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CONSEQUENCES OF LAND DEGRADATION ON LIVELIHOOD AND FOOD SECURITY OF RURAL FARMERS IN SOUTH-EAST, NIGERIA: A COMPARATIVE ANALYSIS

Chima Innocent EZEH, Onwuchekwa OJIMGBA, Justin Kelechi NMERENGWA

Abia State University, Uturu, Faculty of Agriculture, Umuahia Campus, Mobile Phones: +2348064217385, +2348052554014, +2349061849756; E-mails: chimaezeh18@gmail.com, onwuchekwa.ojimgba@abiastateuniversity.edu.ng, justinnmerengwa@gmail.com

Corresponding author: chimaezeh18@gmail.com

Abstract

This study analyzed the consequences of land degradation on livelihood and food security of rural farmers in South-East, Nigeria. The study adopted purposive and stratified sampling techniques in the selection of locations and 900 respondents (450 farmers farming on water degraded farm lands and 450 farmers farming on non-degraded water erosion farm lands). The data collected were analyzed using mean, frequencies, percentages mean score and z-test. The result showed that the mean annual food expenditure of the rural farmers in degraded and non-degraded farm lands were ₦273264.22 and ₦290,592.67 respectively with mean annual farm incomes of ₦122,024.55 and ₦172,737.72 respectively. The perceived socio-economic consequences of water erosion degradation on farm lands were: decreased farm income ($\bar{X}$= 4.70), destruction of crops ($\bar{X}$ = 4.62), reduction in soil nutrient/organic matter ($\bar{X}$ = 4.59), increase in cost of production due to additional money spent in controlling/maintain degraded farm lands ($\bar{X}$ = 4.42), threat to food security ($\bar{X}$ = 4.47), decrease in farm land available for cultivation ($\bar{X}$ = 4.34), reduction in farm yields (output) ($\bar{X}$ = 4.44), laborious agricultural activities ($\bar{X}$ = 3.96) and destroyed properties and infrastructure ($\bar{X}$ = 3.87). The result showed that 56.67% and 60.44% of rural farmers on water degraded and non-water degraded farm lands respectively were food secured. The z-test showed significant differences in incomes and food security status of the two groups of farmers at varying alpha levels. The study recommended that government should ensure that farmers have access to affordable credit and land to increase their ability and flexibility to change production strategies in response to environmental degradation.

Key words**:** *land degradation, food security, rural farmers, South - East Nigeria*

INTRODUCTION

Land degradation refers to a temporary or permanent decline in the productive capacity of the land or its potential for environmental management [2]. [12] also submitted that land degradation is a reduction in the productivity of land resulting from soil loss (water erosion), breakdown in soil structure, water logging, nutrient loss, and pollution from toxic substances. It can be viewed as any act on land that changes it from its natural ecological state and makes it unfit for effective use.

Soil quality has a deep impact on productivity and it could be also influenced by agronomic land-use practices [9, 33].

Water erosion is the primary cause of land degradation in South-eastern part of Nigeria. The South-eastern states are water erosion menace prone because they are on moderate to very gentle dipping, poorly consolidated sandstones usually associated with local or regional highland [8]. Water erosion is a terminal and cancerous ecological disease that destroys within days and weeks land formed with natural nutrients over hundreds, thousands and millions of years ago. [6] noted the disastrous physical and socio-economic effects of water erosion in South-Eastern Nigeria to include among others: loss of lives and livelihoods, destruction of roads, farmlands and homes. Excessive water erosion causes both on-site and off-site problems. On-site impacts include decrease in agricultural productivity and natural landscapes, because of the loss of nutrient rich upper soil layers. Off-site effects include sedimentation of waterways and eutrophication of water bodies, as well as sediment related damage to roads and houses [17].

Land sites degraded by water erosion are now common land features of Agulu, Nanka, Ekwulobia, Nnobi, Nnewi, Oraukwu and Alor (Anambra State); Item, Ohafia, Arochukwu, Isuikwuato and Isuochi (Abia State); Arondizuogu, Amucha, Ideato and Okigwe (Imo State); and parts of Ebonyi State [36]. This has led to acute depletion of land- which threatens existence of many communities in terms of having stable lands for farming, building of residential houses, civic centres, roads, schools and cottage industries. These problems threaten the food security and livelihood of people residing in the affected communities.

Food security and insecurity are terms used to describe whether or not households have access to sufficient quality and quantity of food. The terms emerged following the 1974 world food conference and shift in food policy debate from food supply to food demand and the emergence of new emphasis on food entitlement, sustainability, vulnerability, risk and access [19]. Food security as defined by [16] is a situation when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life. According to [13], food security is widely seen as access by all people at all times to enough food for an active life, while food insecurity is the inability of a household or individuals to meet the required consumption levels in the face of fluctuating production, price and income. Food security has been identified as having food availability, food accessibility, utilization and stability of food access as its elements [18].

Water erosion is presently the major ecological problem in south-eastern Nigeria in the sense that compared to other land degradation agents like poor sanitation, excessive use of inorganic fertilizer, poor investment in land and pollution its effects are more serious [1]. In many African countries including Nigeria, food security at both national and household level is dismal. At the national level, per-capita growth of production of major food items in Nigeria has not been sufficient to satisfy the demand of an increasing population. Food demand in Nigeria has generally grown faster than food production and supply. [4] reported that the rate of increase in food production of 2.5 percent per annum does not keep pace with the annual population growth rate of 2.8 percent per annum. The result is a gap between national food supply and food demand [3]; a situation which increases food import bill and threatens national food security. The problem becomes more worrisome considering the fact that the bulk of Nigeria's agricultural production is controlled by small holder, resource poor farmers who live in rural areas and depend on the exploitation of lands that are highly vulnerable to degradation [30, 32].

Erosion has resulted in the separation of adjacent villages and towns as it may involve the collapse of bridges linking them together. This has had negative impacts on such areas since some facilities such as schools, hospitals and water supplies shared by the affected neighboring communities may become inaccessible. Transportation of farm produce has also been affected and this also often leads to loss of agricultural products especially the perishable ones. Traders who also go to these areas for their trade are also cut off from their normal day-to-day business [5].

However, the socio-economic implications of land degradation are particularly severe in Sub-Saharan Africa including Nigeria because 65.0% of the population is rural and the main livelihood of about 90.0% of the population is agriculture. Every year, the country is losing billions of birr in the form of soil, nutrient, water and agro biodiversity losses [34]. As a result, poverty and food insecurity are concentrated in rural areas [20].

An examination of the spread and socio-economic consequences of active land degradation (water erosion) on livelihood and food security of farm households would proffer insights into new ways of reducing hunger and food insecurity among farming households in Nigeria. This study is also significant because it will examine how the rural farmers can benefit by taking advantage of strategies for water erosion mitigation or prevention so as to improve agricultural

production and livelihood. It will contribute to the debate on land degradation and water erosion especially as it affects livelihood and alleviate level of food insecurity. It will as well provide first- hand information on water erosion issues in South East, Nigeria. It is hoped that the findings of this study if implemented would help in fulfilling some of the aspirations of the Nation's National Economic Empowerment Development Strategy (NEEDS) and the United Nations Millennium Development Goals, and serve as a base for further research on similar issues.

The specific objectives of the study were to:

(i)describe the socio-economic characteristics of rural farmers in water degraded and non-water degraded farm lands in South East, Nigeria;

(ii)analyze farmers' perceived socio-economic consequences of degraded erosive farm sites;

(iii)profile food security status of the farm households on degraded and non-degraded farm lands;

(iv)compare livelihood (income) and food security status of farm households on degraded and non-degraded lands in South East, Nigeria.

Hypothesis of the Study

HO_1: The recommended intervention measures to farm land degradation have no effect on livelihood and food security of farmers on degraded farm lands in South East, Nigeria.

MATERIALS AND METHODS

The study area

The study was carried out in the South-Eastern states, (Abia, Anambra, Ebonyi, Enugu and Imo states) of Nigeria where a greater portion of the farmland management abuse take place [22]. South-east Nigeria is located between Latitudes $5^0 06'$N and $6^0 34'$N of the Equator and Longitudes $6^0 38'$E and $8^0 08'$E of the Greenwich Meridian. South-East geo-political zone shares boundaries with Kogi and Benue states to the north, Edo state to the north-west, Cross River state to the east, Akwa-Ibom and Rivers States to the south, Bayelsa state and Delta state to the south-west and west respectively. According to [24], the population of Southeast zone of Nigeria was 16,381,729 persons, disaggregated into 8, 306, 306 males and 8,075,423 females. Southeast Nigeria experiences two distinct seasons, namely: rainy and dry seasons. The inhabitants of this zone are predominantly farmers cultivating food crops such as cassava, yam, cocoyam, maize and rice, and cash crops such as oil palm, cocoa and cashew [25].

Sampling technique

Purposive and stratified sampling techniques were used to select sampling locations and the respondents for the study. In the first stage, three of the five states in South-East Nigeria, were selected purposively. The selected states were Abia, Anambra and Enugu States. The locations selected for the study were those areas intensely affected by water erosion in the South East. A visit was made to Erosion Control Department in each of the selected states. Nigeria Erosion and Watershed Management Project (New Map) and Ministries of Environment and agriculture in the three selected states were specifically visited to obtain a list of active water erosion sites in the States. Using the list, one agricultural zone with the highest water erosion incidence was also purposively selected from each of the selected three states of South East to give a total of three zones. The zone selected were Ohafia Agricultural zone (Abia state), Nsukka Agricultural zone (Enugu state) and Aguata Agricultural zone (Anambra state). Three blocks were selected randomly from each zone to give a total of 9 blocks. The selected blocks for Ohafia Agricultural zone (Bende, Isuikwuato and Uzuakoli), Nsukka Agricultural zone (Isi-uzo, Uzo-Uwani and Igbo-Eze North) and Aguata Agricultural zone (Aguata, Orumba North and Orumba South). The fourth stage involved selection of 5 circles from each of the selected blocks to give a total of 45 circles. Lists of farmers in the selected circles were obtained from the Zonal Agricultural Development project office, and the farmers were stratified into two groups with the assistance of the extension agents living in those selected circles. Group one consisted of farmers

operating on water degraded farm lands and group two consisted of farmers operating on non-degraded farm lands. From the stratified list, twenty (20) farmers were randomly selected (10 farmers farming on water degraded lands and 10 farmers farming on non-degraded lands) from each of the selected circles. This gave 900 respondents for the study (450 farmers farming on water degraded lands and 450 farmers farming on non-degraded lands).

Method of data Collection

The study made use of both primary and secondary data. Primary data were collected from the selected sample following a field survey conducted with a pre-tested and validated semi-structured questionnaire. Data collected from farmers were on their socio-economic variables such as, household size, farming experience, membership of farmers associations, access to credit and annual farm income. In addition, data on rural farmers' household food expenditure, food security status, land degradation adaptation and mitigation measures were collected.

Secondary data were also used for the study. Secondary data were collected from textbooks, newsletters from Newmap, ministry of environment, articles and journals from agriculture and related institutions

Method of data analysis

Objective (i), was analyzed using descriptive statistics of mean, frequencies and percentages. Objective (ii) was achieved with mean score. Objective (iii) was achieved with food security index. Paired z-test was used to realize objective (iv).

Model specification

Mean score

Mean score was obtained through a five point Likert scale. The scale graded are thus: very high = 5; high = 4; moderate = 3; low = 2 and very low = 1). The Likert scaling is a method of ascribing quantitative values to qualitative perception to make it amenable to statistical analysis. The values of the responses were added and further divided by 5 to obtain a mean score of 3.0, which was regarded as threshold mean level. Rural farmers with mean score of 3.0 and above perceived the socio-economic consequences, while those with score of less than 3.0 did not perceive the socio-economic consequences.

Thus mean threshold score = $\bar{X}$

$\bar{X}$ = ∑fx/N, (the mean score).

Mean ($\bar{X}$) of each item was computed by multiplying the frequency of positive response to each question with its appropriate Likert nominal value and the sum was divided by the sum of the number of the respondents to the items. This is summarized with the equation below:

$$\bar{X} = \sum fn/N. \quad \text{(1)}$$

where:

$\bar{X}$ = mean score;

∑ = summation sign;

F = frequency or number of respondents who responded positively;

n = Likert nominal value;

N = Number of respondents.

Food security index

The farm households were classified into food secure, food insecure and extremely food insecure using food security index, which was used to establish the food security status of various households [26, 28]. It is given by:

Fi = per capita food expenditure for the i^{th} household/ 2/3 mean per capita food expenditure of all households…. (2)

where:

Fi = food security index, which could be interpreted as follows:

when Fi ≥ 1 = food secure i^{th} household;

Fi ≤ 2/3 = food insure i^{th} household;

Fi < 1/3 = extremely food insecure household.

A food secure farmer was therefore that whose per capita monthly food expenditure fall above or is equal to two-third of the mean per capita food expenditure. On the other hand, a food insure farmers is that whose per capita food expenditure falls below two-third of the mean monthly per capita food expenditure and extreme food insecure are those whose monthly per capita food expenditure fall below one third [28].

Z-test

Z-test analysis used to compare the food security status of rural farmers in water degraded and non-degraded farm lands is explicitly stated as used by [29].

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad \text{.....(3)}$$

where:
Z = Z statistic;
$\bar{X}_1$= Mean annual farm incomes/annual food expenditure of farm households on degraded farm lands;
$\bar{X}_2$= Mean annual farm incomes/annual food expenditure of farm households on non-degraded farm lands;
S_1^2 = Variance of Mean farm annual incomes/annual food expenditure of farm households on degraded farm lands;
S_2^2 = variance of Mean farm annual incomes/annual food expenditure of farm households on non-degraded farm lands;
n_1 = Sample size farm households on degraded farm lands;
n_2 = Sample size farm households on non-degraded farm lands.

RESULTS AND DISCUSSIONS

Socio-economic characteristics of rural farmers

The distribution of the rural farmers in water degraded and non-water degraded farm lands in South-East, Nigeria according to socio-economic characteristics is presented in Table 1.

With respect to household size, the table shows that mean household sizes of the rural farmers in water degraded and non-degraded farm lands of South East, Nigeria were 6.34 persons and 6.39 persons respectively. Following [35] classification of farmers by household size (< 5 persons = small; 5 – 8 persons = moderate; > 8 persons = large), the mean household size of the farm households indicate that they had moderate household size.

This means that in the absence of well-functioning labour markets, household members are used as cheap source of farm labour [30].

This is expected to influence agricultural production, livelihood, food security and use of farm land management technologies positively.

Table 1 also shows that 46.67% and 46.22% of the rural farmers in water degraded and non-water degraded farm lands were members of cooperatives.

Farmers involved in cooperatives share knowledge and innovation ideas, discuss problems and challenges with others, and engage in collaborative decision-making [21].

Furthermore, Table 1 shows that 50.89% and 50.22% of the rural farmers in water degraded and non-water degraded farm lands had access to credit.

This implies that farmers in water degraded farm lands had more access to credit than farmers in non-water degraded farm lands. Farmers would be more financially stable and can afford to use land degradation adaptation and mitigation practices when their investment funds increase as a result of access to credit.

Therefore the probability of the farmers' to use adaptation and mitigation measures to reduce advancement of water induced farm land degradation, improve food security and livelihood generally will likely increase with increase in credit access.

Availability of access to credit could enable farmers to purchase farm inputs and solve financial constraints associated with use of land management practices [14].

In addition, Table 1 shows that 48.44% and 51.11% of the rural farmers households in water degraded and non-water degraded farm lands in South East, Nigeria had annual food expenditure of between ₦370,000.00 and ₦519,999.00 respectively.

The mean annual food expenditure of the rural farmers in degraded and non-degraded farm lands in South-East were ₦273,264.22 and ₦290,592.67 respectively.

This translates to ₦748.67 and ₦796.14 per day. This implies that both farmers in water degraded and non-water degraded farm lands are below the estimated base of FAO of 2.16 United State Dollar ($) /day/adult equivalent

[10]. A similar result was obtained by [38]. Table 1 also shows that the mean annual farm incomes of the rural farmers in water degraded farm lands and non-water degraded farm lands were N122,024.55 and ₦172,737.72 respectively. This mean annual farm incomes translate to 10,168.71Naira and 14,394.81 Naira per month which is less than the government approved minimum wage of 30,000 Naira monthly. In the face of the current economic crunch and inflation in South-East Nigeria, this income level may not be adequate to meet production and investment requirements of the rural farmers, hence the income farm households earn from farming have implications on the number of improved technologies and amount of food they can be able to access. The higher the annual farm incomes, the more likely farm households can save and invest in improved technologies for increased farm output and adapt to erosion mitigation and control strategies [31].

Table1. Socio-economic characteristics of rural farmers in South–East Nigeria

	Water degraded farm lands		Non-water degraded farm lands	
Socio-economic characteristics	**Frequency**	**percentage**	**Frequency**	**percentage**
Household Size				
1-4	129	28.67	129	28.67
5-8	218	48.44	212	47.11
9-12	103	22.89	109	24.22
Mean	6.34		6.39	
Membership of cooperatives				
Yes	210	46.67	208	46.22
No	240	53.33	242	53.78
Access to credit				
Yes	229	50.89	226	50.22
No	221	49.11	244	49.78
Annual food expenditure				
70,000.00-219,999.00	169	37.56	145	32.22
220,000.00-336,999.00	63	14.00	72	16.00
370,000.00-519,999.00	218	48.44	230	51.11
520,000.00 and above	0	0	3	0.67
Mean	273,264.22		290,592.67	
Annual farm income				
Below 100,000	253	56.22	136	30.22
100,000-199,999	125	27.78	142	31.56
200,000-299,999	39	8.67	98	21.78
300,000 and above	33	7.33	74	16.44
Mean	122,024.55		172,737.72	
Total	450	100.00	450	100.00

Source: Field survey, 2022.
$ 1 is equivalent to ₦710

Perceived socio-economic consequences of degraded water erosion sites in South-East, Nigeria

The distribution of rural farmers according to perception on the socio-economic consequences of degraded erosion sites is presented in Table 2.

The table shows that the perceived socio-economic consequences of degraded erosion site were decreased farm income ($\bar{X}$ = 4.70), destruction of crops ($\bar{X}$ = 4.62), reduction in soil nutrient/organic matter content ($\bar{X}$ = 4.59), increase in cost of production due to additional money spent in controlling/maintain degraded land ($\bar{X}$ = 4.42), threat to food security ($\bar{X}$ = 4.47) and decrease in farm land available for cultivation ($\bar{X}$ = 4.34).

This implies that land degradation as a result of water erosion can cause yield reductions, reduction in agriculture productivity, high cost of production, loss of cultivable lands, food insecurity and reduction in soil fertility. In some region of the world, problems of insufficient land for cultivation arise due to the soil degradation that cause long term effects to agricultural production [11].

[23] observed that in case of high rated soil erosion events, the removed nutrients (nitrogen phosphorus, potassium, calcium, to mention but a few) are three times more than nutrient particles remaining in the soil.

The table also showed that reduction in farm yields (output) ($\bar{X}$ = 4.44) was perceived as consequences of degraded erosion sites by rural farmers in South-East, Nigeria.

Crops suffer yields loss due to the degradation of physical and chemical composition of the soil. Degraded farm lands not only produce less, but they demand more resources to manage. The poor rural farmers are vulnerable because they farm marginal areas, rely more on the intrinsic quality of their soils and landscape, have fewer capital assets to improve their farm land or invest in conservation technologies, denying their land the necessary labor to manage the resources in a sustainable way and have less resources to be resilient in the face of major problems such as drought, floods and diseases.

Those impacts occur cumulatively and long-term due to successive soil erosion. Soil erosion affect crop yield and loss of arable land areas due to earth fall from landslides and channels formation within the arable areas [17]. Table 2 further showed that farm land degradation made agricultural activities more laborious ($\bar{X}$ = 3.96) and destroyed properties and infrastructure ($\bar{X}$ = 3.87) as were perceived by rural farmers as consequences of degraded erosion sites in South-East, Nigeria.

Table 2. Perception of rural farmers on socio-economic consequences of water degraded farm lands in south East, Nigeria

Socio-Economic Consequences	Very High (5)	High (5)	Moderate (3)	Low (2)	Very low (1)	Total	Mean Adoption Score
Decrease in farm land available for cultivation	208(1,040)	204(816)	23(69)	15(30)	0	1,955	4.34
Reduction in soil nutrient/organic matter	268(1,340)	182(728)	0	0	0	2,068	4.59
Destruction of properties and infrastructure	192(960)	106(424)	68(204)	70(140)	14(14)	1,742	3.87
Displacement of people and loss of lives	28(140)	48(192)	78(234)	113(226)	183(183)	975	2.17
Decreased farm income	317(1,585)	133(532)	0	0	0	2,117	4.70
Threaten food security	310 (1,550)	41(164)	99(297)	0	0	2,011	4.47
Make agricultural activities more laborious	117(585)	106(530)	213(639)	14(28)	0	1,782	3.96
Reduction in farm yield (output)	228(1,140)	192(768)	30(90)	0		1,998	4.44
Increase in cost of production due to additional money spent in controlling degraded land	221(1,105)	197(788)	32(96)	0	0	1,989	4.42
Destruction of cropped land	312(1,560)	103(412)	35(105)	0	0	2,077	4.62
Grand Mean							

Source: Field survey, 2022.
Decision Rule 3.0 and above = perceived; < 3.0 = Not perceived
*multiple responses recorded
Figures in parenthesis = likert norminal values

Food security index of the farm households in water degraded and non- degraded lands in South-East, Nigeria

Food security status of the rural farm households on water degraded and non-water degraded farm lands in South East Nigeria is presented in Table 3.

Table 3 shows that 70.22% of rural farm households on water degraded farm lands were food secured while 21.33% of them were food insecure.

On the other hand Table 3 shows that 74.22% of rural farm households on non-water degraded farm lands were food secured while 23.11% of them were food insecure.

This result is not a surprise since land degradation do not only deteriorate the ecosystem services but also hinders regional sustainable agricultural development.

Table 3. Food security status of rural farmers in water degraded and Non-water degraded farm lands in South-East Nigeria

Food Security Indices	Farmers in water degraded lands	Farmers in non-water degraded land
Mean Annual household food expenditure (₦)	273,264.22	290,592.67
Food security line (2/3 of pooled mean household food expenditure) (₦)	182,176.15	193,728.45
Extreme food insecurity line (1/3 of the pooled mean household food expenditure) (₦)	91,088.07	96,864.22
Food secure	316(70.22)	334(74.22)
Food insecure	96(21.33)	104(23.11)
Extreme food insecure	38(8.44)	12(2.67)

Source: Field Survey, 2022
Figures in parenthesis = %
$ 1 is equivalent to ₦710

This means that more farmers in water degraded lands were food insecure than in non-water degraded farm lands. This is because of reduction of the productive capacity of land in water degraded farm lands [7].

Comparism of Food Security Status and Livelihood (Income) of Rural Farmers on Water Degraded and Non-Degraded Farm Lands in South-East, Nigeria

Table 4 shows the estimates and comparism of mean annual farm income and mean monthly per capita food expenditure of farm households on water degraded and non-degraded farm lands in South-East, Nigeria. Specifically, Table 4 shows that the mean annual farm income of the farmers on water degraded farm lands was ₦122,024.55, while the mean annual farm income of the farmers that are not on water degraded land was ₦172,737.72. The mean difference between the two groups of farmers was ₦50,713.17. The paired t-test result showed a statistical difference between the two groups of farmers and significant at 1.0% alpha level (t-value = 7.768).

This implies that the farmers on water degraded farm lands had significantly lower annual farm incomes compared to the farmers on non-water degraded farm lands.

This result compares favourably with the findings of [27] that farmers on degraded farm lands generate less farm income in relation to farmers on non-degraded lands.

The result further lends credence to [15] assertion that decreased productivity of farm lands attributed to land degradation, contributes directly to reduced livelihoods among the rural and agricultural population of Africa.

Table 4 also shows that the mean annual household food expenditures of the farmers on water degraded farm lands was ₦273,264.22, while the mean annual household food expenditure of the farmers that are not on water degraded farm lands was ₦290,592.67.

The result of the paired t-test (1.983) for mean difference revealed significant difference at 5.0% alpha level, thus lending credence to [37] assertion that land degradation result to changes in levels of production, income as well as household food security and all these affect the socio-economic status of farmers. Land degradation has adverse effect on productive capacity of land, and thus, on food security of the farm households [7].

Table 4. Test of Difference in livelihood (Income) and Food Security Status of Farmers in water degraded farm lands and non- Water Degraded Farm Lands (n = 900)

Variables	Individual mean	Mean difference	Std.dev.	t-value	Sig. (2-tailed)
Mean annual farm income of farmers in water degraded lands (₦)	122,024.55	50,713.17	6,528.86	7.765	0.000
Mean annual farm income of farmers in non-water degraded lands (₦)	172,737.72				
Mean annual food expenditure of farmers in water degraded farm lands (₦)	273,264.22	17,328.44	185,351.97	1.983	0.027
Mean annual food expenditure of farmers in non-water degraded farm lands (₦)	290,592.67				

Source: Field survey, 2022
,* = Significant at 5.0% and 1.0% alpha levels
$ 1 is equivalent to ₦710

CONCLUSIONS

The study had shown evidence that rural farmers perception of the socio-economic consequences of water erosion degraded farm lands to include decreased farm income ($\bar{X}$ = 4.70), destruction of crops ($\bar{X}$ = 4.62), reduction in soil nutrient/organic matter ($\bar{X}$ = 4.59), increase in cost of production due to additional money spent in controlling/maintain degraded land ($\bar{X}$ = 4.42), threat to food security ($\bar{X}$ = 4.47), decrease in farm land available for cultivation ($\bar{X}$ = 4.34), reduction in farm yields (output) ($\bar{X}$ = 4.44), laborious agricultural activities ($\bar{X}$ = 3.96), destroys properties and infrastructure ($\bar{X}$ = 3.87). The study showed that, livelihood (income) and food security of farmers in non-water degraded were significantly higher compared to the farmers in water erosion degraded farm lands

Therefore, the study recommends that farmers should take advantage of cooperative membership and collaborate with relevant agencies and scientists such as extension personnel, soil scientists, ministry of environment and other relevant stakeholders for trainings and workshops on modern methods, combined with local knowledge to prevent and/or combat land degradation problems.

There is need for governments (federal, state and local government) and non-governmental organization to extend emergency food and sustainable income to boost the livelihood of these farmers (water erosion degraded farms) as a deliberate policy to save these farmers from impending famine and hunger.

There has to be a deliberate policy by the governments (federal, state and local) to create a special insurance and emergency fund for farmers facing this awkward natural emergency. This fund will assist the farmers to cushion the debilitating effect of these disasters when they occur. This fund should be separate and different from the agricultural insurance policy. The poor resource farmers may not be capable of contributing to the monthly payment which may bear them from benefiting in case of disaster occurrence. This is a fund to be specially set aside to met the ecological challenges of the farmers in these well established and known areas after due investigation.

To restore, sustain and enhance the productive and protective functions of the land in the areas, farmers should intensify, the use of organic manure due to its regenerative powers on land, the use of alley cropping system to effectively make use of the advantage of trees in the cropping system.

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