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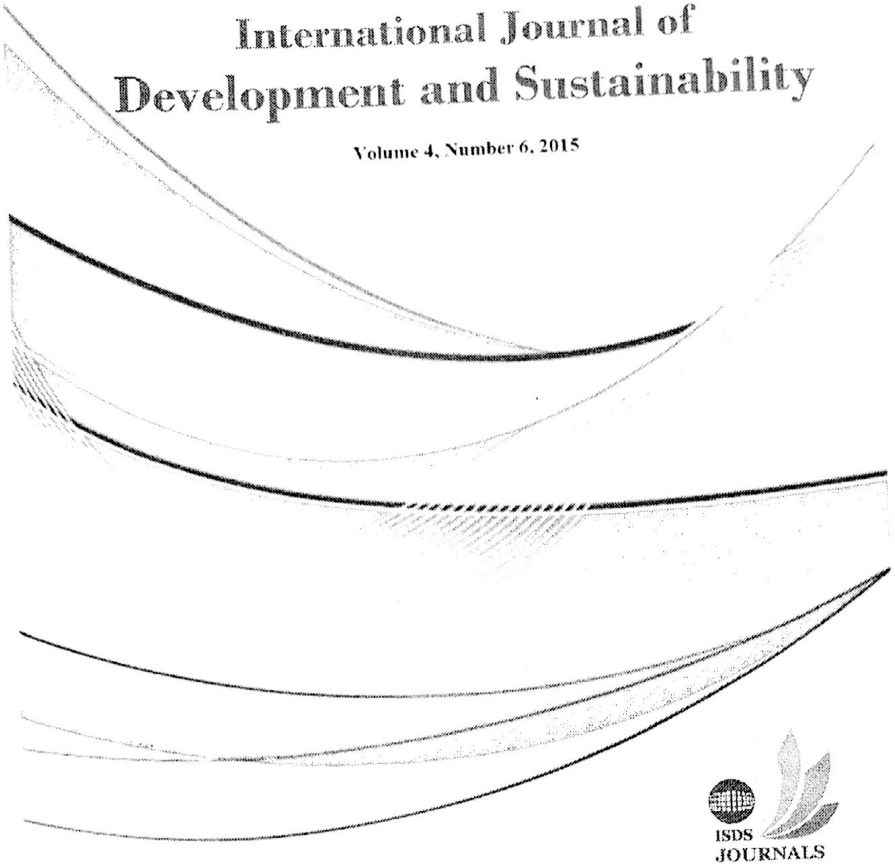

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Profitability of wetland farming: A case study of Eriti wetland in Ogun state, Nigeria

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Abstract

This study examined the profitability of farming around Eriti wetland in Ogun State. The study was based on primary data collected by personal administration of questionnaires /interviews schedule to 80 wetland farmers selected using systematic sampling. The study respondents were asked questions that had to do with their socio-economic status such as age, educational background, gender farm size as well as production costs and returns.Data collected was analyzed through the use of descriptive statistics, budgetary techniques as well as linear programming. The results revealed that an average farmer in Eriti wetland area was a married male (60.3%) aged between 31 and 40 years (34.2%) with primary education (55.9%).The budgetary results showed that the net wetland income was ₦239, 694with returns on investment of ₦3.63. Furthermore, the shadow price of land, labour and intermediate materials was ₦109, 411/ha, ₦164 and₦6.42 respectively implying that each additional unit of this factors put into cultivation will increase farm profit by the associated amount. The study thus concludes that farming around Eriti wetland is profitable and thus recommends that farmers should be encouraged to cultivate fruity vegetable, rice and cassava in order to maximize their profit.

Keywords: Profitability, Wetlands, Net wetland income, Linear programming, Eriti

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1. Introduction

Wetland can be described as an area generally characterized as being moist during an extended period each year (Woodward and Wui, 2001). Wetlands according to Tejuoso (2006) could be forested or non-forested. Forested Wetlands are usually water logged but characterised by the presence of aquatic plants that are mostly mangrove and raffia palms. McCartney et al. (2010), viewed wetland as a valuable agricultural resource since agriculture requires a flat, fertile land with a ready supply of water. One of the most common features linked to agriculture in the world over is wetland due to its widespread and its ability to support a wide range of activities including, farming, fishing, and aquaculture and livestock production amongst others. Universal estimate of wetland is put at 917 million hectares (Mha) with only 131Mha attributed to Africa (Lehner and Döll, 2004). Nigeria wetland extends over 24,009km of land. It consists of inland swamp, fresh waters and mangrove swamp and also fresh and deep water fadama.

The use of wetlands for agriculture has increased over the years as the poor see it as an opportunity to cultivate during the dry season in order to earn more income and further reduce poverty and food insecurity (Frenken and Mharapara, 2002). Also, McCartney et al. (2010) posited that wetlands contribute significantly to the welfare of millions of people. However, there is little recognition of its current extent, its value to poor communities or its future potential. Nevertheless, if wetlands are not properly utilized, the functions which support agriculture, as well as other food security ecosystem services will be destroyed. Thus, this study will examine the profitability of wetland farming by determining the Net Farm Income and also determine the farming enterprise that will maximize farm profit in the study area.

2. Materials and methods

The study was carried out in communities around Eriti wetland. Eriti wetland is located in Obafemi Owode LGA of Ogun state Southwest of Nigeria. It is located on latitude 7.73^0 and longitude 5.79^0. It has an average temperature of 24^{0}C during the dry season and 30^{0}C during the rainy season (Olarewaju et al., 2014). Eriti vegetation is mainly Guinea and derived savannah. Eriti is mainly a farm community and it is popularly known as the home of vegetables as the farmers cultivate more of leafy and fruit vegetables.

The study was based on primary data collected by personal administration of questionnaires/interviews schedule from wetland farmers. The questionnaire included questions on various socio-economic parameters such as age, gender, educational status; farm size as well as production costs and returns. A total of 80 wetland farmers were selected using systematic random sampling. However, only 73 of the wetland farmers gave useful information that was used for the final analysis. The study data were analysed by a combination of descriptive statistics, budgetary techniques, and linear programming techniques.

2.1. Descriptive statistics

The socio-economic characteristics of the respondents were described using descriptive statistics such as mean, percentages, frequencies and tables.

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The socio-economic characteristics of the respondents were described using descriptive statistics such as mean, percentages, frequencies and tables.

2.1.1. Budgetary analysis

The Net Farm Income (NFI) associated with the various crop based enterprise was estimated using budgetary techniques and it is stated as follows:

$$NFI = GFI - TC \quad (1)$$

where; GFI=TR-TVC, GFI is Gross Farm Income, TR is Total Revenue which is the value of crop output and it includes those sold, consumed at home and given as gift, TVC is the Total Variable Cost, and TC is the Total Cost of production including all variable and fixed cost excluding cost of wetland water.

2.2. Linear programming

LP method was used to determine the optimal pattern of wetland allocation among competing farm enterprises by an average farm household in each of the wetlands and the associated shadow prices as used by Matousek and Gärtner (2007). The farm objective was assumed to be maximisation of the Net Wetland Income (NWI), and the LP model was as follows:

$$\text{Maximize } \pi = \sum_{i=1}^{k} \pi_i X_i \quad \text{Subject to } \sum_{\substack{i=1 \\ X_i \geq 0}}^{k} b_{ij} X_i \leq c_j \quad (2)$$

Where; π is the gross Net Wetland Income (NWI) of the average wetland farm operator in the reference wetland, π_i is per hectare NWI (N/Ha) recorded by an average wetland farm operator in the reference wetland, X_i is the area (Ha) of the wetland holding of the average wetland farm operator allocated to the i^{th} enterprise (crop) in the reference wetland, b_{ij} is the quantity of the j^{th} resource - land (Ha), labour (Man-days), cost of intermediate materials like planting materials, fertilisers, etc required to cultivate each hectare of land allocated to the i^{th} enterprise in the reference wetland, and C_j is the average amount of the j^{th} resource that was available to an average farm enterprise operator in the reference wetland.

3. Results and discussion

The main tenet of this study was to examine the profitability of Eriti wetland farming in Ogun state Nigeria and the findings of the study are presented in this section.

3.1. Personal characteristics

Table 1 shows the personal characteristics of the wetland farmers. Most (34.2%) of the wetland farmers were between the ages of 31 and 40 years while some others (23.3%) were between 41 and 50 years. However, a few (11%) of the farmers were above 60 years of age. The implication is that the farmers are within the active age and should be able to cultivate large farms. The presence of aged farmers also connotes efficient use of resources as Ajao et al. (2012) opined that there is a tendency for the older farmers to be more efficient than the younger ones due to experience. More so, younger farmers' have higher probability of

engaging in non- farm activities. The results also revealed that majority (60.3%) of the wetland farmers were males. The drudgery involved in farm activities limits the participation of females in farming activities. Furthermore, women are often more involved in off farm and nonfarm activities such as processing and marketing. Marriage in African settings connotes responsibility and it also contributes to making household labour available. Majority (90.4%) of the farmers around Eriti wetland were married and a larger percentage (55.9%) had just primary education while others had secondary (24.6%) or no formal education respectively (Table 1).

3.2. Budgetary analysis

Four types of crop enterprises were found around the Eriti wetland. These include leafy vegetables, fruit vegetables, rice and cassava-based enterprises. With access to an average of 1.18ha of land, an average farmer operating on the wetland earned a gross income of ₦361,932.07 per hectare per year and Net Wetland Income (NWI) of N 239,694.26 per hectare per year, with a Returns on Investment (ROI) of 3.63 (Table 2). The ROI was higher on an average cassava based farm (5.36) and lower on an average leafy vegetable farm (2.81), while the NWI in Eriti wetland was highest among those farms engaged in fruit vegetable production (₦357,732.71 per hectare). This finding is in line with that of Abdulsalam et al. (2012) who reported that the cultivation of fruity vegetables such as hot pepper, onion, pepper, tomato was the most profitable generating a net farm income estimated at ₦246, 604 per hectare. This he suggested may be due to factors which may have contributed to its high performance could be the combined effect of the crops less cost of processing.

As shown on Table 3, the land available to a typical farmer in Eriti wetland (1.18Ha) will be optimally allocated with a gross margin of ₦329, 451 if 0.54ha of land is utilized for fruity vegetable production, 0.35ha for rice and 0.28ha for cassava. The contribution to the VOF was ₦197111, ₦86692 and ₦45341 from fruit vegetable, rice and cassava enterprises respectively. The results revealed that leafy vegetable production in the study area is not profitable as it contributes nothing to the value of the objective function. More so the ROI for leafy vegetable was lower in the study area. The shadow price of land in the wetland was found to be ₦109, 411/Ha, while those of labour and intermediate materials were respectively ₦164 and ₦6.42. The estimate of the shadow price of land implies that farmers in the study area will make additional profit of ₦109, 411 for each additional hectare of land put into agricultural cultivation. In addition, the result of the shadow price indicates that land, labour and intermediate materials were limited in the study area and this collaborates with the findings of Odine et al. (2013) who found land and labour to be limiting factors around the Lagos wetland. However, increase in the size of land cultivated would translate into more profits than labour and intermediate materials because land was found to be more limited in the study area. This is because wetlands in the study area were put into use for other activities such as fishing, sand mining and other artisans.

Table 1. Distribution of Respondents by Personal Characteristics

Description	Frequency	Percentages (%)
Age (years)		
Below 30	11	15.1
31-40	25	34.2
41-50	17	23.3
51-60	12	16.4
Above 60	8	11.0
Gender		
Female	29	39.7
Male	44	60.3
Marital status		
Married	66	90.4
Single	2	2.7
Widow(er)	5	6.8
Education level		
None	14	19.2
Primary	41	55.9
Secondary	18	24.6
Household size		
1-3	33	45.2
4-6	21	28.8
7-9	11	15.1
10-12	6	8.2
Above 12	2	2.7
Distance from home to wetland		
Below 1km	61	83.6
1-3km	9	12.3
Above 3km	3	4.1
Years spent around wetland		
5-10	14	21.2
11-15	11	16.7
16-20	12	18.2
Above 20	19	28.8

4. Conclusions and recommendations

The main aim of this study was to determine the profitability of farming around eriti wetland in Ogun state. Based on the findings the study concludes that farming around Eriti wetland was mainly done by males who are married and aged between 31 and 40 years. Also, the major crops cultivated around the wetland were leafy vegetables, fruity vegetables, rice and cassava respectively with a NWI of ₦246, 604 per hectare. However, fruity vegetable, rice and cassava were the main crops found to maximize the use of the land and profit of the farmers. In view of the above, the study recommends that farmers around eriti wetlands should be encouraged to cultivate more of fruity -vegetables, rice and cassava on the available lands as these will enable them optimize the use of the land and further increase farm profit.

Table 2. Per hectare costs and returns to various crop-based enterprises at Eriti Wetlands

Enterprise	Value of Outputs (N/Ha_	Cost of variable Inputs (N/Ha)			Gross Margin (N/Ha)	Fixed Costs (N/Ha/yr)	Net Wetland Income	ROI
		Materials	Labour	TVC				
Eriti wetland								
Leafy Vegetable	372,350.00	33,545.00	108,132.35	143,427.35	228,922.65	7,299.34	221,623..30	2.81
	(84,705.83)	(6,881.57)	(23,807.51)	(29,538.36)	(60,557.62)		(60,557.62)	(0.35)
Fruit Vegetable	450,416.67	37,400.00	34,992.95	85,384.61	365,032.05	7,299.34	357,732.71	4.74
	(107,866.56)	(6,315.06)	(8,882.44)	(17,959.50)	(89,924.97)		(189,924.97)	(1.32)
Rice	347,500.00	18,700.00	75,416.86	96,566.86	250,933..14	7299.34	243,633.80	4.32
	(152,500.00)	(3,056.00)	(45,386.86)	(60,836.86)	(91,663.14)		(91,663.14)	(1.14)
Cassava based	191,547.63	6,425.00	28,771.52	35,196.52	156,351.10	7299.34	149,051.76	5.34
	(58452.38)	(1,075.00)	(9,735.48)	(8,660.48)	(49,791.90)		(49,791.90)	(0.34)
Average Enterprise	361,932.07	29,288.24	82,039.95	114,938..48	246,993.60	7299.34	239,694.26	3.63
	(61,876.48)	(4,885.67)	(16,605.92)	(20,304.93)	(48,117.880)		(48,117.88)	(0.39)

Source: Field Survey, 2010

Table 3. LP results for optimum resource use in Eriti Wetland

Enterprise	Leafy vegetable	Fruit Vegetable	Rice	Cassava			
Initial Tableau							
GM/Ha	228922.65	365032.05	250993.14	156351.10	**VOF=**	0	
Allocation (Ha)	0	0	0	0			
Resource requirement					**Used**	**Available**	
Land	1	1	1	1	0	1.18	
Labour	189.22	93.24	129.78	54.37	0	105.34	
Intermediate Material cost	33545.00	37400.00	18700.00	6425.00	0	28544.12	
Final Tableau							
GM/Ha	228922.65	365032.05	250993.14	156351.10			
Allocation (Ha)	0	0.54	0.35	0.29			
Contribution to VOF	0	197117.31	86992.60	45341.82	**VOF=**	**329,451.50**	
Resource requirement					**Used**	**Available**	**Shadow price**
Land	1.00	1.00	1.00	1.00	1.18	1.18	109,411.66
Labour	189.22	93.24	129.78	34.37	105.34	105.34	164.88
Intermediate Material cost	33545.00	37400.00	18700.00	6425.00	28544.12	28544.12	6.42

Source: Data from field survey, 2010

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