

## ANALYSIS OF FARMERS PERCEIVED EFFECTS OF SOIL DEGRADATION ON ARABLE CROP PRODUCTION IN SOUTHEASTERN, NIGERIA.

**NWAIWU J.C.**

DEPARTMENT OF AGRICULTURAL ECONOMIC, EXTENSION AND RURAL DEVELOPMENT,  
IMO STATE UNIVERSITY, OWERRI, NIGERIA

[juanhyginus04@yahoo.com](mailto:juanhyginus04@yahoo.com)

### ABSTRACT

Soil degradation has remained one of the most devastating environmental problems in Southeastern Nigeria. This study analyzed farmers perceived effects of soil degradation on Arable crop production in Southeastern Nigeria. Data were collected using semi-structured and validated questionnaire from 342 randomly selected arable crop farmers. Data analysis were carried out using both descriptive and inferential statistical tools such as mean scores, frequency counts, percentages and 4 likert type scales. Result showed that almost all the farmers (95.9%) were aware of soil degradation and they identified the following soil degradation as occurring very often; water erosion ( $\bar{x}$ = 2.69), wind erosion ( $\bar{x}$ = 2.51) and deforestation ( $\bar{x}$  = 2.25). Arable crop produced in the area among others include cassava (100.00%), maize (85.1%), yam (82.1%) and vegetable (70.2%) with shifting cultivation (80.1%) and mixed cropping (85.1%) as farming system and cropping pattern mostly employed. Based on the farmers perception of effects of soil degradation on production, they generally accept that crop yields reduced significantly ( $\bar{x}$ = 3.04), increased wind destruction of crops ( $\bar{x}$ = 2.89), rate of poverty has increased ( $\bar{x}$ = 3.15), stunted growth was observed ( $\bar{x}$ = 2.89), increased destruction of crops by rain ( $\bar{x}$ = 3.17), general reduction in soil fertility ( $\bar{x}$ = 3.07) and increased in weed infestation ( $\bar{x}$ = 3.09). The study recommends that conservation and regulating measures should be put in place to regulate use of some practices which are detrimental to crops, increase vulnerability and causes soil degradation.

**Keywords:** Perception, Arable Crop, Soil degradation, Nigeria

### INTRODUCTION

Soil degradation is the decline in quality of soil. From creation, the earth was designed with the capacity to sustain man without losing its original qualities. Odiette,(1993) opined that the soil naturally replenishes itself when used properly; man's activities in his quest to conquer the earth have caused vital damages to this natural balance. There is increasing concerns about worn-out soils resulting from continuous cropping to feed the over increasing world population. Today, a growing understanding of the ecological damages inflicted by poor land management practices is

generating new interest in sustainable agriculture in which soil nutrients cycling plays a central role (Foster, 2000).

Arable crops are crops which are planted, cultivated and harvested within a year (Adegbola *et al.*, 1990). Most crops used to supply food for man fall in this category. The bulk of the world's food is supplied by rice, maize, wheat, sorghum, potato, sugar cane, sugar beef, yam sweet potato, cassava, beans, soya beans, groundnuts and barley. Over the years, Nigeria has devoted large heritage to the cultivation of arable crops, however, productivity has remained low a phenomenon that has entangled the farmers in a vicious cycle of poverty. Among factors accounting for the low productivity of these farmers are the uses of obsolete cultural practices and other improved agricultural input including the management of the crop under degraded soil condition (FAO, 2003).

Few resource problems are so important and so little publicized as the disappearance of soil each year, billions of tonnes are washed away to the sea or carried away with the wind. There is no way we can replace this soil, if we wait for the natural process to do the job, it would take centuries, if not millennia. The disappearance of soil threatens to undermine agriculture and limit our ability to feed ourselves. Yet, because it is a salient problem, few give it the attention it deserves.

Soil degradation seriously affects land resources in many tropical, subtropical and dry land regions of the world, with severe impacts on much of the world's population whose livelihoods depends on agriculture and land as well as on urban and rural food security. The magnitude of these trends is inducing changes in global systems and cycle that underpin the functioning of ecosystems and represent major environmental threats, such changes include logging and land degradation and extensive use of chemicals. Johnson and Lewi (2007) opined that the process of land degradation include soil and water erosion, soil compaction, decline in soil biodiversity, organic matter and fertility, salinity and physical and chemical alterations due to poor drainage and misuse of soils.

According to Mailumoet *al.*, (2011) soil erosion is the leading cause of damage to our soils. Today, some farming practices make soil erosion an ever increasing problem. In other words, soil erosion results from the ways the people use the land (Hanyona, 2001). Many land owners cut down trees to create space in which to

plant crops and raise animals which eventually lead to soil erosion (Ayoola, 2008). Similarly, Van Den Bon (2000) opined that soil degradation affects approximately 70% of the world's range lands, 40% of rain fed agricultural lands, and 30% of irrigated lands. Salinity affects some 30% currently irrigated lands, over one-quarter of the worlds land area is affected by decertification – it is a potential threat to half of the world's poor people that live in dry land regions with fragile soils and unreliable rain. Ukpong (1994) is of the view that average yield losses in the country are estimated at 8% with upto 50% loss of productivity. Hence it becomes very necessary to analyze how farmers perceive effects of this soil degradation on their production.

**MATERIALS AND METHODS**

Southeast geopolitical zone was the study area. This zone lies between latitude 4°20' and 7°51'N and longitude 50°25' and 80°51'E covering a land area of about 109,524, 59sq.km (Monanu. 1975). It has a population of about 18.92million or 21.48% of the total population of Nigeria (NPC, 2006). It is one of the most thickly populated agricultural zones in Nigeria (Iloka and Anuebuwa, 1995). About 60-70% of the inhabitants are engaged in agriculture, mainly arable crop farming

except the Riverine areas such as the Ijaws are mainly fishermen (Unammaet *al.*, 1985).

A purposive sampling technique was adopted to select three states (Abia, Anambra and Imo) in the zone. These are arable crop producing states with its large expanse of land prone to soil degradation. One hundred and twenty (120) arable crop farmers were randomly selected from each state giving a sample size of 360 respondents but only 342 questionnaires were properly filled and retrieved. Data were collected through the use of structured questionnaire administered to the respondents. Data were analyzed using both inferential and descriptive statistical tools.

**RESULTS AND DISCUSSION**

**Awareness of Soil Degradation**

The state of awareness is an indication of the level of consciousness of the people on the problem under investigation. The result in Table 2 shows that 95.9% of the respondents were aware of the existence of soil degradation in the area. By this result, it means that the awareness of soil degradation among the people is very high. The reason for the high rate of awareness may be due to presence of gullies in most part of the state (Odilli, 2010; Umahi, 2011; Jimoh, 2011).

**Table 1: Distribution of Respondents according to Awareness of Soil Degradation**

Awareness	Frequency	Percentage (%)
Aware	328	95.90
Not aware	14	4.10
Total	342	100.00

Source: Field Survey, 2015

**Farming Experience**

Table 2 reveals that a fairly large proportion (49.9%) of the respondents had farming experience of 11-20years, (35.9%) had 21-30years, 9.4% had 31-40years. On the average, the respondents had 22years of

farming experience. This indicates that majority of the respondents had longtime farming experience and could have over the years experienced the change in the farm productivity as a result of devastating effect of soil degradation.

**Table 2: Distribution of Respondents by farming experience**

Farming Experience (Yrs)	Frequency	Percentage (%)
1-10	18	5.3
11-20	169	49.4
21-30	123	35.9
31-40	32	9.4
<b>Total</b>	<b>342</b>	<b>100.00</b>

Mean farming experience = 22years

Source: Field Survey, 2015

**Crops Grown in Respondents' Farm**

The major food crops produced in the study area as shown in Table 3 are cassava, yam, maize, melon, cocoyam, vegetable and groundnut. All the respondents farmers in the area (100%) cultivates and produce cassava, 85.1% grows maize, while 82.1%

grows yam. This finding is in line with the findings of Abalu and Igwe (2005), Nwaiwu (2009) who opined that almost all the arable crop farmers in South east zone of Nigeria produce cassava, maize and yam. Vegetable is produced by 70.2% of the respondents, this may be due to the increase in demand for vegetable by the

teaming population. More than half of the respondent farmers produce melon (58.8%), groundnut (57.6%) and cocoyam (56.1%).

Other food crops grown by the respondents according to the table include garden egg (42.1%),

cucumber (40.9%), potato (40.1%), cowpea (22.2%) and rice (9.6%). The low percentage in the production of rice in the study area may be attributed to the preference of foreign rice by the people.

**Table 3: Distribution of Respondents by arable crops grown**

Arable Crops	Frequency	Percentage (%)
Cassava	342	100.00
Yam	281	82.1
Melon	201	58.8
Cocoyam	192	56.1
Vegetable	240	70.2
Maize	291	85.1
Potato	137	40.1
Groundnut	197	57.6
Cucumber	140	40.9
Garden egg	140	42.1
Rice	33	9.6
Cowpea	76	22.2

Multiple Responses

Source: Field Survey, 2015

#### Farming System Employed

Data on Table 4 identified seven farming system. More than three quarter of the respondents practice mixed farming (86.8%) and shifting cultivation (80.1%). This is good as mixed farming as opined by Osaboumen and Okoedo-Okogie (2001) conserves the soil and its fertility. These findings is also in line with the work of Ukoha (2003) and Nwaru (2004) who were of the view that more than 80% of farmers in the South east agro-ecological zone of Nigeria practice mixed farming.

Fallow system is practiced by 23.1% of the respondents, this agrees with Kumar (1993) who is of the view that long period of bush fallow is no longer a common practice among farmers in West Africa because of population pressure on available land. Urban based farming (23.1%), irrigated farming (19.6%) and wetland rice based farming system (9.4%) were also practiced by the respondents as shown by the Table. The low percentage of wetland rice based farming system may be due to the low rate of rice production in the state as opined by Asiabaka (2002).

**Table 4: Distribution of Respondents by arable crops grown**

Farming System	Frequency	Percentage (%)
Irrigated farming	67	19.6
Wetland rice based	32	9.4
Shifting cultivation	274	80.1
Fallow system	79	23.1
Mixed farming	297	86.8
Urban based farming	49	14.3

Multiple Responses

Source: Field Survey, 2015

#### Cropping Pattern

Mixed cropping (85.1%) and rotation cropping (82.5%) were practiced by almost all the respondents as stated in Table 5. Osaboumen and Okoedo-Okogie (2011) opined that mixed cropping conserves the soil and its fertility while Harper (1999) is of the view that rotation cropping is practiced in such a sequence that soil fertility is not too rapidly exhausted while Mailumoet *al.*, (2011) in their findings discovered that

mixed cropping has began to gain popularity as more than 70% of the farmers in Kebbi State of Nigeria engage in mixed cropping or rotation cropping.

Strip cropping is also practiced by more than half of the respondents (65.5%), this may be because of its ability to check soil erosion, intercropping is practiced by 47.7% of the respondents while alley cropping (26.6%), multiple cropping (25.4%) and

monocropping (14.9%) were practiced by the minority farmers.

**Table 5: Distribution of Respondents by cropping pattern employed**

Cropping pattern	Frequency	Percentage (%)
Monocropping	51	14.9
Mixed cropping	291	85.1
Intercropping	163	47.7
Strip cropping	224	65.5
Rotation cropping	282	82.5
Alley cropping	91	26.6
Multiple cropping	87	25.4

Multiple Responses

Source: Field Survey, 2015

#### **Farmers perceived effects of soil degradation on production.**

Table 6 presents numerous effects of soil degradation on arable crop production activities as perceived by the respondents. Out of the fifteen suggested effects of soil degradation, the respondents agreed that twelve were evident in their farms. Using the discriminating index of  $\geq 2.5$  for agreement and  $< 2.5$  for disagreement, they strongly agreed that there is increase in poverty rate of farmers ( $\bar{x}=3.15$ ), general reduction in family income ( $\bar{x}=3.11$ ), increase cost of crop production ( $\bar{x}=3.09$ ), increase weed infestation of crops ( $\bar{x}=3.09$ ), soil fertility has been reduced generally ( $\bar{x}=3.08$ ), crop yields have reduced significantly ( $\bar{x}=3.05$ ), increase cost of agricultural land due to loss of available land for developmental projects ( $\bar{x}=2.9$ ).

The respondents also accepted that there is increase loss of available agricultural land due to erosion ( $\bar{x}=2.85$ ), stunted growth of crop ( $\bar{x}=2.89$ ) and increase pest and disease incidence in plant ( $\bar{x}=2.81$ ).

This findings show that arable crop farmers in Southeast Nigeria are already facing the menace of soil degradation. This is revealed in the level of effects the degradation is already having on them. In the last decade an overwhelming consensus emerged among scientist that soil degradation is taking place at a much faster rate, therefore, not leaving enough time for the soil to recover and regenerate (Osabuomen and Okoedo-Okogie, 2011; Anosike, 2002; Canter, 1975; Duru, 2003; Igbozuruike, 1978; Karim and Igbal, 2000; NCF, 2003; NEST, 2012). This increase in soil degradation affects crop production by causing shift in soil quality and fertility. This expectation can be seen to be a reality today as the effects of soil degradation is already manifesting in different forms and degrees. This is evident in the findings of this study as well as in many researches conducted all over the nation and beyond, (Foster and Magdoff, 2000; Ike, 2008; Johnson and Lewi, 2007; Eswaret *al.*, 2011; Van Den Ben and Hawkins, 1997; Zia and Rashid, 1995).

**Table 6: Distribution of respondents by perceived effects of soil degradation on production**

Attributes/Statements	SA (4)	A (3)	DA (2)	SDA (1)	Total	Mean	Remarks
Crop yield reduced significantly	139 (40.6)	110 (35.5)	62 (18.1)	31 (9.1)	342	3.04	Accept
Stunted growth observed	119 (34.8)	101 (29.5)	86 (25.1)	35 (10.5)	342	2.89	Accept
Rate of poverty increased	158 (46.2)	106 (31.0)	51 (14.9)	27 (7.1)	342	3.15	Accept
Increased wind destruction of crops	123 (39.0)	148 (43.2)	54 (15.8)	17 (2.0)	342	3.10	Accept
Increased destruction of crops by rain	125 (36.6)	144 (42.1)	48 (14.0)	25 (7.3)	342	3.17	Accept
General increase in cost of production	140 (40.9)	125 (36.5)	47 (13.7)	30 (8.8)	342	3.09	Accept
Increased loss of agricultural land due to erosion	128 (37.4)	116 (33.9)	63 (18.4)	25 (10.2)	342	2.85	Accept
Reduction in family income	164 (48.0)	91 (26.6)	49 (14.3)	38 (11.1)	342	3.11	Accept
General reduction in soil fertility	145 (42.4)	112 (32.7)	52 (15.2)	33 (9.6)	342	3.07	Accept
Increase in weed infestation	151 (44.2)	110 (32.2)	42 (12.3)	39 (11.4)	342	3.09	Accept
Increase in disease and pest incidence	106 (31.1)	119 (34.8)	63 (18.4)	54 (15.8)	342	2.81	Accept
Increase in family income	27 (7.11)	51 (14.9)	106 (31.0)	158 (46.2)	342	1.84	Reject
Yield increased significantly	45 (13.2)	74 (21.6)	88 (25.7)	135 (39.5)	342	2.07	Reject
General reduction in cost of production	38 (11.1)	62 (18.1)	151 (44.2)	91 (26.6)	342	2.20	Reject
<b>Total</b>	<b>1739</b>	<b>1604</b>	<b>1006</b>	<b>781</b>	<b>5130</b>	<b>2.83</b>	<b>Accept</b>

Source: Field Survey, 2015

SA = Strongly Agreed; A = Agreed; DA = Disagreed; SDA = Strongly Disagreed

### Conclusion and Recommendations

The overall average of 2.83 shows that the factors mentioned affected crop production and they are outcomes of soil degradation. In other words, the farmers perceived that there were many consequences of soil degradation on crop production activities in the study area. The negative effect of soil degradation will continue to increase in severity if nothing is done to check the current crop production practices.

Based on this, the study recommends that extension delivery as a mandate of the various agricultural development programmes (ADP) in the country should enlighten farmers through teaching in areas as; primary components of the soil, nutrient depletion level, proven technical farming system, suitable use of agrochemicals and effective pest and disease control methods that are suitable for tropical farming without distorting the environment. Also, conservation and regulating measures should be put in place to regulate use of some practices which is detrimental to crops, increase vulnerability and causes soil degradation.

### REFERENCES

- Abalu, G.O. and Igwe, B.A. (2005): "Improved Agricultural Technologies of the small scale Nigeria Farmers". Proceedings of the National Farming Systems Research Workshop held in Jos, Plateau State Nigeria, May 10th – 13th. A publication of the Nigeria National Farming System Research.
- Adegbola, A.A., Ave, L.A., Ashaye, T.I. and Komolafe, M.F. (1990): *Agricultural Science for West African Schools and Colleges*. Oxford University Press Ibadan pp 68-96.
- Anosike, A. (2002): *Environmental Disaster Cost World 70 Billion U.W*". *This Day Magazine* 4(8):32
- Asiabaka, C.C. (2002): *Determinants of Adoptive Behaviours in Rural Farmers in Nigeria*. A proceedings of the 18th Annual Conference AIAEE, Durban, South Africa.
- Ayoola, J.B. (2008): *Economic Assessment of fertilizer use and Integrated Practices for Environmental Sustainability and agricultural productivity in Sudan Savanna Zone Nigeria*". In: F.A. Aiyedun, P.O. Idisi and J.N. Nmadu (eds) *Agricultural Technology and Nigeria's Economic Development proceedings of the 10th Annual National Conference of the National Association of Agricultural Economists, University of Abuja (7th – 10th October, 2008) pp 368-393*.
- Canter, L.W. (1975): *Environmental Impact Assessment*. MacGraw Hill New York.
- Duru, P.N. (2003): "Environmental pollution, causes and consequences". In N.C Ohazuruike, M.O. Onuh and O.N. Okeke (2003). *Man and Environmental Influences*. City prints publishers AladinmaOwerri. Pp 94-103.
- FAO, (Food and Agricultural Organization) (2003): *Fishery Intensification in small Water Bodies. A review of North America*. FOA Fisheries Technical Paper No. 33, Rome Italy
- Foster, J.B. and Magdoff, F. (2000): *Libig Marc and the Depletion of Soil Fertility: Relevance for Today's Agriculture*. In: *Hungry for profit, the Agribusiness. Threat to Farmers, food and the Environment*, Magdoff, F., Foster, J.B. and Bettel, F.H. Monthly reviewing press New York.
- Hanyona, S. (2001): *Soil erosion threatens farmlands of Saharan Africa*. The earth times. Retrieved on January 12, 2012 from <http://www.forestry.org/archeive/african/soeathe.htm>.
- Harper, F. (1999): *Principles of Arable Crop production*. Blackwell Science publishers Ltd. University Press, Cambridge United Kingdom.
- Igbozuruike, U.M. (1978): *An Evaluation of the Impact of land fragmentation on Agricultural Productivity, resources and development in Africa*. Proceedings of the Regional Conference of the International Geographical Union.
- Ike, P.C. (2008): "Agricultural Technology Adoption and Environmental Degradation among Rural Small Scale Farmers in Enugu State, Nigeria". In: E.A. Aiyedun, P.O. Idiri and J.N. Nmadu. *Agricultural Technology and Nigeria's Economic Development proceedings of the 10th Annual National Conference of the National Association of Agricultural Economists, University of Abuja, 7th – 10th October, 2008. pp. 86-93*.
- Iloka, A.W. and Anuebunwa, F.O. (1995): *Appraisal Study of the Agricultural Extension System of Nigeria, South-east Agro-ecological Zone of Nigeria*. Unpublished Manuscript.
- Jimoh, H.I (2005). *Tropical Rainfall events on erosion rates in rapidly developing urban*

- areas in Nigeria, *Singapore journal of tropical geography*, 26 (1) pp. 77-80.
- Johnson, D.L. and Lewis, L.A. (2007): *Land Degradation: Creation and Destruction*, 2nd edition, Rowman and Littlefield, Lanham Boulder New York, Toronto, Oxford, 2007.
- Karim, Z. and Igbal, M.A. (ed) (2000): *Impact of Land Degradation in Bangladesh. Changing Scenario in Agricultural Land Use*, Bangladesh Agricultural Council, Dhaka, Bangladesh.
- Kumar, V. (1993): *Crop production in West Africa*. Macmillan Education Ltd, Hong Kong. Pp. 97.
- Mailumo, S.S., Adepoju, S.O. and Tankari, A.B. (2011): Environmental Degradation and mitigation response by farmers in Danko/Wasagu L.G.A. of Kebbi State Nigeria. *Nigerian Journal of Agricultural Economics (NJAE)*. 2(1):42-48.
- Monanu, P.C. (1975): "Geographical Boundaries of Nigeria". University of Ile Ife Vol. 1, No. 2, P. 3.
- National Population Commission (NPC) (2006): *Population Distribution by Sex, State, L.G.As and Senatorial Districts. 2006 Population and Housing Census, priority tables Vol. III NPC Abuja, Nigeria*.
- NCF, (Nigeria Conservation Foundation) (2003): *World Environmental Day Message*. Guardian Publishers, June 6th. Pp 77
- NEST, (Nigerian Environmental Study Action Team) (2012): *Nigeria Threatened Environment, A National Profile*. A NEST Publication, Ibadan, Nigeria.
- Nwaiwu, J.C. (2009): "Problems and Prospects of Women participation in selected Arab Crops production in Okigwe Agricultural Zone of Imo State Nigeria". M.Sc Thesis, Imo State University, Owerri Nigeria.
- Odiette, W.O. (1993): "Environmental Impact Assessment for Sustainable Development". *Environmental News* October – December.
- Odili, N. O (2010) *Prevention and Control of Soil Erosion in Imo State*, a paper presented at the sensitization workshop on prevention and control of soil erosion in the 27 local government areas of Imo State, Nigeria.
- Osabuomen, J.I. and Okogie, D.U. (2011): *Analysis of the Effect of Arable Crop Production Practices among Farmers on Environmental Degradation in Edo State, Nigeria*. *Archives of Applied Science Research* 3(2):353-360.
- Ukoha, O. O (2003) "Contributions of Women to Family Income in Ikwoano Local Government Area of abia State". *Journal of agriculture and Food Sciences*, Vol. 1 (2) Pp 22-30.
- Ukpong, S.J. (1994): "Global and Nigerian Environmental Protection Analysis". SIRF, Calabar, Nigeria.
- Umahi, H (2011) *Erosion Kills Southeast. The Devastation in Abia, Anambra, Ebonyi, Enugu and Imo States*, Proceedings of the National seminar on erosion ravages in south –eastern Nigeria, held at the federal University of Technology Owerri, Nigeria.
- Unamma, R.P.A., Odurukwe, S.O., Okere, H.E. and Okili, O.O. (1985): *Farming Systems in Nigeria. Report of Benchmark Survey of the Farming Systems of South-east Agricultural Zone of Nigeria*.
- Van Den Ben A. and Hawkins, H.S. (1997): *Agricultural Extension*, second edition. Blackwell Science, pp. 81-105.
- Zia, M.S. and Rashid A., (1995): *Soil Management for Sustainable Agriculture*. *Journal of Progressive farming*. 5(5):50-60.