

Enhancing the Capability of Rural Farmers towards Effective Soil Management in Amucha Community, Imo State, Nigeria

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Abstract

With the continuous prevalence of climate change impacts, the areas suitable for agriculture, length of growing season and with potentials of high yield for staples food are all projected to decline. Some African Countries may experience decrease in agricultural yields by 50 percent by 2050 with the possibility of net revenue falling by 90 percent during the 21st century (IPCC, 2007 and Rutashobya, 2008). To guard against this projected doom, this study is initiated to examine ways rural farmers can be empowered to facilitate effective soil management for sustainable crop productivity in Amucha community of Imo State, Nigeria. A total of 480 respondents comprising farmers and stakeholders were systematically selected for study using survey instruments (checklist, questionnaire and interview). Data were analyzed descriptively using percentages and the use of multivariate tables. Results revealed generally that gender and age have strong influences on farmers' attitude towards soil management; also, low capital/poverty 113(24%), climate variability 112(23%) and local geomorphology (slope, soil) 61(13%) which rank 1st, 2nd and 3rd were identified as the three most outstanding factors militating against farmers effectiveness towards soil management. Again, agricultural loan insurance/health services and agricultural/extension services were farmers' major preference of capability enhancement variables constituting a total of 662(68.9%) in the series. This paper recommends that (1) training local farmers should be geared towards changing the negative attitudes and enhancement of youths to embrace farming; (2) emphasis must be laid on building the capital and technological capabilities of farmers and; (3) enabling local farmers to be adapted to the local geomorphology and climate variability of their areas. Enhancing the capabilities of these local farmers will improve local strategy, soil management abilities and boost soil capabilities for sustainable agriculture.

Keywords: soil management; farmer's capability; climate variability; local geomorphology, and local *strategy*

INTRODUCTION

Soil management represents the coordination of soil resource in an area through the process of planning, directing, controlling and other activities directed towards the prevention, mitigation or eradication of damages on the soil to enhance its sustainable productivity. Building capacity for effective soil management encompasses promoting legal, institutional, leadership, partnership, training and supportive framework; depending on the degree of degradation that have set in (UNEP, 2002; Majule, 2008). The degradable state of soils over space is one of the most serious environmental challenges confronting man in the 21st century, especially in developing countries. This emanates from the persistent population increase and the resultant increase in demand for land, crop production and built-up areas which together increase pressure compounded by climate change and related issues.

In Africa and Nigeria in particular where the rural economies are based on agriculture, such demands are further complicated by poverty, mismanagement,

size of holdings, level of education and others. World Bank (2005), Hazzel and Wood (2008) revealed that approximately 1.2 billion people across the globe live in abject poverty while 160 billion children under the age of five years are malnourished. Similarly, about 75 percent of the African poor reside in rural areas. The scenarios for agricultural development and indeed soil management differ considerably among regions and countries across the globe. Rural farmers in most cases play central role in soil and farm management practices and food production in any area where expanse of lands abound. In the Southeast Nigeria, studies conducted by Ofomata (1985), Umo et al, (2014) and Duru (2012) have been quite outstanding following the observations that conservation activities in the region must be based on adequate knowledge of the local environment if human capacity and soil capability must be enhanced for improved food security.

STATEMENT OF THE PROBLEM

According to Nyagah (2012), most African countries had directed their efforts towards soil management

and conservation since 1970s and huge amount of money have been invested in an attempt to introduce efficient and sustained soil and other resources management measures particularly in the areas where the problem of soil erosion are threatening and food deficit is widespread. In whatever perspective, most of the agronomic and engineering efforts put forward to improve farmers capability enhancement for effective soil management seem to have had limited success in achieving sustained use and widespread adoption and more or less failed to meet the anticipated objectives (Ofomata, 1985). Such limitations according to Antle (2009); Paustian et al., (2006); Sunding and Zilberman (2001) could be attributed to farmers' attitudes, perceptions, and characteristics such as education, experience and age.

The limited successes of those past efforts highlighted the need to better understand the factors that encourage or discourage the adoption, and sustainable use of introduced management measures so that capacity can be enhanced and poverty alleviated. Indeed, enhancing the capabilities of rural farmers is very crucial in advancing capacity for crop productivity, boost food security, diversify employment opportunities and check the extreme effect of climate variability issues on land resources (UNEP, 2002). Yet, farmers may possess divergent views on how to improve their capabilities for both crop production and soil management.

LITERATURE REVIEW

Antle (2009) studied the impact of climate change on agriculture and food system in USA. His findings led to the conclusion that neither the U.S. nor the global food supply are threatened by climate change if current climate predictions are reasonably accurate and if the positive effects of CO₂ fertilization substantially offset some of the negative effects of changes in temperature and precipitation. This conclusion contrasts with frequent comments in journals suggesting possible widespread food shortages and famines. In Tanzania, Madjule (2008) argues that although communities have developed some coping and adaptation mechanisms, there is an opportunity for enhancing adaptation if proper approaches can be taken such as regional integration in managing resources. He concludes that there was need for a proper institution that will ensure that shared basins are properly managed in a sustainable manner to the benefit of all parties involved in order to strengthen adaptation. Within Nigeria and southeastern region in particular, Olofin (1975); Ofomata (1985); Umo et al (2014); Duru (2012) and Ojinma et al (2015) have examined the impact of gully erosion and other despoliation on land resources. Their studies emphasized anthropogenic factors as major causative variable and called for effective capacity building for enhanced coping and sustainable development in environmental and agro-

based sectors. However, their studies tend to provide generalized view on area of capacity building; even the climate, soil, urbanization and local geomorphology remained dynamic.

PURPOSE AND SIGNIFICANCE OF THE STUDY

The relevance of this study lies in the fact that most rural farmers especially in Southeast Nigeria and Amucha in particular, tend to possess little or no relevant expertise in soil management especially in the presence of extreme weather and climate changes of today. As a result of this, degradation of soil resources is rampant due to frequent erosion, and inability of the farmers to adapt to appropriate strategy for sustainable development. It is within this perspective that the following objectives are attempted;

1. To identify the major factors militating against enhancing the capabilities of farmers for effective soil management in Amucha Community of Imo State.
2. To determine if variation in age/gender have any influence on farmers' attitude towards adoption of soil management practices in Amucha community of Imo State.
3. To determine the perspective of empowering farmers for effective soil management in Amucha Community of Imo State.

It is believed that in identifying and exploring these objectives, we may be able to understand the implication of gender and age of rural farmers in enabling them adopt current soil management strategies; especially in terms of the direction that rural farmers may prefer. The work will be useful in the development of adoptable strategy for the farmers, whose preference variables are considered for effective soil management. Also, the basis for further and enhanced researches among scholars are laid as the government of these various countries are encouraged to adopt the findings of this research to enhance their contribution towards sustainable development and poverty alleviation policies.

THE STUDY AREA

Amucha is an agrarian community located within the Njagba Local Government Area in Imo State, Southeast Nigeria. It comprises of eight major villages (Umuoma, Umuopkoko, Umuozika, Umuokwara, Ezerie, Duruezwuru, Umuozike and Umuzealibe) which together have a total population of 22,334 people (National Population Census, 2006).

The climate of the study area is Humid Tropics (Af) based on Koppen classification scheme with the rainy season duration of more than seven months and less than five months dry season on the average. It is located within the coastal plains sands of sedimentary (tertiary) deposits with low percentage of saturation,

less than 40 (Oweremadu, 2007; Ojinma, Umo and Egbe, 2014). Similarly, the soils within the study area are dominantly ferrallitic in nature and would seem to resist erosion, sliding/slumping and other process-induced disasters but possess some physio-chemical and geomorpho-climatic attributes especially excess rainfall/temperature, topography, and land use which often induce it to succumb to certain soil and climatic hazards. The area is drained by the Njaba River, while the major land use types in the area are primarily for crops production, settlement and rearing of animals at the semi-extensive scale.

METHODOLOGY

This study is empirical in nature supported with secondary data. The investigation focuses on how farmers' capabilities are enhanced with a view to improving soil management for sustainable crop productivity. Data are generated from field survey using checklist, interview, and structured questionnaire instruments, and analyzed descriptively using multivariate tables, means and percentages. From a total population of 22,334 people that make up the study area; a sample size of 480 (comprising of 400 farmers and 80 stakeholders in the community were systematically selected for study.

Issues in Capabilities Enhancement for Sustainable Soil Management

It is often agreed that capacity building is central to the quest for sustainable soil management and use. Therefore a community, civil society, nation and/or region may adequately address the principal challenges of sustainable soil management if capacity building becomes a core and explicit priority of rural development. This is evident as UNEP (2002) posited that capacity enhancement is the hallmark for sustainable future of mankind in the fragile environment. Farmers and other rural soil users are assumed to know why they may have to take different decisions toward sustainable soil management, that they know about the changing risk context, how it may affect them, and what they can do to prepare and protect the soil especially in areas of tree planting, conservative farming and other soil protection programs. Unfortunately, most rural communities seem to be either ignorant about the alternative strategies or are starved of this basic support system which makes them highly susceptible to soil degradations.

Within the Amucha community of Imo State, certain variables militating against effective soil management were identified by respondents using checklist and the result is presented as Table 1. The Table reveals that low capital/poverty and climate (rainfall), each representing 113(24%) and 112(23%) are the major factors militating against effective soil management in Amucha, ranked (1st and 2nd) respectively. Local geomorphology 61(13%); varying

type of land use 57(12%) and inadequate level of awareness 53(11%) are ranked 3rd, 4th and 5th in the series. These strengthens Okafor (1988) observation that basic education and other supports should be provided and awareness raised in rural areas on climate change and adaptation using appropriate communication tools such as radio, drama, flyers, posters, seminars, workshops, video, town criers and other traditionally based awareness strategies.

Table 1: Perceived Challenges to Effective Soil Management in Amucha Area

Militating Factor against Soil Management	Total	Percent	Rank
Land use type	57	12	4
Inadequate awareness	53	11	5
Population pressure	33	7	7
Government policies	4	1	9
Land fragmentation	36	8	6
Culture & tradition	00	0	10
Low capital/poverty	113	24	1
Illiteracy	11	2	8
Climate variability (rainfall)	112	23	2
Local geomorphology(soil, slope)	61	13	3
Total	480	100	

Source: Authors' Field Survey, 2015.

Table I indicates that in Amucha there is the need to enable rural farmers understand the variable nature of factors that control the medium of their operations. Hence, advocacy and awareness programmes are needed to aid the empowerment of Amucha rural farmers probably through the services of extension workers.

Capacity Investment and Attitude on soil for Sustainable Crop Productivity

Majule (2008) has observed that there is currently a shortage of integrated approaches for evaluating and making adaptive decisions relating to soil, water and other resources in various regions across Africa. Poor capability investment and low level of awareness to enhance effective soil management may directly associate with poverty and negative attitudes on the part of farmers toward soil management. Such poor capability is often linked with information accessibility, health facilities, illiteracy, and over dependency. Apart from these factors highlighted above, such others as attitude, gender and age of rural farmers in soil management have not been well known in most areas.

Table 2: Farmers Composition and Attitude toward Soil Management in Amucha Area

Attitude	Female		Male	
	35 and Less	Above 35	35 and Less	Above 35
Positive	74 (62%)	77 (64%)	61 (51%)	90 (75%)
Negative	46 (38%)	43 (36%)	59 (49%)	30 (25%)
Total	120 (100%)	120 (100%)	120 (100%)	120 (100%)

Source: Authors Field Survey, 2015.

A multivariate analysis of relationships between farmer's characteristics (age and gender) and their attitude toward effective soil management in Amucha community of Imo State was done and presented as **Table 2**. The result indicates that both age and gender exerted strong influence on farmers' attitude toward soil management. Whereas 74(62%) of females, aged 35 years and below exhibited positive attitude, about 61(51%) of males in the same age group exhibited positive attitude toward soil management in the study area.

In the same vein, as concerns ages of 35 and above females have 77(64%) below their males counterpart with 90(75%). Hence in terms of farmers above 35 years, the males seem to exhibit more positive attitude towards soil management than the females in Amucha community. This strengthens the assumption that soil and indeed, agro-based practices in most rural communities within the southeast Nigeria are left for the adult and aged rather than the youth, and that gender varies in response to attitude toward soil management in the region.

Generally, most government and non-governmental organizations have consistently called on the youths and especially the males within the productive age of 15 – 45 years to embrace agriculture if food security will be attained with land sustainability and soil conservation. However, as has always been observed, illiteracy of farmers and lack of ability to assess information relating to farming practices and soil conservation have become militating factors (Obasi, 2015). Hence our observation that age and gender have influences on attitude of farmers towards soil management becomes valuable.

Preference to Capability Enhancement among farmers

Human interference within a given ecosystem often alters the balance of such space where the systems operate thereby creating new and dynamic equilibrium (Umo et al, 2014; Olofin, 1979). Such changes may manifest in form of erosion, flood and other process-induced hazards which require specialized training and other forms of empowerment programs to enhance effective coping over a period of time. Since Amucha community is highly vulnerable to various types of soil erosion hazards especially in this 21st century following the impact of climate change and local geomorphology, we examined the various areas which the populace have been or want to be empowered to enhance adequate adaptation to the changing scenarios of the environment for sustainable soil use.

Table 3: Farmers' Preferred Variables towards Capabilities Enhancement

Variables of Capability Enhancement	No. of Response	Percent	Ranking
Regular workshop	4	0.4	11 th
Government subsidy	28	2.9	9 th
Agricultural Loan	434	45.2	1 st
Fertilizer/manure supply	60	6.3	5 th
Insurance/health Services	126	13.1	2 nd
Environmental Education	34	3.5	7 th
Awareness creation	42	4.4	6 th
Adult Education	88	9.3	4 th
Cooperative Society	32	3.3	8 th
Agricultural Extension Services	102	10.6	3 rd
Policies on land ownership/use	10	1.0	10 th
Total	960	100	

Source: Authors Fieldwork, 2015.

Each respondent was asked to identify two most preferred options that will facilitate sustainable soil management. Data generated from the field was presented as **Table 3**. Analysis using percentages indicate that agricultural loan 434(45.2%), insurance/health services 126(13.1%) and agricultural extension services 102(10.6%) are the three major variables that Amucha farmers preferred for the enhancement of effective soil management. Other variables in their ranking are adult education 88(9.3%), fertilizer/manure supply 60(6.3%), awareness creation 42(4.4%), environmental education 34(3.5%) (4th, 5th, 6th, and 7th respectively) while regular workshop 4(0.4%) attracts the least attention among the variables that can enhance their capabilities.

Our identification of provisions of agricultural loan, insurance, and health services from Table 3 as most preferred variables is instructive. This means that for the rural farmers to relate to capacity building programmes such must include their preferred variables as components. Otherwise, the Amucha rural farmers may not identify with such programmes, hence such programmes will not accomplish what is expected from them. Some of these variables are as observed by Majule (2008) and always emphasized by Ofomata (1985) in their consistent observation for the preference of rural farmers to be taken into consideration in every plan.

CONCLUSION AND RECOMMENDATIONS

From the foregoing analyses and discussions, the effects of such factors like poverty, climate change, and local geomorphology etc are noted in militating against effective soil management. These are exacerbated by the absence of youths and active males in the farming processes coupled with the inability of capacity building programmes to mainstream the preferred variables as indicated by farmers. Hence the basic problem of balancing the present needs against the future prospect through

effective soil management strategies must involve the attraction of more youthful males into rural farming system. Again, these farmers must be empowered through the injection of capital and eradication of poverty; education about variabilities in climate and local geomorphology (rainfall, soil nature and slope types); establishment of insurance/health facilities and provision of extension services and programs. These factors, when they are incorporated into the system, better and effective strategy will be formulated for proper training of rural farmers to enhance their capacities for soil management and poverty alleviation in Amucha.

We therefore recommend as follows:

1. Government should partner with the farmers in Amucha community to enhance capabilities through effective financial supports (agricultural loan); manpower training, and awareness creation to create sustainable soil management and alleviate poverty in the study area. Such services according to Madu (2012) will improve farmers' knowledge of agricultural practices and environment in general within the various rural communities in the region and beyond.
2. Emphasis should be placed on enabling local farmers to be adapted to the local geomorphology and climate change in their areas. Such enablement will boost their capabilities in sustainable soil management and enhanced agricultural productivity.

REFERENCES

- Antle, J.M. 2007: Agriculture and the Food System: Adaptation to Climate Change. RFF Research Report, June 2007.
- Duru, .P N (2012) Sustainable management of Agricultural Land use: A panacea for soil Erosion in Njaba Local Government Area of Imo State In International journal of Arts And Humanities. Vol.5. No.4 April 2012. Pp 90-98.
- Federal Government of Nigeria, 2006: National Population Census.
- Hazell, P. and Wood, S. 2008: Drivers of Change in Global Agriculture. Philosophical Transaction of Royal Society B (363), 495 – 515. Retrieved on February 12th 2015 from (doi:10.1098/rstb.2007.2166)
- Inter-governmental Panel on Climate Change (IPCC), 2007: *Climate Change Impacts, Adaptation and Vulnerability*. Contributions of Working Group11 to the Fourth Assessment Report: M. L. Parry; O. F. Canziani; J. P. Palukef; P. J. Van der Linden and C. E. Hanson eds., Cambridge University Press.
- Madu, I. A. 2012: *Spatial Vulnerability Assessment of Rural households to Climate Change in Nigeria: Towards Evidence Based-Based Adaptation Policies*. Paper Presented at Berlin Conference on the Human Dimensions of Global Environment Change, Ferie Universitat, from 5 - 6th October 2012.
- Majule, A. E. 2008: Climate Change and Variability: Impact on Agriculture and Water Resources and Implications for Livelihood in Selected Basins. In Petermann Thomas edition, *Towards Climate Change Adaptive Capacity in Managing African Trans-boundary River Basins, Case Studies from African Practitioners and Researchers*. InWent, Germany, 157 – 174.
- Nyagah, F. M. 2012: *Influence of Capacity Building on Adaptation of Soil Conservation in Mieru West Division, Imenti North District, Kenya (Abstract)*. Retrieved on the 3rd day February 2015 from <http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/7397>
- Obasi, M.N., Ojinma, C.C., Umo, I.S. Okafor, C. 2015: Farmers Awareness of Climate Change Impact and Adaptation towards Effective Crop Production in Owerri West, Imo State. Paper Presented at the 56th ANG Annual Conference, "Climate Change and Human Security" University of Osun, Nigeria, 23rd – 27th March 2015.
- Ofomata, G. E. K. 1985: Gully Erosion in Southeastern Nigeria: the view of a Geomorphologist. *Inaugural Lecture Series* No.7 University Nigeria Nsukka, 22nd February, 1985.
- Ojinma, C.C, Umo, I.S. and Egbe, C. A. 2014: Household Vulnerability to Flashfloods and Information Sources for the Safety of Owerri Urban Residents, Imo State. *CEDSAF Journal of Science and Technology*, Vol. 9 (1), 47 – 55.
- Okafor, F. C. 1988: Rural Development and Environment: Degradation Versus Protection. In P. O. Sada and F. Omuta (ed.): *Environmental Issues and Management in Nigeria*. Ibadan, Evans Publishers
- Olofin, E. E. 1979: Some Implications of the Bagauda and Tiga Dams on the Environment of the Downstream Areas: a preliminary report. In P.O. Sada and F. O. Omuta eds., *Spatial Perspectives in National Development*; Proceedings of the 22nd Annual NGA Conference

Onweremadu, E. U. 2007: Pedology of Near-gully Sites and its Implications on the Erodability of Soils in Central Southeastern Nigeria. *Journal of Environmental Sciences*, 1(2), 71 – 76.

Paustian, K., Antle J.M., Sheehan J. & Paul A.E. 2006: *Agriculture's Role in Greenhouse Gas Mitigation*. Arling VA: Pew Center of Global Climate Change.

Rutashobya, D. G. 2008: Climate Change Scenarios: Impacts and Adaptation Strategies in Africa. In Petermann Thomas Editions, *Towards Climate Change Adaptive Capacity in Managing African Trans-boundary River Basins, Case Studies from African Practitioners and Researchers*, 24 – 40.

Sunding, D., and Zilberman D. 2001: The Agricultural Innovation Process: Research and Technology Adoption in a Changing Agricultural Sector. In *Handbook of Agricultural Economics, Volume 1A: Agricultural Production*, edited by B.L. Gardner and G.C. Rausser, Amsterdam: Elsevier.

Umo, I. S., Ojinma, C. C. and Enwereuzor, A. I. 2014: Impacts of Ibiono-Itu Dam Project on the Downstream Crop Productivity of Ididep and Itam Communities in Akwa-Ibom State, Nigeria. *SIREN African Science and Technology Journal*, 8(2), 23 – 32.

UNEP, 2002: Capacity Building for Sustainable Development: An Overview of UNEP Capacity Development Activities. 164pp.

World Bank, 2005 CD-ROM World Development Indicators; Washington DC: World Bank.