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Determinants to Soil Water Conservation Techniques Adoption among Farmers in Akwa Ibom State, Nigeria

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Abstract
This study examines soil water conservation techniques adoption as a means towards increased food production, income generation and poverty reduction among farming households in Akwa Ibom State. 90 farmers/respondents were randomly selected from the three Senatorial Districts of Uyo, Ikot Ekpene and Eket that make up the study area. Frequency counts, means and percentages were the tools of analysis using tables to summarize the results. The logit regression model is used to ascertain the determinants to soil-water conservation adoption among farmers in the study location. Findings reveal that most of the farmers have adopted one form of soil water conservation or the other since the inception of their farming business especially in erosion and drought prune locations. A very negligible percentage (8.89%) of the farmers that have not used any conservation method attributed it to their cultural belief, no erosion problem and operating on few and less than 1 hectare of farmland on subsistence level to feed the family. The results also reveal that apart from marital status and farming system all other explanatory variables specified in the models were significant determinants to soil water conservation techniques adoption. More extension contacts, increased micro credit and effective marketing systems are recommended.
Keywords: Determinants, Adoption, Farmers, soil water conservation techniques.

BACKGROUND INFORMATION

Man existence on earth is seriously threatened by series of factors including environmental degradation, population explosion, food in-security and above all poverty especially in developing countries of the world. The situation has become so critical that the farming environment in all its ramifications has become vulnerable to many hazards such as soil erosion, flooding, deforestation, gas flaring, oil spillage, climate change etc. which are brought about by human activities in an attempt at meeting their basic needs of life and general well being. Findings from previous studies have shown that households do not have enough income to support and sustain a reasonable standard of living. Farmers complained of food shortages, seasonal fluctuations and general decline in production levels.

Nigeria with a population of over 140 million people (NPC; 2006) has most of the areas densely populated where people compete for few or non-existing agricultural production resources with serious pressure and other multiplier effects on the environment including agricultural land and water resources.

The underlying cause of the present food crises and low agricultural productivity in developing nations of the world are environmental degradation and increasing population pressure. Economic growth performance in these countries has been dismal (Christiaensen and Tollens, 1989). Central to all these problems enumerated above is poverty. Nigeria's poverty situation has been described as a rural phenomenon affecting the people who are predominantly farmers with frightening dimensions. As published by the National Bureau of Statistics (2005), the poverty incidence in the rural areas were 46%, 69.3% and 63.3 as at 1992, 1996 and 2004 respectively while the urban areas had 37.5%, 58.2% and 43.2% the same period.

Man inability to attend to, checkmate or having what it takes to acquire increased agricultural productivity and a comfortable living is because he or she is poor. In the words of Adegboye (1996); that there will be food for tomorrow is a possibility to some people, certainty for others and a miracle for the poor. When it comes to food people in developing countries are highly disorganized. They have neither the land to grow their food nor the income to ensure themselves of adequate meals and they are at the mercy of the job market, adequate weather and natural disasters. They work harder and longer for poor outputs, die young and pass on the misery. The people are vulnerable to food insecurity because of poverty which is rooted in the land where their food should grow. The vulnerability faced by poor people includes that brought about by uncertainties in climate, politics, markets and potential conflict situations.

Agricultural production lags below expectation due to a degrading environment, inefficient and low productive capacity. Inefficient use of production resources has been the bane of agricultural development in sub-Saharan Africa (Nweke, 1996); and this has been the greatest concern to policy makers in addressing the present food crises in Africa (Hamidu et al., 2003). However, there are many intervention programmes put in place by individuals, the government, NGO's, corporate bodies and International organizations towards making the environment sound and productive again vis-a-vis eradicating poverty. These could be witnessed in the various land reclamation projects, irrigation schemes, use of organic manure/fertilizer instead of the inorganic which destroys the soil structure, afforestation, landscaping, crop rotation, planting of wind breaks, cover crops

and efficient and effective resource management among other strategies. The question is how far how well?

Since the introduction of these innovations (past and present) in many parts of Nigeria including Akwa Ibom State, little or no effort/study has been undertaken to know their status in many farming systems and their spread or whether they are still confined to the initial original adopters. This is important as one of the ways of assessing the success, acceptability and adaptability of any technology(ies) or innovation(s) in an area to know the rate and extent of spread among the target group. This is a clear indication of the viability of such innovation which is one of the foremost conditions for adoption (Arnon, 1989).

Most of the farming systems especially in the study location lacks adequate information on the various conservation techniques in terms of farmland and water use toward improved food security, generate more income, increased well-being, reduced vulnerability and encourage sustainable use of the natural resource base. Of course a household decision to invest in soil-water conservation is based on anticipated benefits (Boyd and Turton; 2000, Carney; 1998). One may therefore ask are the economic benefits enough to justify the huge investments by the farmers? Again, what is the rate or level of adoption of the various conservation measures among the farmers. Finally, what are the factors and constraints to effective conservation techniques?. Scoones (1998); Hailu and Runge - Metzger (1993), had that the adoption of soil water conservation practices represents a decision by households to intensify agricultural production, improve output per unit area through capital investments or increased labour inputs, generate returns in the long run and as a risk reduction strategy.

Increased agricultural productivity can reduce poverty by increasing farmers' income, reduce food prices and enhance increased consumption pattern (Diagne et al; 2009). According to the Department of International Development of the United States of America (2003) a 1% increase in agricultural productivity reduces the percentage of poor people living on less than1 dollar a day by between 0.6 and 2%.

The performance of the above programmes and the various land and water conservation techniques towards increased agricultural productivity and poverty eradication in many locations in Nigeria is not enough to create the needed impacts to achieve the above objectives. Again research efforts on impact assessment of public and private projects especially in resource and environmental economics in terms of agricultural productivity and poverty eradication are scanty in Nigeria. This will determine strategic plan of actions and priorities in the economic programmes of the people especially the rural dwellers.

This study seeks to address and uncover the various socioeconomic parameters and determinants to effective farmland and water conservation measures towards poverty reduction. Specifically the study will determine the socio-economic attributes of the farmers, assess the various soil and water conservation measures in the study area, assess the performance of the conservation methods in terms of income generation (profitability), rate of adoption and poverty reduction in the study area, determine the constraints to effective conservation measures and Offer some policy recommendations.

Study methodology

The study location and data collection procedures: Akwa Ibom State is located in the South South geopolitical zone of Nigeria. With a population of 3.92 million people (NPC; 2006), which are predominantly farmers especially in the rural areas producing rain fed crops, both in small and large scales. Livestock rearing and fishing are other farming activities in the area. The state is distinct and contiguous covering an estimated Area of 8,421 square kilometers with two ecological seasons - the wet and the dry seasons. Rain is evenly distributed and it decreases from above 3,000mm in the south to about 2700mm in the North (Udofia and Inyang 1987). The soil is generally sandy; the south has a swampy coasts and creeks with salt and fresh water mangrove and up North is the rain forest belt. These suggest why the area is susceptible to flooding and easily drained soils with high water absorption capacity. A multistage sampling approach was applied in data collection. To actually achieve the objectives of this study Thirty (30) farmers were randomly selected from each of the three (3) Senatorial districts that make up Akwa Ibom State. A total of ninety(90) farmers/respondents were finally selected and a pre-tested structured questionnaire was used in gathering the primary data which include information on the socio-economic attributes of the farmers, input and output, soil and water conservation techniques adopted, revenue generation and other benefits then the constraints the farmers are having towards achieving effective conservation measure in their farming business. Previous studies in Journals, Print media, textbooks and farm records with group discussion were also consulted for the secondary data.

Statistical Models and Analytical Techniques

(i) Descriptive and inferential statistical models such as the means, frequency counts and percentages were used in analyzing the data and tables in presenting the results.

(ii) A logit regression model is applied to determine the probability or effects of the explanatory variables on adoption or investments in soil water conservation (SWC).

The logit model follows that

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + e$$

where

y_1 = $^1/_0$ if farmer invests in SWC

y_1 = $^0/_1$ if farmer is not investing in SWC

β_0 = A constant or intercept

$X_1 - X_{10}$ = Explanatory Variables

$B_1 - \beta_{10}$ = Regression co-efficient

e = Error term

The explanatory or independent variables include Gender (x1), Age (years) (x2), marital status(x3), household size (x4) educational level (x5) farm size (ha) (x6), farming experience (x7), monthly income (x8), access to credit (x9), and extension constants (x10).

The above model is quite flexible and has been used by previous related studies by Amaza, et al (2008); Mailumo, et al (2005); Etim, et al (2005); Helfand, (2003); Appleton, et al (1996) and Ali and Byerlee, (1991).

Results and Discussion

The related statistical test result obtained from the logit regressive analysis is presented on table 6 below which gives an evidence that the estimate of gamma (y) is large and significantly different from zero indicating a good fit and the correctness of the data. The generalized likelihood ratio test is highly significant at one percent level.

The estimated coefficient of factors of production such as farm size and household size are all positive and highly significant at one percent level while planting materials is positive but significant at 5% level. This implies that farmers in the study area will increase production with an increase in the use of the above listed production factors. This is consistent with previous findings by Amaza et al, (2008); Kabubo - Mariara et al (2006); Onyenweaku et al (2005) and Amaza and Olayemi (2000) whose results showed a positive and significant relationship between these variables and productivity. The estimated coefficient of age, level of education, farming experience, monthly income, extension contact, and access to credits are negatively but statistically significant at 1% level.

Table 6. Regression Analysis of the Maximum likelihood estimates of the determinants of soil conservation techniques adoption

Variables	Standard Coefficient	Standard Error	T - Value
Gender	0.9894	1.0094	0.8914
Age (years)	-39.5148	13.2859	-11.5259***
Marital Status	-0.2889	9.2156	0.3956
Household size	23.4838	3.9384	9.8579***
Educational status	-138.9259	16.4668	-10.9255***
Farm Size	113.7296	2.3107	95.7895***
Crop Diversification	18.9829	2.9289	9.5392***
Planting materials	5.5306	3.3168	3.0695**
Farming experience	-98.6048	12.9832	12.6456***
Monthly income	-o4882	1.0028	0.0000***
Extension contacts	-03916	1.0025	0.0012***
Access to credit	-0.2031	2.1045	0.0030***
Gamma (γ)	**0.9818**	**0.0678**	**32.9628***

****(p<0.05) ***(P<0.01)**

Sample size = 90

Likelihood ratio test = 38.85

The implication here is that farmers that are aged, having high level of education, experienced with increased access to credit, more extension contacts and a reasonable income level will be willing and capable of adopting soil water conservation methods for increased food production and more income generation. That of crop diversification is positive and statistically significant at 1% level showing that it could also lead to increased adoption and productivity in the study area. Crop diversification tend to check the risks of losing a sustained level of output apart from producing assorted products from the farm.