

**DETERMINATION OF EXTENT OF APPLICATION OF SOIL AND WATER  
CONSERVATION TECHNIQUES BY SMALL HOLDER SWAMP RICE FARMERS IN IMO  
STATE**

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**Abstract**

The study investigated extent of soil and water conservation techniques application by small holder Swamp rice farmers in Imo State, Nigeria. Specifically, level of application of the techniques by farmers and reasons for non-application of the techniques were ascertained. Primary data were collected through the use of a set of structured questionnaire and subjected to descriptive statistical analysis and use of likert summated rating. Findings showed that 73.8% of Swamp rice farmers applied one form of the techniques or another. It was further found that 100% of farmers practices mulching, fertilizer application, irrigation and cover cropping, while about 5.56% and 2.53% applied diversion and salinization respectively. The techniques that recorded 100% application were rated high. Also, some reasons were found to be responsible for non-application of the techniques by 26.1% of the farmers. These includes; poor knowledge/Information (52.8%), poor interest (17.1%), inadequate capital and input (17.1% and 14.2%) and management problem (8.5%). The study recommends effective extension programme and workable credit/loan schemes to motivate farmers to practice those techniques.

**Keywords:** Conservation, Rice Farmers, Soil, Small Holder, Water.

**Introduction**

Rice (*Oryza sativa*) is the most important food crop for about half of the human race (Onwueme and Sinha, 1991). They further stated that it is one of the only food crop that can be grown in the standing water of vast area of flat low-lying tropical soils and is uniquely adapted for the growth in submerged soils. Rice is a major food staple for large segment of the population. It is a highly protected commodity among developed countries (FAO, 2004) but unprotected in West Africa (Momoh, 2007). In Imo state Swamp Rice production is dominated by small-holder farmers whose holdings do not exceed five hectares (Beats, 1990; Nwajiuba, 2002).

Soil and water conservation entails prevention of loss or wastage of soil and water for efficient crop production. Efficient conservation of water, soil and its nutrients is very essential if agriculture is to progress. The loss of soil nutrients and water cannot be completely prevented but measures call for proper land use, proper agronomic and husbandry practices, and adequate mechanical measures to prevent erosion, hence promoting infiltration of water into the soil (Baffour, 1986). Soil erosion, a major environmental problem in the eastern Nigeria systematically removes plant nutrients from the soil surface leaving impoverished crust (Nzegbule, 2002). Soil erosion according to SCSA (Soil Conservation Society of America) (1982) is one of the most important causes of soil and water losses. They defined it as the wearing/washing away of soil particles by water, glacier or other natural agents under natural environmental conditions. Soil erosion that occurs naturally without human influence is termed geological erosion while that which occurs when people disturb the soil or natural vegetation by grazing livestock, lumbering of forest, ploughing hillsides or tearing upland for road and building construction is called accelerated erosion (Brady and Weil, 1999). An increased understanding of fundamental soil erosion principles and processes help in selecting effective soil and water conservation techniques for specific land condition (Mayer and Renerd, 1991). Soil and water conservation is synonymous with soil fertilizer maintenance. According to Allan (1993), the techniques applied by a farmer to maintain the fertility of his soil depend to a large extent, on his immediate environment and economic condition. The way farms are managed can have a marked influence on the degree to which soil and water are conserved (Rowland, 1993). Previous studies have identified the following conservation practices-mulching, zero tillage, use of fertilizer, bush fallowing, cover cropping, organic manuring, shifting cultivation, ridging across slope, minimum tillage, cross bars construction, fencing/bunding and crop rotation as mostly practiced in the South-eastern Nigeria. More so, Vanderwel and Abday

(2001) identified grassed water ways, drop structures, lined channels or terracing as practices used to control more severe erosion problem in crop farms.

For sustainable growth in rice production, the natural resources (soil and water) must be adequately conserved so as to guard against their degradation. It is against this background that this study broadly determined the extent of application of soil and water conservation techniques by small holder Swamp rice farmers. Specifically the study examined level of application of the techniques and ascertained reason for non-application of the techniques.

**Materials and Methods**

The study was carried out in Imo State, Nigeria which lies between latitudes 5° 44' and 5° 54' North and longitudes 6° 54' and 7° 7' East (Okorafor, 1975; MLSUP, 1993). It is bounded in the North and North-West by Anambra State, South and South-West by Rivers State and North and North-East by Abia State. The State comprised of three agricultural zones (Okigwe, Orlu and Owerr)-with Twenty Seven Local Government Areas (LGA). Imo State has a population of 3,934,899 million persons (NPC, 2006) and a landmass of 5,289.49 km<sup>2</sup> with a total flood and Swamp areas of 1,689.99 km<sup>2</sup> and 1,128.26 km<sup>2</sup>, respectively (MLSUP, 1993) Rice farm families in the state is about 2,100 while total cultivable land area for rice production is 116,100ha (MANR, 2003). The State mean annual rainfall ranges 2000mm-250mm with southern area having a little more share of the rain than the Northern areas (FDALR, 1990). Its mean annual temperature ranges from 26°C to 28°C with mean daily maximum and minimum seldom below 27°C and 18°C,

respectively. The people of the State are mainly farmers-crop, livestock and fish farmers. Such crops produced include, rice, oil palm, yam, cassava, maize, fluted pumpkin, orange. While livestock includes sheep, goat, rabbit, chicken and pigs.

Purposive sampling and multi-staged random sampling techniques were adopted. Ihitte/Uboma, Ideato-North and Ohaji/Egbema LGAs were purposively selected from Okigwe, Orlu and Owerrri Agricultural Zones. This was based on their long standing history of being the highest rice producing LGAs in the Zones (ISADP, 2003; Ogbunike, 2002). For the multi-staged random sampling, first, additional 2 LGAs were randomly selected from each of the Zones. These includes; Isiala Mbano and Okigwe (Okigwe zone), Njaba and Orlu East (Orlu Zone) and Owerrri West and Ezinihitte Mbaize (Owerrri Zone). Second, 3 communities were randomly selected from each of the LGAs and finally, 10 Swamp rice farmers were randomly selected from each of the communities. The sample size for the study was 270.

Primary data were collected through the use of structured questionnaire administered to the respondents. The data were subjected to descriptive statistical analysis (frequency, mean and percentage).

**Results and Discussion**

As shown in Table 1, about 73.8% agreed having applied one form of soil and water conservation techniques or the other. On the other hand, about 26.1% have not. With application of appropriate soil and water conservation techniques in Swamp rice production, the resources are expected to improve and sustained, hence yield becomes higher.

Table 1: Farmers distribution on application and non-application of soil and water conservation techniques.

Items	Frequency	Percentage
Applied	198	73.88
Not Applied	70	26.12
Total	268	100

Source: Field Survey, 2009

Result in Table 2 showed that not all respondent applied all the techniques. Virtually, all the farmers (100%) practices mulching, fertilizer application, irrigation and cover cropping. These techniques were rated first in this study as shown in table 2. The application of these techniques could be as a result of poor and acidic nature of sols in the study area, continuous cropping and pollution of these resources (soil and water) owing to urbanization. Furthermore, about 5.56% and 2.53% applied diversion hence rated 8<sup>th</sup>. This could be attributed to poor knowledge of the actual and potential benefits of the techniques. Sequel to this, effective extension service is highly advocated.

Table 2: Distribution of small-holder Swamp Rice farmers by level of Application

Techniques	Frequency	Percentage	Rating
Fertilizer application	198	100	1 <sup>st</sup>
Mulching	198	100	1 <sup>st</sup>
Cover cropping	198	100	1 <sup>st</sup>
Irrigation	198	100	1 <sup>st</sup>
Bunding	98	49.5	5 <sup>th</sup>
Channelization	70	35.35	6 <sup>th</sup>
Minimum/Zero Tillage	14	7.07	7 <sup>th</sup>
Diversion/drainage channels	11	5.56	8 <sup>th</sup>

Source: Field Survey, 2009

**\* Multiple Response**

Data in Table 2 could be rated into low, medium and high levels of application using likert summated rating system as adopted by Ayinde *et al* (2001) as shown in Table 3.

Table 3: Farmers Distribution by level of application using likert summated rating system

Rate items	Percentage	rating
7, 8 and 9	0 – 34	low
5 and 6	35 – 69	medium
1	70 – 100	high

Source: Ayinde *et al* (2001).

On of Table 1, 70 representing about 26.1% of the respondents did not apply any of the identified soil and water conservation techniques. While adducing reasons for non-application of the techniques in Table 4, about 52.8% of the respondent identified poor knowledge/Information and 7.1% indicated poor interest. Others includes, inadequate capital (17.1%), inadequate input (14.2%) and management problem (8.5%). Poor knowledge/Information as reason for non-application of the techniques could be ascribed to ineffective extension programme. In view of this fact therefore, extension service becomes a matter of necessity as conservation programmes require large volume of information (Eswaran 1991).

Table 4: Farmers Distribution by reasons of non-application of the techniques.

Items	Frequency	Percentage
Poor knowledge/information	37	52.8
Inadequate capital	12	17.1
Inadequate input	10	14.2
Management problem	6	8.5
Poor interest	5	7.14
Total	70	100

Source: Field Survey, 2009.

**Conclusion**

The study investigated extent of application of soil and water conservation techniques by small holder Swamp Rice farmers. Majority of the farmer were found to have practiced one form of the techniques or another. Mainly, they practiced mulching, fertilizer application, irrigation and cover copping. Poor knowledge/Information, poor interest, inadequate capital and input, and management problem were reasons for the non-application of the techniques. This therefore called for effective extension programme and workable credit/loan schemes to motivate farmers to adopt these practices considering the significance attached to them.

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