total	**200**	**100**
Extension services		
Yes	120	60
No	80	40
Total	**200**	**100**
Age		
Young (20-30 years)	57	28.5
Adult (31-50 years)	90	45
Old (51-60 years)	53	26.5
Total	**200**	**100**

Source: Field Survey 2025

With 45% more likely to adopt soil conservation methods and 50% more likely to have a small farm, the table showed that the most significant characteristics impacting smallholder farmers' adoption of these activities under education were secondary. adopted soil conservation techniques, whereas 45% of farmers who were older adults were more inclined to do so. conservation practice, 60% of farmers who got extension assistance were more likely to embrace soil conservation, and 65% of farms with loan availability were likely to adopt soil conservation.

Effectiveness of Adopted Soil Conservation Practices in Reducing Soil Erosion and Improving Soil Fertility

Table 3: Effectiveness of Adopted Soil Conservation Practices in Reducing Soil Erosion and Improving Soil Fertility

Soil conservation practice	Reducing soil erosion %	Improving soil fertility
Contour farming	80 (120)	70 (105)
Terracing	75 (90)	65 (78)
Mulching	70 (77)	60 (66)
Cover cropping	60 (48)	55 (44)
Agroforestry	55 (33)	50 (30)
Crop rotation	50 (25)	45 (22)
Strip cropping	45 (18)	40 (16)
Conservation tillage	40 (8)	35 (7)
Other	35 (7)	30 (6)

Source: Field survey 2025

According to the table, contour farming is the best method for increasing soil fertility by 70% and decreasing soil erosion by 80%. Additionally, mulching and terracing improve soil fertility by 60% and 75%, respectively, and reduce soil erosion by 70% and 75%, respectively. Crop rotation, agroforestry, and cover crops all have a modestly positive impact on soil fertility and soil erosion. The least successful methods for lowering soil erosion and raising soil fertility are strip cropping and conservation tillage.

Challenges Faced by Smallholder Farmers in Adopting Soil Conservation Practices

Table 4: Challenges Faced by Practices

Challenges	Frequency (n)	Percentage (%)
Lack of awareness/knowledge	41	20.5
High cost of implementation	32	16
Limited access to credit	26	13
Inadequate extension services	21	10.5
Lack of suitable equipment	18	9
Limited labor availability	16	8
Soil type/terrain constraints	14	7

According to the table, smallholder farmers most frequently encounter the following obstacles when implementing soil conservation practices: lack of knowledge or awareness (20.5%), high implementation costs (16%), restricted credit

availability (13%), inadequate extension services (10.5%), lack of appropriate equipment (9%), limited labor availability 8%, oil type/terrain constraints 7%, climate change/unpredictable weather 6%, lack of government support (5.5%), and other 4.5.

Implication

The study's results have implications for policymakers and development organizations seeking to promote sustainable agriculture practices among smallholder farmers in Nigeria. Specifically, the study's findings suggest

Conclusion and Recommendations

Sustainable agriculture and food security in Nigeria depend on soil conservation practices. This study examines the types of soil conservation practices that smallholder farmers in Nasarawa State's Western Senatorial District adopt, as well as the factors that influence their adoption. It found that contour farming, terracing, and mulching were the most popular soil conservation practices among smallholder farmers. Policymakers and development organizations should give priority to providing extension services, credit facilities, and training programs to help smallholder farmers adopt soil conservation practices. These factors include education, farm size, access to credit, and extension services.

The results of the study have consequences for smallholder farmers, development groups, and governments. Policymakers and development organizations should give smallholder farmers access to extension services, credit, and education as a top priority in order to encourage the adoption of soil conservation methods.

Giving instruction and training: Smallholder farmers should receive instruction and training on the value and advantages of soil conservation techniques. financing availability: Give smallholder farmers access to financing so they may buy inputs and carry out soil protection measures. Extension services:

To assist smallholder farmers in implementing soil conservation techniques, offer them extension services. Encouragement of conservation agriculture: Encourage smallholder farmers to use conservation agriculture techniques like mulching, terracing, and contour farming.

Acknowledgement

The Author wishes to thank the farmers from nine villages in 3 Local Government Councils out of the five Local Government Areas, namely, Panda, Guruku, and Karshi (Karu LGA), Akum, Ajaga, and Laminga (Nasarawa LGA), and Gadabuki, Umaisha, and Ugya (Toto LGA), for their valuable collaboration.

References

Abduallah A. (2017). Determinants of adoption of soil and water conservation techniques: evidence from Northern Ghana. Int. I. Sustainable Agricultural Management and Informatics, Vol. 3, No. 1, 2017.

Aberha, K. and Seenga, R.B. (2008). Keys Influence adoption of soil conservation Practices, sustainability, and socio-economic Impacts among farmers in Mbey rural district, Tanzania. M.Sc. dissertation, Sokoine University of Agriculture, Morogoro, Tanzania.

Anzaku M. Iliyasu1 Alkali Mohammed2 Buba Y. Alfred4 L.M. Akpami Sa'adu Sabitu Da (2022). Assessment of the Effects of Flood on Agricultural Land Use in Doma Local Government Area, Nasarawa State, Nigeria. Journal of Environment and Earth Science www.iiste.org ISSN 2224-3216 (Paper) ISSN 2225-0948, Vol.9, No.3, 2019

Abubakar, S. A. & Mashi, S.A. (2008). Gender, Culture, and Environmental Conservation in Suleja, Niger State, Nigeria. The Abuja Journal of Geography and Development, Vol 2

Alkali Mohammed, Nasiru Umar & Iliyasu M. Anzak (2022) Africa Journal of Agricultural Science and Food Research. Department of Geography, Nasarawa State, Keffi & BUK

Canadian Agri-Food Policy Institute 960 Carling Avenue, CEF Building 60 Ottawa, ON K1A 0C6 capi-icpa.ca (2025).

Jimoh H.I (2023) Erosion tolerance range of land use and management techniques in Ilorin, Nigeria (International Journal of Environmental Studies).

Oladimeji, Oyakhilomen Oyinbo , Abubakar A. Hassan and Oseni Yusuf 2 1 2, sustainability Article Understanding the Interdependence and Temporal Dynamics of Smallholders' Adoption of Soil Conservation Practices: Evidence from Nigeria Tolulope E.

Division of Agricultural Colleges, Ahmadu Bello University, Zaria Nigeria; tolulopeoladimeji66@gmail.com Department of Agricultural Economics, Ahmadu Bello University, Zaria 810107, Nigeria; abuifadhilah@gmail.com (A.A.H.); oziyusuf@gmail.com (O.Y.) Correspondence: ooyinbo@abu.edu.ng Received: 13 February 2020; Accepted: 25 March 2020; Published: 31 March 2020

Kehinde, A.D. and Ogundeji, A.A. 2022. Social Capital Networks (SCNs) Reducing Poverty In Cocoa Producing Households: Evidence From Osun and Ondo States Of Southwestern Nigeria. Tropical and Subtropical Agroecosystems, 25, #082.

Nasarawa Agriculture Development. Project (2020) Agronomic Survey Report for 2019 Cropping

Season Planning, Monitoring, and Evaluation Department. Nasarawa Geographical Information

Nasarawa State Ministry of Agriculture (2022). Agricultural Briefing Paper. Nasarawa State Ministry of Environment

Nasarawa Urban Development Board: Internets 2023.

Odendo, M., Obare, G., and Salasya B. (2020). Factors responsible for the difference in uptake of integrated soil fertility management practices amongst smallholders in western Kenya, Africa Journal of Agricultural Research.

Tanagahari, T.E. and Asfaw, T.K. (2010). Economic analysis of soil conservation practice in Benue State. M.Sc. Thesis Department of Agricultural Economics University of Nigeria NSUKKA.

World Economic Forum (2011). Private Sector Development in Haiti: Opportunities for Investment, Job Creation and Growth. Report.

Geneva: World Environmental Fund. Retrieved7 April, 2015http://www3.weforum.org/d ocs/WEF_Haiti_PrivateSect or Development_Report_2011.