CONTRIBUTIONS OF THE FADAMA II PROJECT TO AQUACULTURE DEVELOPMENT IN OGUN STATE, NIGERIA

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ABSTRACT

The National Fadama Development Project (FADAMA II) was an idea conceived by the World Bank, Africa Development Bank and Federal Government with active involvements of the State and Local governments as quick and sustainable agriculture and rural development strategy targeted at dry season farming activities and related agro–processing and marketing. This study was carried out to assess the contributions of Fadama II project to aquaculture development in Ogun State, Nigeria. 120 fish farmers were selected using multi-stage sampling techniques and structured, pre-tested and validated interview guides to elicit information from fish farmers. The data collected were analyzed using descriptive and inferential statistics. The study revealed that majority of the respondents were male (60.8%), married (84.2%), cultured *Clarias spp.* only (62.5%) and also had large household sizes (63.3%), secondary education (44.2%), source of aquaculture messages was mainly from telephone (GSM-66.7%) and extension guides/bulletins (75.8%), and generated large annual fisheries' income from Fadama aquaculture (65.8%). Fadama II project had contributed positively to acquisition of productive asset, poverty reduction, increased income, rural infrastructure, provision of input supports, project management, reduced fish culture period, increase in overall fish yield, expansion of fishery business, improvement in livelihood, and demand-responsive advisory services. The results also showed that majority of the fish farmers considered both lack of finance and high cost/lack of construction equipment as serious factors affecting their fish farming. The results of Chi-square analysis (X^2) revealed that there was a significant relationship between the Fadama II project and aquaculture development in provision of Pilot Assets Acquisition Support ($X^2 = 52.050$; $P<0.05$). Based on the findings, it was recommended that more Fadama facilitators should be employed to provide technical knowledge to fish farmers on how to use some equipment and on how to improve their fish farming business and productivity.

Keywords: Fadama, Community-driven development, Aquaculture development, Nigeria

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INTRODUCTION

Fish cultured in salt (marine) water is called mari culture (Omotayo *et al.*, 2006).

Aquaculture, the farming of aquatic organisms in controlled environment was introduced to Nigeria in the early 1950s and fish production through aquaculture has risen steadily from a few hundred kilograms to over 45,000 metric tonnes in 2004 (FAO, 2007). Prior to the 1990s, aquaculture development in Nigeria was driven by socio-economic objectives including; nutrition, improvement of rural communities; generation of additional family income; creation of employment and diversification of income generating activities. It was promoted by international organizations and agencies and the government at Federal, State and Local Government levels. Today, aquaculture is the fastest growing livestock production sector in Nigeria, with a growth of about 29% in 2006 alone. This is because demand for fish is on the increase in line with population growth, while yields from capture fisheries are on the decline, even globally (Delgado *et al.*, 2003).

Fish farming in Nigeria today is responsible for about 9.7% contribution (53,355 tonnes in 2005) to the annual supply of 705,000 metric tonnes which lags far behind the annual fish demand of 1,865,000 metric tonnes. Most of the fish consumed by Nigerian citizens, which accounts for 55% of the total protein intake sources, is from fishing in our natural water bodies (marine, estuarine, lacustrine and riverine biotype) which is far being over fished as Total Allowable Catch (TAC) has always exceeded the Maximum Sustainable Yield (MSY) of 415,000 Metric tonnes. Aquaculture is, therefore, the only visible and sustainable fish production alternative which can ensure the satisfaction of

our fish self-sufficiency quests. Thus, profitable investment opportunity exists in this sector (Gbolade and Adekoya, 2007).

There is a saying that; "Give a man fish, you would have given him food for the day, teach him to fish, you would have given him food for the rest of his life." Another saying is "Where there is water, there must be fish". These suggest that training people to become better fish farmers is not only an empowerment strategy, it is also the only way by which some of our natural resources can be creatively tapped for the good of all (Omotayo *et al.*, 2006).

Small holder agriculture is the dominant occupation of rural Nigerians which is mainly rain-fed and characterized by low-land and labour productivity. This is because the country is endowed in underground and surface water reserves, rich pasture and favourable agro-ecological conditions in the country's low-lying planes with alluvial deposit called *fadama* (Fadama, 2007). Fadama is a word borrowed from the Hausa language. It is called *Akuro* or *Abata* in Yoruba Language which means a bottom land very close to river which is commonly used for pre season or early cultivation.

The National Fadama Development programme is a World Bank, Africa Development Bank, Federal Government, State and the Local Government's funded programme in Nigeria. Due to the fact that poverty remains widespread in Nigeria, where 70 percent of the rural population lives below the poverty line, competition and conflict in the phase I, Africa Development Bank joined with Federal Government and World Bank in an attempt to include other aspects of farming into the Fadama such as Livestock farming, Fisheries, Hunting, Crop farming,

Pastoral farming, and Agro processing (NFDP II, 2003; Nkonya *et al.*, 2008). Fadama II project aims to reduce poverty by supporting communities to acquire infrastructure and productive assets, providing demand-driven advisory services, increasing the capacity of communities to manage economic activities and reducing conflicts among resource users (Nkonya *et al.*, 2008). It also aims at boosting agricultural production through the use of small scale irrigation technology known to be cost effective thereby increasing the income and standard of living of the beneficiaries (OGSFDO, 2005).

Objectives of the Study

The broad objective of the study is to assess the contributions of Fadama II project to aquaculture development in Ogun State, Nigeria.
The specific objectives are to:

- describe the socio economic characteristics of fish farmers in the Fadama project in the study area;
- identify the factors affecting fish farming in the study area;
- assess the contributions of the Fadama II project to aquaculture development in the study area;
- ascertain the sources of information available to the farmers on fish farming; and
- proffer useful recommendation based on the research finding.

Conceptual analysis

The word *fadama* as mentioned earlier is the Hausa name for irrigable land-area, flood plains and low lying areas underlined by shallow aquifers found along Nigeria's river systems. (NFDP II, 2005). The Fadama project utilizes the bottom-up participatory concept to development planning and is based on the Community Driven Development (CDD) approach. The main thrust of the project is to enhance the capacity of beneficiaries to maximally access, exploit and utilize all the services and opportunities provided by the project to create jobs, improve their well-being and reduce poverty in such a manner to ensure the sustainability of agricultural resources and the rural areas.

The First National Fadama Development Project 1 (NFDP I) came into inception in 1992 and continued to 1999. It was designed to promote dry season farming and thereby support and sustain the activities of Agricultural Development Project (ADPs) in some States in Nigeria. NFDP I only took interest in crop farming and largely neglected support for post production activities such as commodity processing, storage, and marketing. Thus, there was conflict among the various users of Fadama in the community, which resulted in loss of lives especially in the northern parts of the country.

The introduction of the Second National Fadama Development Project (NFDP II) led to the settlement of the conflict among the Fadama users. It was an idea conceived by the World Bank/Africa Development Bank (AFDB) and Federal Government with the active involvement of the State and Local Government and sustainable agricultural about rural development project targeted at dry season farming activities and related agro-processing and marketing (NFDP 11, 2005). The NFDP11 came about as a result of the success recorded in the first National Fadama Development project (NFDP1) by some of the States that participated in the NFDP1 of which Ogun State is one.

The Fadama II is being financed from a $100million World Bank credit with Federal,

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State and Local Government's full participation. Participating states are to pay a sum of ₦38m as counterpart fund for successful take-off of the project while participating Local Governments are expected to pay the sum of ₦1m as counterpart fund in order for them to benefit from the programme.

The project development (NFDP-II) objectives include raising rural productivity and sustainably increasing the income of at least 50 percent of Fadama users by at least 20 percent, building capacity to manage economic activities, supporting acquisition of productive assets, developing rural infrastructure, and reducing conflicts among resource users by at least 50 percent (Nkonya et al., 2008). It empowers the local communities to take charge of their own development agenda, supporting improved management and increased food production (Hansen and Allen, 2006).

Fadama II Project provides the following benefits:
- Provision of equipment and infrastructure needed to boost production and processing to avoid post harvest wastage;
- Fadama resource users would be exposed to better trading in the handling and management of their assets;
- Fadama resource users would be encouraged to acquire their LDPs; and
- Infrastructure such as good access farm road, water supply system including irrigation and power support systems generators and water pumps would be provided.

The categories of people to benefit include: vegetable farmers, crop farmers, fisher folks, hunters, pastoralists and agro-processors through a community driven development approach (NFDP – II, 2003;

Nkonya et al., 2008).

METHODOLOGY
Study Area
The study area was Ogun State, a state created out of the old Western State of Nigeria in 1976. It is situated within longitude $20^\circ45'$E and $3^\circ55'$E and latitude $7^\circ01'$N and $7^\circ8'$N in the tropics and located in the rain forest belt, bounded in the West by the Benin Republic, in the South by Lagos State and the Atlantic Ocean, in the East by Ondo State and in the North by Oyo and Osun State. Ogun State covers a land area of 16,409.28 square kilometers which is less than two per cent of the country's landmass (Figure 1, Olaoye et al., 2007). The natural vegetation ranges from fresh-water swamp with mangrove forest in the southwest and diverse forest communities to the woody Guinea savannah in the southwest. The rainy season starts around the middle of March and continues until late October. The dry season starts in November and lasts until February in most locations in the state. Like most states in the southwest, the state is highly urbanized with a population of approximately 3.73 million people and growth rate estimated at 3 per cent annually (The National Population Commission [NPC], 2006).

The Ogun State Agricultural Development Programme (OGADEP) divided Ogun State into four Agricultural Extension Zones based on ecological views for effective, adequate and complete improved technologies dissemination, namely: Ilaro, Ikenne, Abeokuta and Ijebu-Ode which comprises twenty Local Government Areas (LGAs) out of which ten LGAs are involved in the Fadama Projects. These are: Abeokuta North, Ifo, Ijebu North, Ijebu North-East, Ipokia, Obafemi Owode, Odogbolu, Yewa North,

Ijebu Ode and Ogun Waterside. Four Local Government Areas were purposively selected in the State, one from each zone: Ifo LGA (Abeokuta zone), Yewa North LGA (Ilaro zone), Obafemi Owode LGA (Ikenne zone) and Ijebu North LGA (Ijebu Ode zone). The choice of these LGAs for the study were based on the Advisory Services Activities (ASA), hence areas that exploit aquaculture practices (fish farming) most.

Sources of Data

Both primary and secondary data were used for the study. Primary data were obtained through the use of structured, interview guides and direct observation. Information was sought on socio-economic characteristics of the small scale fadama fish farmers, fish production variables, factors affecting fadama aquaculture, source of information and contribution of the Fadama II project to aquaculture development in Ogun State, Nigeria. Secondary data were sourced from relevant materials, journals, literature, internet and annual reports.
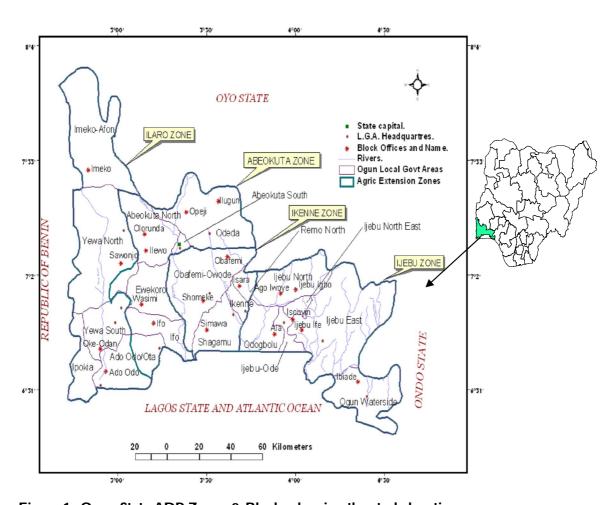

Figure 1: Ogun State ADP Zones & Blocks showing the study locations

Sample Size and Sampling Techniques: Thirty fish farmers were randomly selected from each of the selected four LGAs (Table 1) making a sample size of one hundred and twenty (120) respondents.

Table 1: Sample number and study location

Fadama Zone	Number of respondents	LGAs study	Location
Ikenne	30	Obafemi-Owode	Eriti, Oba, Eerin-Oba, Mokoloki, Odofin-Bantile, Imedunla, Mowe, Asanle & Orile-Imo
Ilaro	30	Yewa North	Imasayi, Igbogila, Sawonjo
Ijebu-Ode	30	Ijebu-North	Ijebu-Igbo, Ago-Iwoye (Agan & Ayegbami)
Abeokuta	30	Ifo	Coker, Lumesi, Solu, Obelawo & Mapara- Moboluwaduro
Total	120		

Analytical Procedures: The data collected were analyzed using Statistical Package for Social Scientist (SPSS) version 16 for both descriptive and inferential statistics. The descriptive statistics such as, frequency counts, percentages, mean and standard deviation were used to describe the socio-economic characteristics including the age, household size, pond size, marital status, mode of farming and business experience of the fish farmers, factors affecting fadama aquaculture, source of information used and contribution of the Fadama II project to fish farming development. The technique was used to group and summarize the data obtained from the field. Chi square (π^2) analysis was used to make inferences and testing of hypothesis at a priori five percent level of probability.

RESULTS AND DISCUSSION
Socio-economic profiles of Fadama fish farmers

Table 2 shows the socio-economic profiles of the respondents. The mean age of the respondents was 44.5 years old (SD= 8.18). Many of the fish farmers (39.2%) involved in fadama aquaculture fell between the age distributions of 41-50 years. From the results, one can also infer that Christianity (61.7%) was mostly practiced than any other religion; 63% of the fish farmers had a large household size (6-10). These results showed that the *fadama* farming embraced the use of extended family members as labour in order to reduce the cost of hiring labour. Many of the fish farmers (44.2%) had secondary education.

Majority of the respondents (65.8%) gener-

ated between ₦100,000 and ₦500,000 annual income from fishery. Many (62.5%) of the fish farmers cultured *Clarias spp.* more than any other fish species. The reasons being that the species has a high market value, hardy, more tolerant and it can attain market size under few months of culture (Olaoye *et al.,* 2007). Many of the respondents (31.7%) claimed that the distance of the fadama facilitators' office was not far away from their fish farm site, because the distance was less than 1 km. This implied that fish farmers' assess to the use of some technologies and dissemination of new ideas on how to improve the fish farming systems and productivity will be enhanced. Majority of the fish farmers produced large quantities of fish (output) ranging from 2,000-3,000 kg of fish per production cycle. This indicated that Fadama II projects had contributed to the increase in their productivity as well as improved their economic status.

Table 2: Socio-economic characteristics of the respondents

Characteristics	Frequency	%	Mean	Standard Deviation
Age (Years)				
Less than 30	4	3.3		
31 – 40	42	35.0		
41 – 50	47	39.2		
Above 50	27	22.5		
Total	120	100.0	44.5	8.18
Sex				
Male	73	60.8		
Female	47	39.2		
Total	120	100.0	-	-
Marital Status				
Single	2	1.7		
Married	101	84.2		
Divorced	10	8.3		
Widowed	7	5.8		
Total	120	100.0	-	-
Educational Status				
Adult Literacy	7	5.8		
Pry Education	12	10.0		
Secondary Education	53	44.2		
Tertiary Education	48	40.0		
Total	120	100.0	-	-
Religion				
Christianity	74	61.7		
Islam	46	38.3		
Total	120	100.0	-	-

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Table 2: Socio-economic characteristics of the respondents (Continued).

Characteristics	Frequency	%	Mean	Standard Deviation
Household Size				
1 - 5	21	17.5		
6 - 10	76	63.3		
Above 10	23	19.2		
Total	120	100.0	-	-
Annual Income Level Fishery made Income Ranges in Naira				
Less than 100,000	4	3.3		
100,001 - 500,000	79	65.8		
500,001 - 1,000,000	27	22.5		
1,000,001 - 100Mil	6	5.0		
Above 100 Mil	4	3.3		
Total	120	100.0	-	-
Secondary made income range in Naira				
Less than 10,000	1	0.8		
10,000 - 50,000	7	5.8		
50,001 - 100,000	86	71.2		
No response	26	21.7		
Total	120	100.0	311850	188920.3
Other Occupation				
Crop Farming	46	38.3		
Trading	16	13.3		
Teaching	11	9.2		
Civil Servant	28	23.3		
Livestock Farming	12	10.0		
Photographer	7	5.9		
Total	120	100.0	-	-
Business Experience				
1 - 5	36	30.0		
6 - 10	49	40.8		
11 - 15	21	17.5		
16 - 20	9	7.5		
Above 20	5	4.2		
Total	120	100.0	-	-

Table 2: Socio-economic characteristics of the respondents (Continued)

Characteristics	Frequency	%	Mean	Standard Deviation
Distance of fish farm site to farmers' home (km)				
Less than 1				
1 – 2	5	4.2		
2 – 3	12	10		
3 – 4	22	18.3		
Above 4	28	23.3		
Total	53	44.2	-	-
	120	100.0		
Distance of fish farm site to fadama facilitator's office (km)				
Less than 1	38	31.7		
1 – 2	26	21.7		
2 – 3	18	15		
3 – 4	16	13.3		
Above 4	22	18.3		
Total	120	100.0	-	-
Quantity of fish harvested/ production cycle				
Less than 1,000				
1,000 – 2,000	20	16.7		
2,001 – 3,000	15	12.5		
3,001 – 4,000	32	26.6		
4,001 – 5,000	20	16.7		
Above 5,000	12	10		
Total	21	17.5		
	120	100.0	-	-

Source: Field survey, 2008

Factors affecting aquaculture development in the study area

Table 3 revealed the various factors which affect fish farming development in the study area and these were rated according to the degree of severity. Details in Table 3 show that (74.2%) and (53.3%) of the respondents rated that high inflation rate in the economy and high cost of most fish feed ingredients and its competitive use by livestock farmers as problems. Most of the fish farmers depended on imported quality fish feeds which were expensive and not affordable (Omitoyin, 2007). Many of the fish farmers (49.2%) considered both lack of finance (credits and capital) and high cost or lack of construction equipment as serious factors affecting their fish farming. It indicated that the situations were made more difficult by the unwillingness of financial

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institutions to grant loans to the farmers even when loans are given; it is usually at very high interest rates (Omitoyin, 2007).

Table 3: Distribution of respondents by factors affecting aquacultural development

S/No	Problems	Very Serious (4) %	Serious (3) %	Not a Problem (2) %	Don't Know (1) %
1	Lack of appropriate land	7.5	31.7	60.8	0.0
2	Old Age	1.7	5.8	92.5	0.0
3	Insufficient Labour	24.2	39.2	36.7	0.0
4	Distance of the extension agents' office to Farm site	8.3	29.2	52.5	10.0
5	Distance of fadama facilitators' abode to farm	1.7	10.0	88.3	0.0
6	Poaching of cultured fish	9.2	32.5	52.5	5.8
7	Diseases & Predators	14.2	41.7	37.5	6.7
8	High inflation rate in the economy	74.2	23.3	2.5	0.0
9	Lack of finance	45.8	49.2	4.2	0.8
10	High cost/lack of construction equipment	25.8	49.2	25.0	0.0
11	Marketing of fish & fish product	10.8	45.0	44.2	0.0
12	Poor quality fish seeds	10.8	33.3	54.2	1.7
13	Poor genetic brood stock fish	7.5	41.7	49.2	1.7
14	High cost of fish feed	53.3	25.8	20.8	0.0
15	Testing of water quality parameters	6.7	30.0	58.3	5.0
16	Technical skills & knowledge	1.7	20.8	77.5	0.0

Source: Field survey, 2008

Contributions of the Fadama II project to aquaculture development in the study area

Table 4 shows that majority of the respondents (90.0%) had one training or the other. The choice of training as indicated in the result shows that 37.5% of the fish farmers had training in two or more of the fish farm training. About fifty four percent (54.2%) of the respondents were not given inputs support by Fadama II project while 45.8% were given inputs support, especially in Ijebu -Ode and Ikenne zones compared to the remaining two zones.

In terms of Pilot Asset Acquisition Support (PAAS), most of the fish farmers (84.2%) were assisted with pilot assets. The results

also revealed that 47.5% of the respondents benefited from the purchase of pumping machine, 41.7% benefited from procurement of cutlasses, 39.2% benefited from others (procurement of water pumps and deep freezers) while majority of the fish farmers did not benefit from the purchase of pelleting machines. Most (93.4%) of the respondents claimed that the contributions of the Fadama II projects increased their profit or revenue while 84.2% said it led to expansion of their fishery business.

Table 4: Contributions of Fadama II project to aquaculture development in Ogun State by the respondents

S/N	Fadama II Projects for fish farming activities	Frequency	%
1	Fish farming Training (ASA)	108	90.0
2	Area of training imparted:		
	Fish Breeding	11	9.2
	Fish Feed Production	23	19.2
	Fish Handling & Preservation	1	0.8
	Fish Production & Management	28	23.3
	Fish Farm Management	12	10.0
	Two/more of the above	45	37.5
3	Provision of inputs support	55	45.8
4	Provision of PAAS	101	84.2
5	Area of intervention:		
	Purchase of overhead tank	11	9.2
	Purchase of generator	5	4.2
	Pelleting machine	0	0.0
	Hatchery pond	5	4.2
	Drag net	27	22.5
	Construction of deep well	21	17.5
	Purchase of pumping machine	57	47.5
	Construction of earthen pond	13	10.8
	Construction of concrete tank	27	22.5
	Purchase of weighing machine	34	28.3
	Construction of cold room	20	16.7
	Procurement of wheel barrow	10	8.3
	Procurement of Shovel	10	8.3
	Procurement of Cutlasses	50	41.7
	Feed mill machine building	37	30.8
	Knapsack Sprayers	34	28.3
	Reservoir tanks	30	25.0
	Impact of contribution:		
	Reduced fish culture period	79	65.9
	Increase in overall fish yield	95	79.2
	Expansion of fishery business	101	84.2
	Increase in profit/revenue	112	93.4
	Improvement in livelihood	92	76.7

Source: Field Survey, 2008

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Sources of information for aquaculture development in the study area

Access to information is one of the most valuable resources in agricultural development (Fabusoro *et al.*, 2007). Data in Table 5 show that majority of the respondents (66.7%) obtained information on the fish farming through telephones (GSM) while (0.8%) of the respondents obtained information on aquaculture development via village criers.

Table 5: Distribution of the respondents by sources of information on Aquaculture development

Variables	Always use (1)		Occasionally use (2)		Don't use (3)	
	Freq	%	Freq	%	Freq	%
Extension agent	25	20.8	55	45.8	40	33.3
Radio broadcast	45	35	61	50.8	17	14.2
Television broadcast	31	25.8	70	58.3	19	15.8
Newspaper	33	27.5	42	35	55	37.5
Friends and relations	65	54.2	34	28.3	21	17.5
Village criers	1	0.8	40	33.3	79	65.8
Fadama facilitators	43	35.8	77	64.2	0	0.0
Telephone (GSM)	80	66.7	38	31.7	2	1.7
Extension guide/bulletin	26	21.7	91	75.8	3	2.5
Total	120/v	100/v	120/v	100/v	120/v	100/v

Source: Field survey, 2008. V= Variable

Results of Chi-square (π^2) analysis of Fadama II Project and aquaculture development

Entries in Table 6 revealed the results of chi-square analysis of the contributions of Fadama II projects to aquaculture development, since there was significant relationship between the provisions of Pilot Asset Acquisition Support (PAAS) and aquaculture development (π^2 = 52.050, P = 0.002) while there was no significant relationship between the inputs support and aquaculture development (π^2 = 0.899, P = 0.638). Also, there was no significant relationship between improved fish seeds and aquaculture development (π^2 = 11.958, P = 0.638) while there was a significant relationship between provision of drag nets and aquaculture development (π^2 = 20.355, P = 0.000).

Table 6: Distribution of the respondents by result of Chi-square analysis of Fadama II project to Aquaculture development

Variables	π^2 calculated	DF	P value	Decision
Provision of PAAS	52.050	26	0.002**	Reject Ho (S)
Provision of inputs support	0.899	2	0.638	Accept Ho (NS)
Improved fish seeds	11.958	6	0.063	Accept Ho (NS)
Provision of drag nets	20.355	4	0.000**	Reject Ho (S)

Source: Field Survey, 2008
π^2 = Chi – square value, DF = Degree of freedom
P = Probability – Level of significance (shows the strength of the   relationship)
** = Significant (S) at $P \leq 0.05$,   NS = Not significant

CONCLUSION AND RECOMMENDATIONS

The study showed that the Fadama II project had contributed positively to acquisition of productive asset, poverty reduction, increased income, rural infrastructure, provision of input supports, project management, reduced fish culture period, increased in overall fish yield, expansion of fishery business, improvement in livelihood, and demand-responsive advisory services, as well as promoted development in the rural community where Fadama farming was being practiced.

Based on the finding of this study, it is recommended that assistance to fish farmers should focus on the supply of inputs at subsidized rate. Standardization of the price of the outputs of Fadama farmers should be a priority. More extension workers (fadama facilitators) should be employed to give the technical knowledge to fish farmers on how to use some equipment and dissemination of innovations on how to improve their fish farming system and productivity. The initiator of this programme (Federal Government, World Bank, and Africa Development Bank) should ensure the continuity of aquaculture in the Fadama project.

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