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ASSESSMENT OF FARMERS' PERCEPTIONS OF THE FORMS, EXTENT AND CAUSES OF LAND DEGRADATION IN OTUKPO LOCAL GOVERNMENT AREA, BENUE STATE, NIGERIA

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ABSTRACT

This study assessed farmers' perceptions of the forms, extent and causes of land degradation in Otukpo Local Government Area (LGA), Benue State, Nigeria, and examined its perceived implications for crop production and household livelihoods. A descriptive survey design was adopted. Using a multistage sampling procedure, 400 farming households were selected from Adoka, Akpa, Okete, Otukpo peri-urban and Ugboju; 388 completed questionnaires were retrieved and analysed. Data were analysed using frequencies, percentages, ranking and Principal Component Analysis (PCA). Declining soil fertility (79.4%), nutrient depletion (64.9%) and soil erosion (62.1%) were the most frequently reported forms of land degradation. Continuous cultivation (72.9%), poor conservation practices (63.1%) and deforestation (62.6%) were the leading perceived causes. Most respondents considered degradation moderate (41.8%) or extensive (25.5%), while 62.3% had observed signs of degradation for more than ten years. A total of 61.6% reported that farmland conditions had worsened compared with five years earlier, and 90.4% considered human activities to contribute to degradation to a moderate or greater extent. Farmers also reported stunted crop growth, reduced crop size and quality, and lower harvest quantities. Maize, cassava and yam were identified as the crops most affected. The findings indicate that land degradation is perceived as a longstanding problem associated mainly with unsustainable land-use and farming practices, with adverse implications for crop production. The study recommends improved soil-fertility management, stronger extension support, affordable credit and community-based land-restoration programmes.

KEYWORDS: Farmers' perceptions; land degradation; soil fertility; crop production.

1. INTRODUCTION

Land is a fundamental resource for agriculture, food production and rural livelihoods. Its productive capacity can decline through processes such as soil erosion, nutrient depletion, loss of vegetation cover, soil compaction and unsustainable land-use practices. Land degradation therefore poses a serious challenge to agricultural productivity, particularly where households depend heavily on smallholder farming (Aleminew, 2024; Lal, 2020).

Across sub-Saharan Africa, pressure from continuous cultivation, deforestation, overgrazing and inadequate soil management has contributed to declining soil quality and reduced agricultural output. These processes can lower soil organic matter, weaken soil structure and reduce water-holding capacity, thereby constraining crop growth and yields (Sonneveld et al., 2016; Parkes et al., 2018; Tefera et al., 2024). In Nigeria, farmers' experiences of soil-fertility decline and erosion have been associated with land-use change and unsustainable farming practices (Aigbe et al., 2022; Ihemezie & Dallimer, 2021).

Benue State is an important agricultural area, but land-use change, deforestation and intensive cultivation have increased pressure on agricultural land (Ikyernum et al., 2024; Mbasaanga et al., 2025). In Otukpo LGA, agriculture is a major livelihood activity, while population pressure and changes in land use present challenges for maintaining farmland quality (Udoinyang, 2024). Understanding how farmers identify the forms, extent and causes of land degradation is important because their observations provide practical evidence for locally appropriate soil-conservation and land-restoration interventions. This study therefore assessed farmers' perceptions of land degradation in Otukpo LGA, with particular attention to its forms, extent, causes and perceived effects on crop production.

2. MATERIALS AND METHODS

Study Area

Otukpo Local Government Area is located in the Benue South Senatorial District of Benue State, Nigeria, with Otukpo town as its administrative headquarters. It lies approximately between latitudes 7°00′N and 7°30′N and longitudes 7°30′E and 8°10′E, and covers about 1,947 km² (Agber & Ali, 2013; Ogwuche & Owoicho, 2018). The study covered Adoka, Akpa, Okete, Otukpo peri-urban and Ugboju. The area has a tropical wet-and-dry climate, with a rainy season generally extending from April/May to October and a dry season from

December to March. Annual rainfall is reported to range from about 1,200 to 1,500 mm (Ikyernum et al., 2024).

The landscape is generally flat to gently undulating, with elevations of approximately 100–200 m above sea level. The underlying geology includes shale, sandstone and siltstone, while the soils are described as predominantly ferruginous tropical soils with sandy-loam to clay-loam textures (Agber, 2023; Ogwuche & Owoicho, 2018). Agriculture is a major rural economic activity. Common crops include yam, cassava, maize, rice and groundnut, and production is largely rain-fed (Agber & Ali, 2013; Ikyernum et al., 2024).

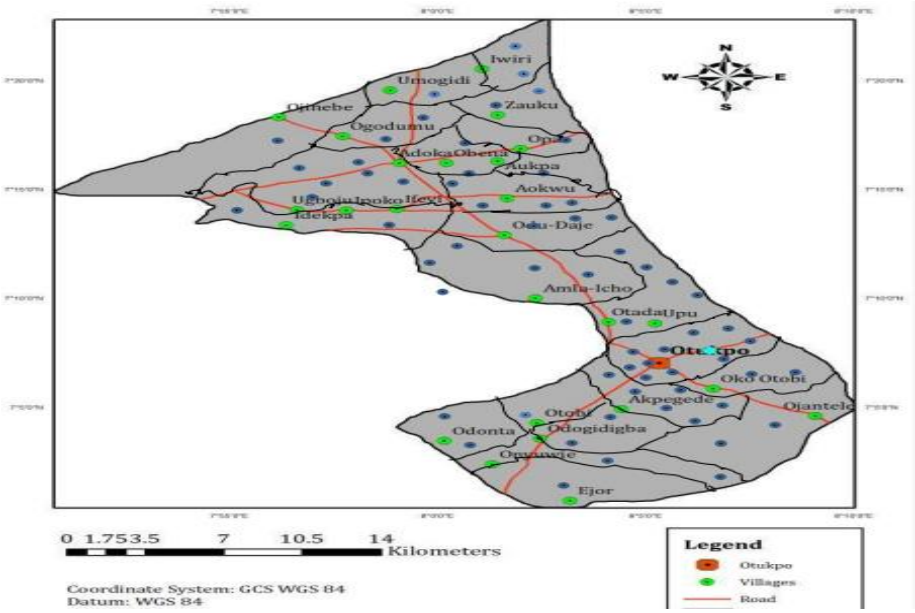

Figure 1: Otukpo Local Government Area.

METHODS

The study adopted a descriptive survey design to obtain quantitative information on farmers' characteristics and their perceptions of the forms, extent and causes of land degradation, including perceived effects on crop growth and production. The target population comprised crop-farming households in Otukpo LGA. The population estimate used in the study was 384,600 (Udoinyang, 2024).

The sample size was determined using Yamane's (1967) formula, $n = N/[1 + N(e^2)]$, where N = 384,600 and e = 0.05. The calculated sample was approximately 400 farming households. A multistage sampling procedure was used: five communities (Adoka, Akpa, Okete, Otukpo peri-urban and Ugboju) were purposively selected, farming households were identified with assistance from community leaders and research assistants, and respondents were selected

using proportionate stratified random sampling. Of the 400 questionnaires administered, 388 were retrieved and used for analysis: Adoka (78), Akpa (77), Okete (78), Otukpo peri-urban (77) and Ugboju (78).

A structured questionnaire was the principal instrument. It obtained information on respondents' farming characteristics; perceived forms, extent and causes of land degradation; perceived effects on crop growth, yield and production; and household-level implications and responses. Most questions were closed-ended, with single-response or multiple-response options. The questionnaire was reviewed by academic supervisors and specialists for content validity. A pilot test involving 30 farmers outside the main sample was conducted, and the reported Cronbach's alpha for the multi-item scale exceeded 0.70.

Data were collected between June and October 2026 through face-to-face administration by trained research assistants. Participation was voluntary, respondents were informed of the purpose of the study, and confidentiality was maintained. No personal identifiers were recorded.

Data were coded and analysed using the Statistical Package for the Social Sciences (SPSS). Frequencies, percentages and ranking were used to summarise farmers' characteristics and responses on land-degradation forms, extent, causes and perceived effects on crop production. Multiple-response analysis was applied where respondents could select more than one option. Principal Component Analysis (PCA) was used to examine the socioeconomic, farm-related and institutional factors associated with farmers' perceptions. Component loadings, eigenvalues, percentage of variance explained and communalities were considered in interpreting the extracted components.

3. RESULTS AND DISCUSSION

Farmers' Perceptions of the Forms, Extent and Causes of Land Degradation

The result of the perceived forms of land degradation observed by respondents is presented in Table 1. The result indicates that declining soil fertility was the most commonly observed form of land degradation, reported by 79.4% of respondents, followed by nutrient depletion (64.9%) and soil erosion (62.1%). Vegetation loss (47.2%) and loss of organic matter (41.0%) were also prominent. Other reported forms included sheet erosion (39.4%), soil compaction (34.0%), rill erosion (28.6%) and gully erosion (25.0%). In contrast, salinisation was the least reported form, accounting for only 2.6%. These findings suggest that land degradation in the study area is predominantly characterised by declining soil fertility, nutrient depletion and different forms of soil erosion. This highlights the importance of soil fertility management, erosion control and land restoration measures in sustaining agricultural productivity.

Table 1: Perceived Forms of Land Degradation Observed (Multiple Response).

Variable	Frequency (n)	Percentage (%)	Rank
Declining soil fertility	308	79.4	1
Nutrient depletion	252	64.9	2
Soil erosion	241	62.1	3
Vegetation loss	183	47.2	4
Loss of organic matter	159	41	5
Sheet erosion	153	39.4	6
Soil compaction	132	34	7
Rill erosion	111	28.6	8
Surface crusting	102	26.3	9
Gully erosion	97	25	10
Waterlogging	71	18.3	11
Desertification/drying	51	13.1	12
Salinisation	10	2.6	13

Source: Field Survey, 2026; N = 388

The result of the perceived major causes of land degradation is presented in Table 2. The result reveals that continuous cultivation was the leading perceived cause, identified by 72.9% of respondents, followed by poor conservation practices (63.1%) and deforestation (62.6%). Improper farming practices (53.9%) and population pressure (52.1%) were also prominent perceived causes. Excessive rainfall and runoff (48.5%) and bush burning (47.2%) were similarly identified by substantial proportions of respondents. Conversely, mining and excavation (10.1%), steep-slope cultivation (17.0%) and construction or road development (19.3%) were among the least reported causes. The findings indicate that respondents associated land degradation largely with unsustainable agricultural practices and human activities, although climatic and hydrological processes also contribute. This suggests the need to promote sustainable farming methods, appropriate soil conservation practices, afforestation and improved land-use management.

Table 2: Perceived Major Causes of Land Degradation (B26_*) - Multiple Response.

Variable	Frequency (n)	Percentage (%)	Rank
Continuous cultivation	283	72.9	1
Poor conservation practices	245	63.1	2
Deforestation	243	62.6	3
Improper farming practices	209	53.9	4
Population pressure	202	52.1	5
Excessive rainfall & runoff	188	48.5	6
Bush burning	183	47.2	7
Excessive tillage	128	33	8
Flooding	106	27.3	9
Overgrazing	95	24.5	10
Agrochemical misuse	94	24.2	11
Construction/roads	75	19.3	12
Steep slope cultivation	66	17	13
Mining/excavation	39	10.1	14

Source: Field Survey, 2026; N = 388

The result of the observed changes in crop growth and performance associated with land degradation is presented in Table 3. The result indicates that stunted crop growth was the most frequently reported effect, accounting for 48.5% of respondents, followed by reduced crop size and quality (45.1%) and leaf yellowing (42.3%). Poor germination (36.9%) and increased crop failure (35.3%) were also commonly reported, while premature wilting accounted for 33.2%. Other observed effects included poor root development (27.8%), delayed maturity (27.1%) and increased susceptibility to pests and diseases (23.2%). These findings suggest that land degradation affects different stages of crop development, from germination to maturity, with particularly noticeable effects on crop growth, size and quality. Such changes may ultimately reduce agricultural productivity and threaten farmers' livelihoods.

Table 3: Observed Changes in Crop Growth/Performance (Multiple Response).

Variable	Frequency (n)	Percentage (%)	Rank
Stunted growth	188	48.5	1
Reduced crop size/quality	175	45.1	2
Leaf yellowing	164	42.3	3
Poor germination	143	36.9	4
Increased crop failure	137	35.3	5
Premature wilting	129	33.2	6
Poor root development	108	27.8	7
Delayed maturity	105	27.1	8
Increased pest/disease susceptibility	90	23.2	9

Source: Field Survey, 2026; N = 388

The result of the crops perceived to be most affected by land degradation is presented in Table 4. The result shows that maize was the most frequently identified affected crop, reported by 58.2% of respondents, followed by cassava (49.2%) and yam (42.5%). Soybean (30.9%) and cowpea (29.4%) were also considerably affected, while groundnut accounted for 25.5%. In contrast, millet (9.5%) and sesame (11.9%) were the least frequently identified crops. The findings suggest that land degradation affects a broad range of crops cultivated in the study area, although maize, cassava and yam were perceived to be particularly vulnerable. This is significant because these crops constitute important components of local agricultural production and household food supply. Their reduced productivity could therefore have implications for food availability, household income and livelihood security.

Table 4: Crops Most Affected by Land Degradation (Multiple Response).

Variable	Frequency (n)	Percentage (%)	Rank
Maize	226	58.2	1
Cassava	191	49.2	2
Yam	165	42.5	3
Soybean	120	30.9	4
Cowpea	114	29.4	5
Groundnut	99	25.5	6
Rice	77	19.8	7
Sorghum	75	19.3	8
Sweet potato	74	19.1	9
Sesame	46	11.9	10
Millet	37	9.5	11

Source: Field Survey, 2026; N = 388

The result of the aspects of crop production affected by land degradation is presented in Table 5. The result indicates that the quantity of harvest was the most affected aspect, as reported by 75.0% of respondents. This was followed by the frequency of crop failure (54.6%), cost of farm inputs and production (54.4%) and quality of harvest (51.0%). Furthermore, 41.0% identified the size of cultivated farmland as being affected, while 38.1% reported changes in the number of crop varieties cultivated. The length of the growing season was the least reported effect, accounting for 28.4%. These findings demonstrate that land degradation has considerable implications for both the physical and economic dimensions of crop production. In particular, its perceived effects on harvest quantity, crop failure and production costs suggest that declining land quality may reduce farm output while increasing the financial burden on farmers.

Table 5: Aspects of Crop Production Affected by Land Degradation (Multiple Response).

Variable	Frequency (n)	Percentage (%)	Rank
Quantity of harvest	291	75	1
Frequency of crop failure	212	54.6	2
Cost of farm inputs/production	211	54.4	3
Quality of harvest	198	51	4
Size of cultivated farmland	159	41	5
Number of crop varieties	148	38.1	6
Length of growing season	110	28.4	7

Source: Field Survey, 2026; N = 388

The result of the most prominent form of land degradation observed on farmland is presented in Table 6. The result reveals that declining soil fertility was the predominant form, identified by 45.1% of respondents, followed by soil erosion (26.8%). Soil compaction accounted for 7.2%, while vegetation loss and loss of organic matter represented 7.0% and 6.7%, respectively. Waterlogging was identified by only 5.2% of respondents. The findings indicate that declining soil fertility and soil erosion constitute the two major forms of land degradation perceived by farmers across the five communities. Together, these accounted for 71.9% of responses, demonstrating the prominence of fertility-related deterioration and soil loss in the study area. This reinforces the need for soil fertility improvement, erosion prevention and sustainable land management interventions.

Table 6: Most Prominent Form of Land Degradation on Farmland.

Community/ Variable	**Soil erosion**	**Declining fertility**	**Soil compaction**	**Loss of organic matter**	**Waterlogging**	**Vegetation loss**	**Other**	**Total**
Adoka	17	37	4	8	2	6	4	78
Akpa	25	32	5	4	4	3	4	77
Okete	20	38	4	3	4	9	0	78
Otukpo peri-urban	21	32	10	5	7	2	0	77
Ugboju	21	36	5	6	3	7	0	78
Total	**104**	**175**	**28**	**26**	**20**	**27**	**8**	**388**
Percentage (%)	26.8	45.1	7.2	6.7	5.2	7	2.1	100

Source: Field Survey, 2026

The result of the duration for which respondents had observed signs of land degradation is presented in Table 7. The result indicates that the largest proportion of respondents (27.8%) had observed signs of land degradation for 11–15 years, followed by those who had observed it for 5–10 years (22.4%) and 16–20 years (18.3%). Respondents who had observed land degradation for more than 20 years accounted for 16.2%, while 8.5% reported observing such signs for less than five years. Only 6.7% could not remember when the signs first became noticeable. Overall, 62.3% of respondents had observed signs of land degradation for more than 10 years. This suggests that land degradation is perceived as a longstanding environmental problem in the study area rather than a recent development. The prolonged observation period also provides a useful basis for understanding farmers' experiences of changes in farmland conditions and agricultural productivity.

Table 7: Duration of Observed Signs of Land Degradation.

Community /Variable	<5 years	5–10 years	11–15 years	16–20 years	>20 years	Cannot remember	Total
Adoka	9	14	21	15	16	3	78
Akpa	6	19	18	13	15	6	77
Okete	5	18	26	18	8	3	78
Otukpo peri-urban	8	16	22	14	10	7	77
Ugboju	5	20	21	11	14	7	78
Total	**33**	**87**	**108**	**71**	**63**	**26**	**388**
Percentage (%)	8.5	22.4	27.8	18.3	16.2	6.7	100

Source: Field Survey, 2026

The result of respondents' perceptions of the current extent of land degradation is presented in Table 8. The result shows that 41.8% perceived land degradation to be moderate, while 25.5% considered it extensive and 10.8% described it as very extensive. In contrast, 17.0% perceived it as slight, while only 4.9% considered it not extensive. This indicates that 78.1% of respondents perceived land degradation to be at least moderate in extent. The findings suggest that land degradation is a considerable environmental concern across the study communities, with a substantial proportion of farmers experiencing or recognising noticeable deterioration in farmland conditions. This situation may have important implications for crop productivity and the sustainability of agricultural livelihoods.

Table 8: Perceived Current Extent of Land Degradation.

Community/Variable	Very extensive	Extensive	Moderate		Slight	Not extensive	Total
Adoka	10	23	29		14	2	78
Akpa	8	19	36		12	2	77
Okete	7	19	33		15	4	78
Otukpo peri-urban	10	14	31		15	7	77
Ugboju	7	24	33		10	4	78
Total	**42**	**99**	**162**		**66**	**19**	**388**
Percentage (%)	10.8	25.5	41.8		17	4.9	100

Source: Field Survey, 2026

The result of respondents' assessment of farmland conditions compared with five years ago is presented in Table 9. The result indicates that 32.7% considered the condition of their farmland to be slightly worse, while 28.9% reported that it had become much worse. In contrast, 21.6% observed no significant change, while 12.6% and 4.1% reported slight and

substantial improvements, respectively. Overall, 61.6% of respondents perceived a deterioration in farmland conditions over the five-year period, compared with only 16.7% who reported improvements. This suggests a predominantly negative perception of changes in farmland quality across the study area. The findings further reinforce concerns about the persistence and possible intensification of land degradation and its implications for agricultural production.

Table 9: Condition of Farmland Compared with Five Years Ago.

Community/ Variable	Much worse	Slightly worse	No significant change	Slightly improved	Much improved	Total
Adoka	24	20	17	11	6	78
Akpa	16	24	23	11	3	77
Okete	21	29	18	7	3	78
Otukpo peri-urban	27	27	15	7	1	77
Ugboju	24	27	11	13	3	78
Total	**112**	**127**	**84**	**49**	**16**	**388**
Percentage (%)	28.9	32.7	21.6	12.6	4.1	100

Source: Field Survey, 2026

The result of respondents' perceptions of the proportion of farmland affected by land degradation is presented in Table 10. The result reveals that the largest proportion of respondents (34.8%) estimated that between 26% and 50% of their farmland was affected. This was followed by 22.9% who estimated that 10–25% was affected, while 19.6% reported that between 51% and 75% of their farmland was affected. Respondents who perceived more than 75% of their farmland to be affected accounted for 7.7%, while 8.2% estimated that less than 10% was affected. Overall, 62.1% of respondents estimated that at least 26% of their farmland was affected by land degradation. These findings suggest that the problem extends beyond isolated portions of farmland and affects a considerable proportion of agricultural land available to farmers. This may constrain productive farmland availability and reduce the capacity of households to sustain crop production.

Table 10: Proportion of Farmland Perceived Affected by Land Degradation.

Community/ Variable	<10%	10–25%	26–50%	51–75%	>75%	Not sure	Total
Adoka	9	17	30	15	6	1	78
Akpa	10	17	25	15	4	6	77
Okete	2	18	31	14	6	7	78
Otukpo peri-urban	4	19	28	15	7	4	77
Ugboju	7	18	21	17	7	8	78
Total	**32**	**89**	**135**	**76**	**30**	**26**	**388**
Percentage (%)	8.2	22.9	34.8	19.6	7.7	6.7	100

Source: Field Survey, 2026

The result of respondents' perceptions of the extent to which human activities contribute to land degradation is presented in Table 11. The result indicates that 36.6% considered the contribution of human activities to be high, while 22.4% rated it as very high. Furthermore, 31.4% perceived the contribution to be moderate, whereas only 7.2% and 2.3% considered it low and very low, respectively. Overall, 90.4% of respondents perceived human activities to contribute to land degradation to a moderate or greater extent. This suggests a strong recognition among farmers of the role of human activities in the deterioration of farmland conditions. The finding is consistent with the earlier identification of continuous cultivation, poor conservation practices and deforestation as major perceived causes of land degradation. It therefore highlights the importance of promoting environmentally sustainable farming practices, responsible land-use decisions and community-based land conservation initiatives.

Table 11: Extent of Human Activities Contribution to Land Degradation.

Community/Variable	Very high	High	Moderate	Low	Very low	Total
Adoka	19	24	28	6	1	78
Akpa	17	24	30	4	2	77
Okete	15	33	20	6	4	78
Otukpo peri-urban	16	31	25	5	0	77
Ugboju	20	30	19	7	2	78
Total	**87**	**142**	**122**	**28**	**9**	**388**
Percentage (%)	22.4	36.6	31.4	7.2	2.3	100

Source: Field Survey, 2026

Declining soil fertility, nutrient depletion and soil erosion were the leading forms; continuous cultivation, poor conservation practices and deforestation the main causes. Most respondents viewed degradation as moderate to extensive, had observed it for more than ten years, and attributed it substantially to human activities. Farmland condition was widely judged worse than five years earlier.

These perceptions are strongly corroborated. Adenle et al. (2022) in Niger State used PCA and found high agreement (>70–80%) on soil-fertility decline, erosion, vegetation loss and related symptoms, driven primarily by over-cultivation, overgrazing and migrant pressures. Ihemezie & Dallimer (2021) in Benue recorded recognition of soil degradation, fertility loss and cropland abandonment linked to human and policy drivers. Multiple Imo State studies (2022–2025) ranked soil erosion and fertility decline as top forms, with heavy rainfall, continuous cultivation, deforestation and poor practices as leading causes; awareness was near-universal and multi-year observation common. Ogun State research (Ojo et al., 2022)

identified bush burning, continuous cropping, tillage and topography as key determinants. Yobe State farmers (2020) cited wind erosion, nutrient depletion, loss of fertility and vegetation cover, attributing them to deforestation, bush burning and continuous cropping. Jigawa State indigenous farmers (Gambo et al., 2025) perceived soil erosion as intensifying desertification and reducing yields. Oyo State studies (Atisbo and Orire) similarly reported high awareness of fertility decline and erosion. Collectively, these studies confirm a consistent farmer consensus across ecological zones that fertility loss and erosion, driven by intensifying human land use, constitute the core degradation problem and have intensified over the past decade or more.

The prominence of soil erosion in Otukpo is also consistent with Olumba et al. (2025), who investigated sustainable land management practices in erosion-prone areas of southeastern Nigeria. Their study examined the relationship between land degradation, conservation practices and the challenges confronting farmers in managing degraded agricultural land. The findings reinforce the importance of erosion as an agricultural land management concern in Nigeria. However, the relatively high proportion of respondents identifying declining soil fertility and nutrient depletion in Otukpo suggests that degradation is not limited to visible physical soil loss. Rather, it also involves the deterioration of the soil's capacity to support crop growth and maintain agricultural productivity. This distinction is important because fertility-related degradation may occur even where severe erosion features are not immediately visible to farmers.

Regarding the perceived causes of land degradation, continuous cultivation (72.9%), poor conservation practices (63.1%) and deforestation (62.6%) emerged as the leading factors. This indicates that farmers largely associate land degradation with unsustainable human activities and inappropriate agricultural land management. The finding agrees with Adenle et al. (2022), who established that unsustainable activities within Niger State and pressures from adjoining areas contribute to land degradation. Their study particularly emphasised the importance of human activities, land governance and agricultural management in explaining the persistence of degradation.

4. CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The study concludes that farmers in Otukpo Local Government Area perceive land degradation, particularly declining soil fertility, nutrient depletion and soil erosion, as a longstanding and substantial problem. Continuous cultivation, poor conservation practices

and deforestation were identified as the leading causes, and most respondents considered human activities to contribute moderately or greatly to degradation. Farmers also associated degraded land with stunted crop growth, reduced crop size and quality, and lower harvest quantities, especially for maize, cassava and yam. The findings demonstrate the need for improved soil management and practical interventions that address the farming practices and land-use pressures contributing to degradation.

RECOMMENDATIONS

1. Government agricultural agencies, research institutions and non-governmental organisations should improve farmers' access to affordable credit and financial support for soil-improvement materials, improved crop varieties and basic conservation facilities.
2. Extension services should provide practical, community-based training on integrated soil-fertility management, intercropping, organic-manure application, crop rotation, conservation tillage and erosion-control techniques.
3. Land-use policies and local programmes should encourage secure and longer-term land-use arrangements that provide farmers with incentives to invest in soil conservation and land restoration.
4. Farmers' associations and cooperatives should be strengthened to support collective input procurement, information sharing, access to extension advice and participation in community land-restoration activities.
5. Integrated land-management programmes should combine agronomic practices, including crop rotation, intercropping and appropriate fertiliser use, with measures such as vegetation barriers, contour practices and agroforestry.
6. Local government and relevant state agencies should support erosion-control and land-restoration initiatives in affected communities, with the participation of farmers in identifying priorities and implementing interventions.

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