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DILAPIDATING IRRIGATION STRUCTURES, EFFECTS AND MANAGEMENT: A CASE STUDY OF DILAPIDATING ENUGU -ABO UFUMA IRRIGATION SCHEME

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ABSTRACT

Irrigation farming has increased in Nigeria in the recent times. The possible reason for this is the increased awareness from the irrigation projects jointly funded by World Bank, Federal Government and State Governments. This study which was conducted between June 2013 – September 2013, and encompasses major settlements in Enugu-abo, within Anambra state in the South Eastern region of Nigeria using data collected from a sample of fourteen Fadama (irrigation) farmers. The result of the study showed that irrigation farming in the area is on the verge of collapse. Farmers realized an average net produce of 13 tons of rice as against the 20 tons that was being realized at the inception of project. Furthermore, irrigation farming was found to be capable of alleviating poverty among farming households because the majority of the farming households depend solely on it in spite of the downslide in production rate which is been caused by a variety of factors including silting, lack of equipment's, amongst other problems. From result obtained, all respondents (100%) agreed that silting of the irrigation canals is a major problem. Summarily, 50% of respondents experience a water logging of farmland areas which may affects efficiency of farming operations. Percentage of respondents that insist on pollution of irrigated water is 36.7%. This survey describes the socioeconomic characteristics of irrigation farmers in Enugu-abo, Ufuma, factors affecting efficiency at scheme. Recommendations were enumerated to alleviating the present poor rate of production and suggested solutions to problems militating against irrigation farming in the study area.

Keywords: Irrigation farming, Production, Silting, Efficiency.

I. INTRODUCTION

Irrigation is the artificial application of water for the cultivation of crops, trees, grasses etc. Method of application also evolved, from traditional gravity flow and farm flooding to micro-irrigation where water is applied close to the root zone of the plant.

One of the eight MDGs is the “Eradication of extreme hunger and poverty” (FDP, 2005). The problem of hunger and of course malnutrition cannot be addressed without paying proper attention to agriculture. In the developing countries, most farmers practice rain-fed agriculture which results in low productivity, low income, perpetual poverty and malnutrition. To improve agricultural productivity in these countries, irrigation farming along with the use of improved seeds and fertilizers, are imperative alternative option. This will help in reducing hunger and malnutrition because there are direct relationships between agricultural productivity, hunger, malnutrition and poverty (Strauss, 1986; Adesoji et al., 2006; Babatunde et al., 2008; Blench and Ingawa, 2004; Obiechina, 2000; Onugha, 1998).

One of the goals of irrigation farming is the provision of right amount of water at the right time for plant

growth and development. Consequently, it ensures sustainable agriculture with its economic benefits. Globally, massive investments have been made in the development of irrigation scheme. In Nigeria, according to NINCID (2009), recent survey suggests that 39% of the land mass is potentially suitable for agriculture and out of this between 4.0 and 4.5 million ha (approximately 4.5 to 5.0% of the land) are judged suitable for irrigated agriculture but only 1.1 million ha can be supported fully by the water available, the remaining 3.4 million ha being Fadama (Anon 2008, Dauda et al 2009, Umar and Tyem 1995).

II. HISTORY OF IRRIGATION IN ENUGU-ABO, UFUMA

Irrigation actually started in Ufuma town before the year 1976 (basically traditional). As time passed on, the World Bank initiative on Agriculture alongside the various Federal Government projects overtime led to the recent transformation/ upgrading of the ancient scheme (ASADEC, 1995).

The World Bank Irrigation Projects was established under the NFDP loan No. 3541 UNI to assist Fadama development (Fadama is additional effort to spread

water to low lying lands) in the states that met the pre-determined eligibility criteria (Federal Agricultural Coordinating Unit – FACU 1995) The NFDP was approved for funding on March 26, 1992 for a loan of US \$ 67.5 million. It was to build on the achievements of some of the Northern ADPs in developing small-scale irrigation through extraction of shallow ground water, using low-cost petrol-driven pumps. It was intended to raise farmers' incomes and contribute to food security and poverty alleviation (World Bank, 1992; Bhattacharai, 2004a). The loan closed on December 1999.

III. GEOGRAPHY AND CLIMATE

The study area is Anambra State of Nigeria. Ufuma is an educational, commercial, green and holy land. It is located in Orumba North LGA in Anambra State of Nigeria. It has a thick population which stood at 750,000 by 1963 census period. It is bounded by eleven towns namely; Akpu, Ajalli, Nawfija, Ogbunka, Awlaw, Inyi, Akpugoeze, Awa, Omogho, Ndikerionwu and Ndiowu.

Ufuma land (Ana Ufuma) is one of the 16 major towns that make up the geo-political area called Orumba North Local Government Area of Anambra state, Nigeria. Ufuma has the geographical coordinates of $6^{\circ} 5' 0''$ North, $7^{\circ} 11' 0''$ East. Ufuma is well known for agriculture. Major food crops include yam, cassava, cocoyam, plantain, banana, and maize. Ufuma also boasts of major agricultural projects like World Bank rice project, Anambra fishing project, ADA palm to palm project and Kpokobros rice project. There are several private farms, Garri Processing Plants, Poultry and cattle rearing projects in Ufuma. Dry season in the state commences from late October to early May; and has at least six dry months in the year. The vegetation consists of rainforest.

Specifically, the objectives of the study were to describe the state of irrigation in Enugu-abo, Ufuma and to identify problems militating against irrigation farming in the study area.

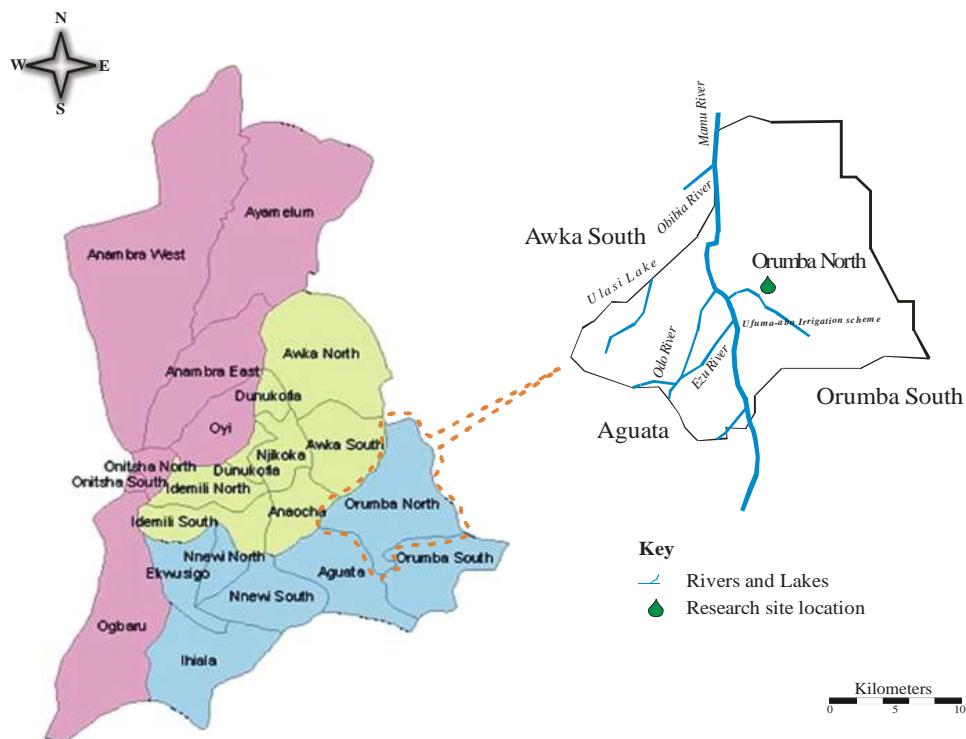


Figure 1: Map of Anambra state with study location insert

IV. RESEARCH METHODOLOGY SAMPLING DATA COLLECTION AND ANALYSIS

Data used for this study were collated from a farm survey of fourteen (14) major farmers selected from the community irrigation scheme; these are farmers practicing irrigation farming in the study area. The farmers were selected through a sampling procedure as used by Rahji and Rahji (2008). The first stage was the definition of the specific study location. The second stage involved the selection of key players in the irrigation scheme at Enugu-abo. Respondents were then randomly selected from the lists of farmers involved in irrigation farming in the areas. A total of fourteen (14) respondents were consulted in the study area. Data were collected with the aid of structured questionnaire designed to elicit information on socioeconomic characteristics viz sex, designation, years of farming experience; irrigation variables viz pollution of water, ownership of pumping machine, flooding of farm land, silting; economic viability of irrigation activities viz selling price of produce; variable costs viz interests and revenues from irrigation farming. The questionnaires were subjected to pretest method of validation, (Reynolds and Dimantopoulos, 1998). This was used to adjust the content of the questionnaire.

The data sets were converted to descriptive statistics such as frequency tables and percentage in order to give brief background information about the socioeconomic characteristics of the population under study.

V. RESULT AND DISCUSSIONS

Socio-economic characteristics of respondents.

Majority of the respondents (78.6%) were males while the rest (21.4%) were females (Table 1). This is consistent with Adeoti (2006) who reported that more men were found in farming than women. It however conflicts with Salisu (2001) who reported that irrigation was a male affair only in Northern Nigeria. The disparity may not be attributed solely to the culture of the study area, it may also be explained from the perception and observation of Shilpa Vasavada (2000), who in her study of women irrigators of canal irrigation systems in South Gujarat, showed that while women farmers contribute substantial labour in agricultural operations and in the maintenance of canal, their involvement in the decision making for access of canal institutions is marginal (Vasavada, 2000). Amongst the farmers contacted, 78.6% were farmers operating in the scheme while only 21.4% were staff. Among the staff, 78.6% were male and

none female (Table 2). This agrees with the aforementioned statement. This lack of participation from women farmers in irrigation institutions is not only detrimental to the efficiency of the system but also affects the workload on women farmers.

Table 1: Classification of Respondents based on Sex

Sex	Frequency	Perc	Valid Percent	Cumulative Percent
MALE	11	78.6	78.6	78.6
FEMALE	3	21.4	21.4	100.0
Total	14	100.	100.0	0

Table 2: Classification of Respondents based on Occupation

Occupation	Frequency	Perce	Valid Percent	Cumulative Percent
FARMER	11	78.6	78.6	78.6
STAFF	3	21.4	21.4	100.0
Total	14	100.0	100.0	

Irrigated area was about 200ha. Some of the major factors militating against irrigation farming in the study area as reported by the farmers were lack of mechanized equipment including pumps, lack of motivation from government, silting of canals etc. It should be noted that most of the farmers reported more than one problem.

VI. TRENDS IN PRODUCTION

Paddy is grown widely in Ufuma. The paddy harvested area was 200 ha with an annual brown rice production of about 20 tonnes in 1990, which increased to a record high of 25 tonnes in 1995. However, since the rot in the public sector commenced, there have been a rapid decline in production rate, infrastructural development and maintenance and also efficiency of operations. Present production rate is pegged about 13tonnes annually, which reflects a critical state of operation.

Figure 2, indicates the production rate, which is a combination of the production costs and actual farmer's earnings for 1992-2013. As far as production value is concerned, there is a clearly defined trend of production during this period. 42% of respondents indicated a production rate of 30%, 7.1% of respondents a 7.1%, 28.6% of the respondents attested to a 28.6% production rate, 14.3% of respondents pegged present production rate at 60% while 7.1% of respondents indicated a production rate of 65%. From the result obtained therefore, it can be said that 78.6% of respondents agreed that present production rate of scheme falls below 50% and only 21.4% falls above the average mark. The implication of this is that the present production efficiency of the Enugu-abo irrigation scheme is far below average. This calls for a revitalization program from the government.

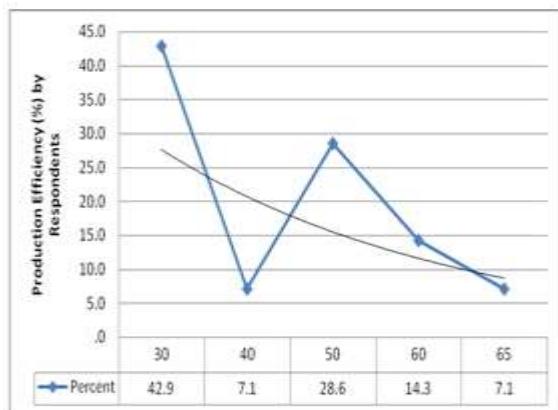


Figure 2: Production rate percentage as obtained from Respondents

VII. TRENDS IN PADDY YIELD

The variation of paddy yield from 1992 to 2013 is shown in figure 3. During early and mid-1992, Enugu-abo produced about 20t but during the 1992 revitalization programme, paddy yield went as high as 25t. The annual rate of production presently as attained is far below 13t which reflects a rapid decline in yield.

The factors affecting the yield differences between are discussed in a subsequent section. Paddy yield in Enugu-abo as seen in figure 3 is in a retrogressing pattern. This calls for revitalization and restructuring programme to enable her produce at an optimum rate.

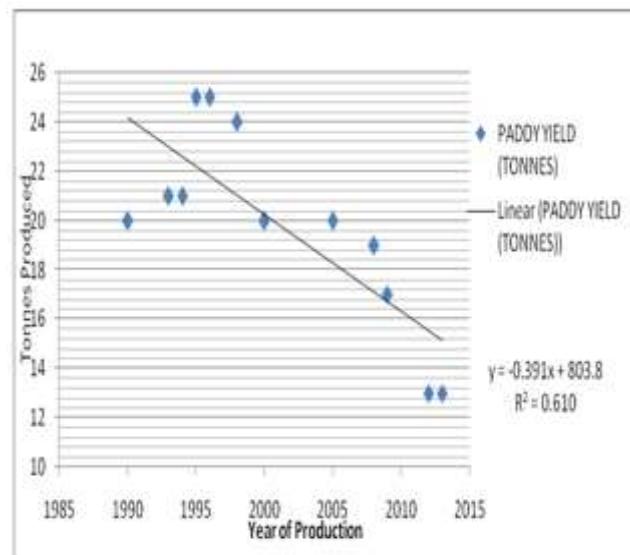


Figure 3: Yield (tonnes) obtained from 1992 – 2013

VIII. TRENDS IN IRRIGATED AGRICULTURE

Trends in Conveyance and Distribution System Canal

Figure 4, shows the trend in conveyance system canal silting. 21.4% of respondents indicated a silting rate of 50%, 7.1% indicated a silting rate of 55%, another 7% indicated 57%, a silting rate of 60% was indicated by 14.3%, another 14.3% of respondents indicated silting rate of 70%; finally, 14.3% indicated a silting rate of 75%. In summary, all respondents (100%) agreed that silting of the irrigation canals is a major problem. This has implications for canal loss in conveyance systems and, consequently, the total water to be diverted/pumped from the source as well as the cost of maintenance and operation.

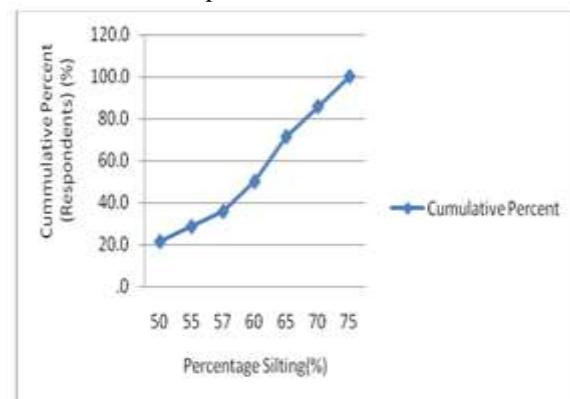


Figure 4: Silting rate (percentage) of canals

On the other hand, the distribution system canal has an effect on the production rate as seen from figure 5. The Higher rate of silting certainly will lead to a reduced production rate. Silting leads to reduced water distribution, growth of vegetation, amongst other problems. This has an adverse effect on production.

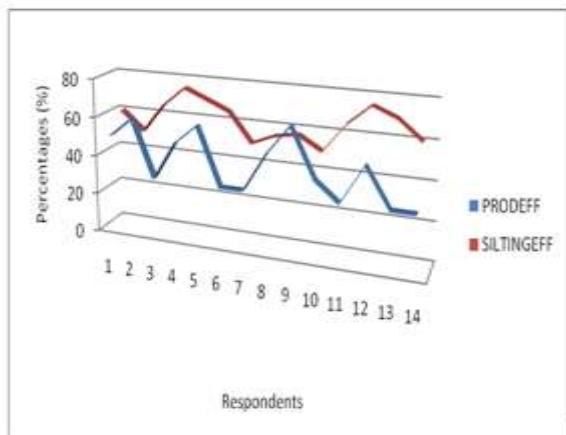


Figure 5: Relationship between silting and production rate

IX. TRENDS IN WATER APPLICATION AND WATER LOGGING

Table 3, indicates water logging of various farmlands. 50% of the respondents have no challenge with water logging of their irrigation fields, 14.3% indicated that their irrigation field is usually water up to 50%, 21.4% indicated a water logging rate of 55%, 7.1% indicated a rate of 60% while another 7.1% indicated a water logging percentage of 65% of farm lands. Summarily, 50% of respondents experience a water logging of farmland areas which to a good extent will affects efficiency of farming operations.

Table 3: Percentage of water logging of fields

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	7	50.0	50.0
	50	2	14.3	64.3
	55	3	21.4	85.7
	60	1	7.1	92.9
	65	1	7.1	100.0
Total	14	100.0		100.0

Water logging was as a result of blocked canals, shallow (silted) canals and lack of maintenance of canals and water ways.

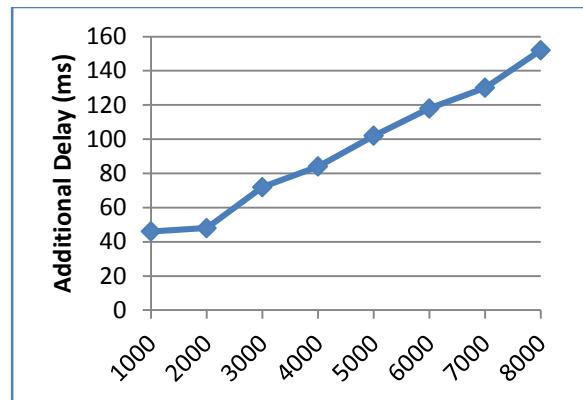


Figure 10: Response Delay Variation vs. Packet Size

X. WATER POLLUTION AND QUALITY TREND

From Figure 6, it can be concluded that water quality at irrigation scheme is above average as 64.3% have no water quality issue. Nevertheless, 7.1% attested to a 20% quality problem, 7.1% insisted on 25% pollution of the irrigated water, 14.3% said pollution rate is 35% while 7.1% pegged pollution percentage at 40%. Percentage of respondents that insist on pollution of irrigated water is 36.7%.

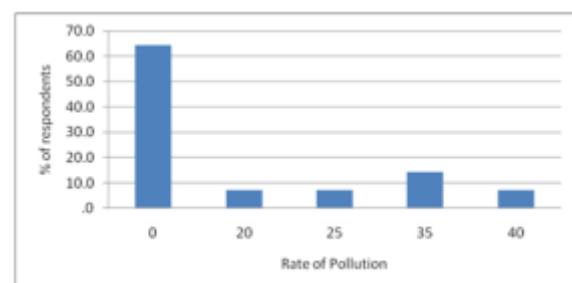


Figure 6: Relationship between silting and production rate

The water pollution as observed from survey is due to a host of activities such as runoff into water ways, indiscriminate dump of sewage and solid waste by companies and bordering towns. This is mainly because of the absence of task force to implement law governing pollution of water ways. From the survey data collected. Chi-square was conducted to ascertain the likelihood of pollution of the water ways. A likelihood ratio of 31.571 was gotten which reflects a possibility of occurrence (Table 4).

Table 4: Classification of Respondents based on Occupation

	Value	df	Asymp. Sig. (2-sided)
Person Chi-Square	56.000 ^a	52	.327
Likelihood Ratio	31.571	52	.989
N of Valid Cases	14		

a. 70 cells (100.0%) have expected count less than 5. The minimum expected count is .07.

XI. SUMMARY

Towards Improvement of Irrigation System Performance at Enugu-abo

In the operation of the Enugu-abo, Discharges passing through the respective regulatory structures in the lateral and sub-lateral canals and tertiary canals are not been recorded. These data are very important to evaluate the water delivery performance of the canals. In the Enugu-abo irrigation system, Solid waste are been disposed very close to the irrigation canal by industries and individuals. This has given rise to point and non-point pollution of Enugu-abo water source. Both groundwater and surface water are two sides of the same coin and they are inter-related. A fair amount of surface water is recharged to the groundwater from the paddy fields. This pollution of Enugu-abo water affects both surface water and groundwater. In the long run, both industry and Enugu-abo irrigation scheme have to work in close cooperation to maintain the quantity and quality of surface water and groundwater. Therefore, there is a need to systematically monitor the water within the Irrigation farm and vicinity to study the impact of irrigation on groundwater quantity and quality, and vice versa. A comprehensive study through detailed water accounting for quantity and quality needs to be undertaken.

Effect of Enugu-abo revitalization.

The resuscitation of the project will give rise to:

Rural Services Sector

Once the project is revitalized, the services sector will flourish to meet the needs and demands of the people in the region. Establishment of health centres, schools, colleges, markets, community centres will take place. Rural health care, education, and family welfare are bound to improve.

Rural Economy

With assured water supply for irrigation, domestic, and industrial use coupled with hydro power availability as well as access to basic amenities, services, employment avenues, and infrastructural facilities, the rural economy is certain to grow. The household per capita income in rural areas is expected

to grow faster than urban areas to reduce rural poverty rapidly.

Overall infrastructural development can be expected to escalate rural land and property prices boosting the economy further. The local administration can generate additional revenue by way of property and land registration, income tax and so on. There will also be an increase in employment and thus on demand for goods and services. The local population is likely to get employment as skilled and unskilled labor in these irrigation farms. Further, avenues of employment will be there for the poor people due to the increased agricultural activities and ancillary industries in the regions. This may help in socio economic upliftment of the project hinterland to a greater extent. More people will also be involved on a long term basis in the operation and maintenance of the projects.

Rural Industries

Many agro-based and other industries may come up due to reliable supplies of water from link canals and increased agricultural activities in the region.

Rural Water Supply

The water supply situation is grim in rural areas. Womenfolk have to walk for miles in search of drinking water, which is often of poor quality. Link canals are so planned as to provide water to both urban centers and rural areas in the command with special emphasis on rural drinking water provisioning. Right of access to clean water is linked with fundamental right to life which the Federal Government aims to provide to common man both in the cities as well as in the villages.

It is worthy to note that the WHO-assisted Irrigation project situated in Enugu-abo, do not cause any environmental deterioration instead it paves way for the inhabitants to explore opportunities that can boost their economic and social stance. A brief summary of the positive impacts of the Irrigation project on inhabitants and environs are enumerated thus:

- Overall increase in production of crops
- Creation of new habitat for animals and bird
- Improved micro climate due to evaporation from the irrigation command area of the project
- Overall improved oxygen production in and around area of irrigation site
- Availability of clean water to the populace. This in turn have aggravated the standard of living of those resident in the area via,
- Gradual urbanization: the project to a large extent have commanded a steady growth rate, this is evident in the concentration of people before and after project implementation,

- Financial resurrection: the financial stance of the people has been improved. Neighbouring towns and villages visit farm/ mill to obtained readily available produce.

XII. CONCLUSION AND RECOMMENDATION

Irrigation farming is a profitable and sustainable venture for the farmers in Enugu-abo. Farmers can make a good fortune out of it.

Irrigation farming can serve as an instrument for alleviating poverty among farmers which is a major item among the MDGs. In conclusion, it is recommended that policy actions can focus on factors, which significantly sustains the agricultural sector of the economy. Also, irrigation and other agricultural development intervention programs such as the Fadama Project (of the Federal Government and the World Bank) should concentrate on the development of storage facilities and provision of enough soft loans to farmers which were identified as major problems militating against irrigation farming.

Farmers are always compelled to sell their produce immediately after harvesting even when the prevailing prices are not favorable to them (Appendix I-A). These product when stored and sold at a later date can command higher prices which will be economically advantageous to the farmers and their households. These will only be attainable if policies and legislation backing revitalization, improved adequate extension services that can train farmers on the use of new technology such as irrigation scheduling and pumping machine operating techniques and sustained maintenance of the scheme is put in place.

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