



**MARKET  
DEVELOPMENT  
IN THE NIGER DELTA**

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# BASELINE SURVEY REPORT, AQUACULTURE INTERVENTION IN THE NIGER DELTA REGION, NIGERIA

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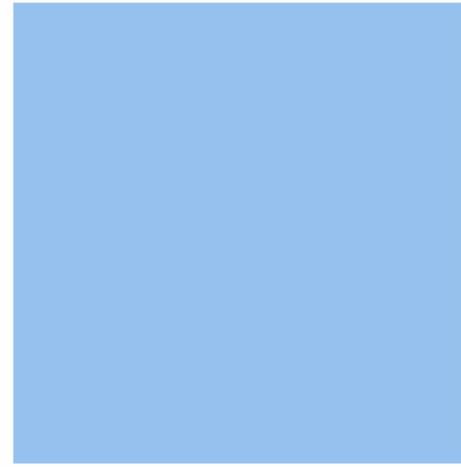
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IN THE NIGER DELTA**



# **BASELINE SURVEY REPORT, AQUACULTURE INTERVENTION IN THE NIGER DELTA REGION, NIGERIA**

**June 2015**



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## Abbreviations and Acronyms

ADP	Agricultural Development Project
ATA	Agricultural Transformation Agenda
ARAC	African Research Aquaculture Center
DFID	Department for International Development
FGDs	Focus Group Discussions
GDP	Gross Domestic Product
HACCPs	Hazard Analysis Critical Control Points
KII	Key Informant Interview
LAPO	Live Above Poverty
LGAs	Local Government Areas
MADE	MARKET Development for the Niger Delta
MDAs	Ministry Department and Agencies
M4P	Making Markets Work for the Poor'
M&E	Monitoring and Evaluation
NAEC	Nigerian Agricultural Enterprise Curriculum
NGOs	Non Governmental Organizations
PIND	Partnership Initiatives in the Niger Delta
SMEs	Small and Medium Entrepreneurs



## Essential Indicator Fact Sheet

S/N	INDICATOR	RELEVANT BASELINE MEASUREMENT	BASELINE VALUE
1	Number of small/medium scale farmers, entrepreneurs, labourers and workers	Average size of daily workers per small/medium scale farm	Bayelsa = 3 persons - Rivers = 2 person
		Average part-time/full-time workers employed per farm	- Bayelsa = 1.6 persons - Rivers = 2 persons
2	Number and type of trainings	Number of trainings ever attended per fish farmer	- Bayelsa = 4 workshops in three years - Rivers = 3 workshops in three years
3	Number of farmer association members trained	Proportion of farmers belonging to an association	- Bayelsa = 22% - Rivers = 26%
4	Number of small/medium scale farmers, adopting record keeping practices.	Proportion of fish farmers keeping records	- Bayelsa = 68% - Rivers = 76%
5	Number of direct beneficiary and indirect beneficiary small/medium scale farmers reporting increased yield (kg) due to applied better production techniques	Average farm size per small/medium scale fish farmers	- Bayelsa = 2.4 ponds - Rivers = 3 – 6 ponds
		Average annual fingerlings stocked per farmer	- Bayelsa = 4,964 fingerlings - Rivers = 5,520 fingerlings
		Average annual yield in volume/quantity in kilogramme or Tons	- Bayelsa = 1,628kg - Rivers = 3,584kg
6	Number of direct beneficiary and indirect beneficiary small/medium scale farmers reporting increase in other volumetric measures of harvested fish derived from records due to reduced fish loss	Average cost of productive assets	- n/a
		Average cost of pond preparation in 2014	- Bayelsa = N221,524 - Rivers = N200,608
		Average cost of seedlings,	- Bayelsa = N21.8 per seed - Rivers = N17.20 per seed
		Average cost of feed	- Bayelsa = N4,566.40 per bag - Rivers = N4,566.00 per bag
		Average cost of harvest/ tons, etc.	- Bayelsa = N243.03/kg - Rivers = N331.72/kg
7	Number of direct beneficiary and indirect beneficiary small/medium scale farmers reporting increased income	Average annual revenue/income by fish farmer in 2014	- Bayelsa = N1,972,530 - Rivers = N2,175,488
9	Marketing aspects/ business linkages with other market actors	% of fish volume sold as fresh	- Bayelsa = 80% - Rivers = 75%
		% of fish volume sold as smoker size	- Bayelsa = 20% - Rivers = 25%
		Ownership of kilns by farmers	- Bayelsa = 45% traditional kiln

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			- Rivers = 41%
<b>10</b>	Farmers demographic characteristics	Average Household size	- Bayelsa = 2.6 members - Rivers = 4.29 members
		Average household income	- Bayelsa = N301,724 - Rivers = N950,000



## EXECUTIVE SUMMARY

MARKET Development for the Niger Delta (MADE) is a DFID funded development programme that uses a 'making markets work for the poor' (M4P) approach to generate pro-poor and inclusive economic growth in the non-oil sectors of the Niger Delta Region. MADE's work in the aquaculture sector is driven by a strategy to improve the productivity and competitiveness of fish farmers by addressing the sector's key constraints: (a) poor fish-farmer production knowledge; (b) poor business management knowledge; (c) low market penetration by some feed companies and hatcheries and (d) limited access to new markets.

The baseline survey for aquaculture intervention was designed to collect the baseline data on targeted value chain actors - fish farmers, fish farmers' associations, and input suppliers (hatcheries & feed companies). Specifically, the study aimed at collecting and analyzing benchmark data against which progress in the future can be objectively measured from the changes brought about by the deployment of interventions. Specifically, the baseline indicators include: (i) the socio-economic profile of surveyed fish farmers; (ii) farmers' demographic profiles - household size and age/gender composition, (iii) economic activity such as production, yields, sales, income; (iv) access/use of improved production and processing technologies and services; (v) information on business linkages between market actors in the value chain;

In conducting the baseline study, a multi-pronged approach was adopted which included desk research, interviews with key stakeholders in the aquaculture sector, focus group discussions with small/medium fish farmers and quantitative survey among fish farmers. A total of 38 participants were interviewed in 4 focus group discussions while 15 in-depth interviews were carried among key informants.

The baseline survey was conducted in Bayelsa and Rivers States. A multi-stage sampling procedure was used to select the 400 respondents that participated in the study. Two hundred fish farmers were selected from fish farm clusters across Yenagoa and Sagbama Local Government Areas (LGAs) in Bayelsa state; 200 fish farmers from fish farm clusters across Tai, Khana, Bonny, Obio-Akpor, Ikwerre, and Port Harcourt LGAs in Rivers State. The selection of the final respondents was carried out using snowball sampling (otherwise known as chain sampling, chain-referral sampling or referral sampling).

The study revealed that about one-third of fish farmers in Bayelsa have aquaculture as their main occupation and source of income while two-thirds practise it as secondary occupation. In contrast, aquaculture was found to be the occupation of nearly two-thirds of fish farmers in Rivers, while one-third practise aquaculture as secondary occupation. Earthen ponds were most common among farmers in Bayelsa (77%) while in Rivers, concrete ponds (58%) were most common followed by earthen ponds (40%). Water for fish culture was sourced mainly from boreholes in both states. Water treatment is practised without regards to testing for acidity level of water. Also, as part of pond pre-stocking preparation, farmers apply organic fertilizers (particularly poultry dung, fish intestine, and animal dung), lime, and vitamins.

Fish farmers in Bayelsa and Rivers States commonly grow catfish. Of the fish farmers in Bayelsa, 52% sourced fish seeds mainly from other farmers, while 29% of the fish farmers in Rivers claimed to raise their fish seeds (have own nursery) and 23% sourced seeds from private nurseries. Most of the farmers in Bayelsa (65%) use homemade fish feeds while the majority of the farmers in Rivers (58%) apply imported floating feeds to grow their fish. Generally, most fish farmers in Bayelsa (61%) and Rivers (56%) are not aware of the biomass method of feeding for fish. Also, findings on knowledge, attitude and practice of improved fish cultivation technology and focus on hazard analysis of critical control points system (HACCPs) indicate that over half of

fish farmers in Bayelsa (54%) and Rivers (59%) are not aware of the recommended practices to improve fish yield and profitability.

Over two-thirds of the fish farmers in Bayelsa and Rivers sell their produce to buyers at the farm gate. Wholesalers/fish mongers or middlemen or agents are the predominant buyers of fresh fish. Based on inputs costs and revenue data collected from the survey, the basic income statement for an average farmer showed a potential profit margin of up to 80 to 90% for a small/medium farmer in Bayelsa and Rivers states.

Apart from their own savings, the major sources of financing readily available to the fish farmers are money lenders, friends, relatives and microfinance banks. While three-quarters of farmers in Rivers keep business records which include record of sales and expenses, profit and cash flow, only about two-thirds in Bayelsa do so.

The study has shown that fish farmers from the participating states are faced with some problems that limit the farmers' capacity to achieve business growth and profitability. These problems and constraints are poor knowledge of improved fish cultivation technology; lack of awareness of the hazards analysis of critical control points systems (HACCPS); lack of formal training on aquaculture entrepreneurship; lack of proper extension program; poor access to financial facilities; poor access to quality fish seeds; and high cost of floating fish feeds.

These problems could be addressed through establishment of demonstrations ponds or demo ponds - model fish ponds as embarked upon by MADE could be utilized to train fish farmers on the technical and managerial aspects of a successful fish farming business. A major step to attract fish-farmers to demo ponds might be to first organize them into community groups or clusters for mobilization. Such groups could be offered free return rides to demo pond sites. Another strategy is to encourage or facilitate existing strong associations to setup branches in nearby communities. Also, farmer call centres could be established to provide quick and immediate free advisory solutions via phone to fish farmers. Access to the Nigerian Agricultural Enterprise Curriculum (NAEC) aquaculture business management and record keeping training manual would be helpful to existing and aspiring fish farmers. Fish farmers' associations/cooperatives should be formed and strengthened through provision of revolving loan facilities guaranteed by group savings. Also, access to quality fish seeds could be improved through farmers' interaction with feed and hatchery companies participating in the demo pond project as well as through production and distribution of telephone directory for hatcheries in the two states.

Finally, lot more direct efforts will be required to develop linkages among feed companies, hatcheries, extension services, farmer associations etc. These include but not limited to orientation of key actors, workshops on the formation of associations with leadership orientation and membership commitment and of course catalytic support by necessary government institutions for hassle free registration, limited tax burden (at most annual market levy)<sup>1</sup>.

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<sup>1</sup> This document was prepared and submitted to MADE by: MarketSight Consultancy Limited

## 1 INTRODUCTION TO THE BASELINE STUDY

### 1.1 BACKGROUND

MARKET Development for the Niger Delta (MADE) is a DFID funded development programme that uses a 'making markets work for the poor' (M4P) approach to generate pro-poor and inclusive economic growth in the non-oil sectors of the Niger Delta Region.

The programme aims to improve market access for poor producers, increase economic activity and trade and raise the incomes of poor men and women. The ultimate goal being to address the causes of poverty with an expected impact of increased incomes for 150,000 poor people, 50% of which should be women in the nine states of the Niger Delta, over a four and half year period (2013-2018).

MADE interventions aim to facilitate change, improved performance and sustainable, pro-poor and inclusive growth in selected markets by: a) selecting and working in sectors in which poor men and women are actively engaged; b) motivating market actors to change their behaviour in a sustainable and catalytic way; and c) facilitating access to new knowledge, information, services and/or technologies to small/medium-scale farmers and entrepreneurs.

The design phase of the programme (September 2013 to February 2014) focused on establishing the project in the Niger Delta as well as conducting thematic and technical sector ground research and analysis. This enabled MADE to select and design sectors of interventions aligned to the programme's objectives. The selected sectors are palm oil, aquaculture, smoked fish/fisheries, and poultry, along with the service sector of agricultural inputs.

The pilot phase started in March 2014 and will run up to 31 August 2014. The focus of this phase is on prototyping, testing and refining interventions through demonstration activities across three selected value chain sectors – agricultural inputs, fisheries and oil palm. Other activities include to test the assumptions laid out in the sectorial analyses, set up the baseline for the M&E performance measurement, and develop a network of private sector partnerships for collaboration. The implementation phase will have a life span of 3-5 years, starting in September 2014 and ending on 28 February 2018.

#### **Aquaculture Sector – Focus of this Assignment**

The fisheries sector—comprised of both cultured and wild capture fish—is one of the most important sectors in Nigeria, both from an economic and social standpoint. In 2009, the Federal Department of Fisheries contributed approximately US\$ 1 billion to the country's GDP (PIND, 2011). Further, in the Niger Delta, the sector is an important contributor to employment, livelihoods, and food security. Particularly for the sector's participants including pond farmers and fishermen, as well as input suppliers, distributors, marketers, transporters, credit service providers, and boat and net repairers.

In the fisheries sector, fish reaches the end consumer—households, informal eateries, formal institutions—in either a smoked or fresh state. The domestic fresh fish channel supply is dominated by cultured fish which represents approximately 85% of total supply (PIND, 2011). The importance

of cultured fish to the fisheries sector is further reflected in its size, value, and number of employed. The aquaculture sector is valued at N70 billion and contributes some N22 billion to the regional GDP. Importantly the aquaculture sector has seen strong growth trends, with production jumping from 16,619 tonnes in 1995 to 200,535 tonnes in 2010 representing an 1,106% increase in growth. In terms of employment, the aquaculture sector directly supports an estimated 12,0662 pond fish farmers of which 3,016 (30%) are female.

Thus, MADE selected the aquaculture sector for intervention because it fulfilled the programme's key selection criteria—growth potential, impact on the poor and women, and feasibility. The sector's growth potential is driven off the back of strong market demand. The sector's poverty reduction potential is rooted in the number of fish farmers in the Niger Delta and the sector's strong multiplier effect with additional labour and economic activity revolving around each pond (e.g. feed, fingerlings). Finally the sector's feasibility stems from technological advances that have increased the efficiency and profitability of actors in the sector and the supporting enabling environment at the national (through the ATA) and state level (in particular Rivers State).

### **MADE's Interventions in the Aquaculture Sector**

MADE's work in this sector is driven by a strategy to improve the productivity and competitiveness of fish farmers by addressing the sector's key constraints:

- a. Poor fish-farmer production knowledge
- b. Poor business management knowledge
- c. Low market penetration by some feed companies and hatcheries and
- d. Limited access to new markets.

To address these constraints, MADE is facilitating the establishment of demonstration ponds or demo ponds - model fish ponds which are utilized to train fish farmers on the technical and managerial aspects of a successful fish farming business. They are also the physical focal points of the intervention, bringing together key supporting actors in the value chain (feed companies, hatcheries, extension services, farmer associations etc.) to improve communication and coordination between these actors.

At the demo ponds, fish farmers learn new and improved skills, practices, and technologies of fish cultivation in addition to access to the Nigerian Agricultural Enterprise Curriculum (NAEC) aquaculture business management and record keeping training.

Through their interaction with feed and hatchery companies they will have improved knowledge of these companies' offer and in turn companies will have improved understanding of their market.

Producer associations will be able to use the demonstration ponds as a site to coordinate existing members to access new markets and market outlets and identify new members. In this way the demonstration pond will improve productivity and competitiveness of fish farmers.

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2. Figures from MANR Delta state and from field survey. Figure is inclusive of homestead farmers, which number approximately 10,000.

MADE is collaborating with local feed companies and technical trainers in Rivers State to run the demonstration ponds. The demonstration ponds in Woji (Obio-Akpor Local Government Area - LGA) and Bori (Khana LGA), Rivers state were launched in August 28, 2014 and September 25, 2014 respectively and are estimated to reach approximately 80 fish-farmers during the pilot phase.

The Aquaculture intervention will gradually expand to other parts of Rivers, Akwa Ibom, Balyelsa, Delta, and to other Niger Delta States. The total targeted outreach for MADE's interventions in this sector is estimated at 5000 fishfarmers over the life of the project.

## **1.2 OBJECTIVES OF THE STUDY**

Specifically, the study aimed at collecting and analyzing benchmark data against which progress in the future can be objectively measured from the changes brought about by the deployment of interventions; the baseline indicators covers the following areas:

- i. The socio-economic profile of surveyed fish farmers;
- ii. Demographic profiles - household size and age/gender composition.
- iii. Economic activity such as production, yields, sales, income;
- iv. Access/use of improved production and processing technologies and services; and
- v. Information on business linkages between market actors in the value chain

The baseline data/survey will enable MADE measure the impact of the interventions. Findings from this baseline study will also be a source of information for decision making and strategic planning.

The baseline survey will also promote the involvement and/or participation of key stakeholders and indirect beneficiaries from the start to enhance buy-in, eventual ownership of the change process that is key to program success and sustainability, and a solid basis for eventual attribution of change.

## **1.3 SCOPE OF THE STUDY**

The implementation of the baseline survey comprised of two main phases – the first phase involved development of tools and methodology for the baseline survey, and the second - implementation (data collection) phase.

### **Phase 1 - Development of Methodology and Tools for the Baseline Survey**

This included drafting a methodology with explicit rationale for gathering the required information from identified targeted groups, a sample plan and the process for drawing the sample for gathering representative data for the identified target beneficiaries from stated locations; a work plan showing a precise timeline for each activity including training of enumerators on questionnaire protocol, administration and execution (pre-testing, mock interviews, etc.).

### **Phase 2 – Implementation of The Baseline Survey**



This phase involved:

- a. **Literature review** of existing documentation, including sector analysis carried out by the project team, other program documents (including results chains and indicators) and other context specific published and unpublished documentation that would provide a good understanding of the value chain and context of the demo activities.
- b. **Field data collection** on the current level of key results indicators and complementary information that will help guide project implementation and enhance the measurement of project results.

#### **1.4 THE BASELINE REPORT OUTLINE**

This report consists of six chapters:

- Chapter one is the introduction which gives the background information, study locations and conceptual framework.
- Chapter two describes the methodology used for the study especially the study area, target group, sample size, and data analysis techniques.
- Chapter three presents the qualitative research findings
- Chapter four gives information on the fish farmers baseline survey findings in Bayelsa state
- Chapter five presents findings from the fish farmers baseline survey in Rivers state
- Chapter six gives the summary and recommendations of the study.

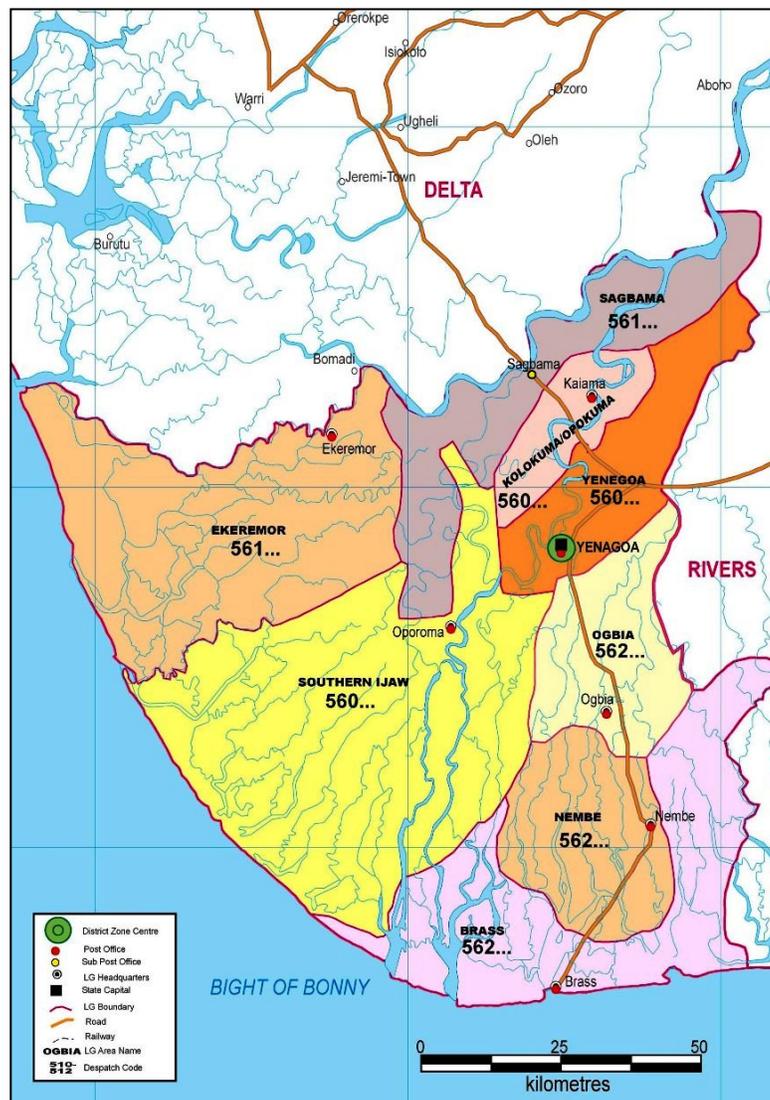


## 2 METHODOLOGY OF THE BASELINE STUDY

### 2.1 STUDY LOCATIONS

The baseline study was carried out in Bayelsa and Rivers States in the Niger Delta region.

#### Bayelsa State



**Figure 1: Bayelsa State Map**

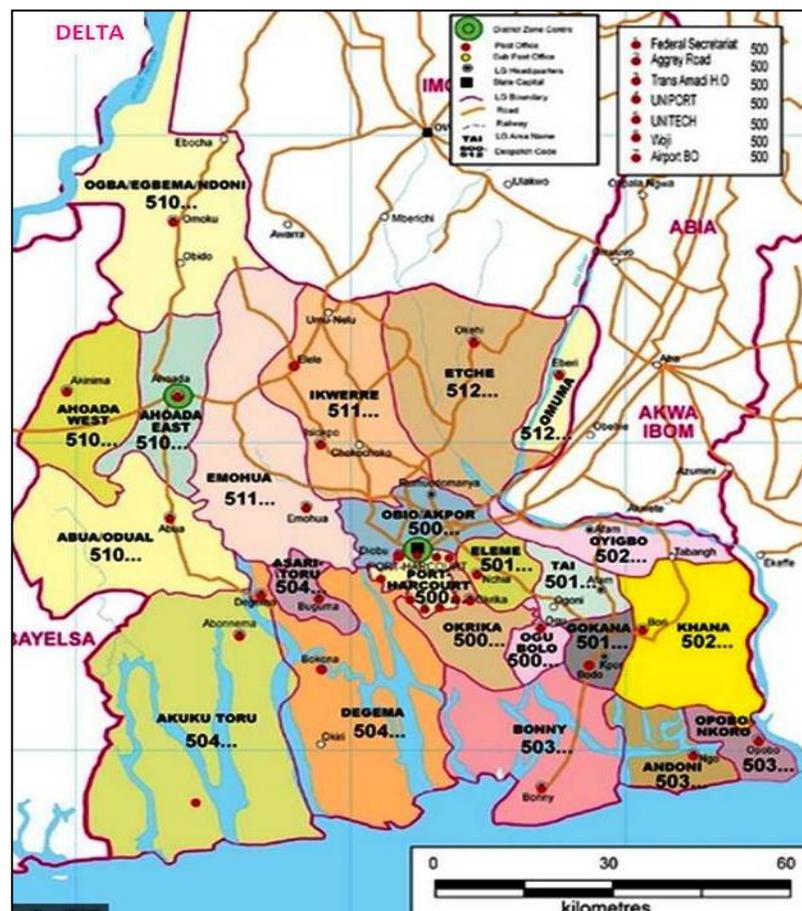
(Source: <http://nigeriazipcodes.com>)

Bayelsa State was created on October 1, 1996 out of the old Rivers State by the Federal Military Government of Nigeria. The name, Bayelsa, is an acronym of three former local government areas – Brass, Yenagoa and Sagbama – in the then Rivers State, which had earlier on comprised the entire

area now constituting Bayelsa State. Its capital is Yenagoa. Bayelsa State covers an area of 9,415.8 square kilometres. It lies at latitude 4°45' north and longitude 6°05' east. It has a population of 1,704,515 (2006 census figures) with a population density of 158 people per square kilometre. It accounts for 1.2% of Nigeria's total population. It has interstate boundaries with Rivers State to the west and northwest and Delta State to the east and southeast. The Gulf of Guinea lies to its south.

Bayelsa State has one of the largest crude oil and natural gas deposits in Nigeria. As a result, petroleum production is extensive in the state. The local population engage in fishing on a subsistence and commercial level. Bayelsa State has eight LGAs namely: Kolokuma Opokuma, Brass, Nembe, Sagbama, Ekeremor, Ogbia, Yenagoa, Ijaw North and Ijaw South.

The baseline study will cover only **Yenagoa and Sagbama LGAs**.



**Figure 2: Rivers State Map**

Rivers State is located in the coastal southern part of the country, bounded on the south by the Atlantic Ocean, to the north by Imo, Abia and Anambra States, to the east by Akwa Ibom State and to the west by Bayelsa and Delta states. The state was formed in 1967 with the split of the Eastern Region of Nigeria. Until 1996 the state contained the area which is now in the Bayelsa State.

Rivers State is divided into twenty-three LGAs and the study will cover **Tai, Khana, Gokana, Obio-Akpor, Ikwerre and PortHarcourt**.

For purpose of sample design, the Consultant will, in collaboration with MADE Team, need to generate list of fish farm clusters and farmers associations in:

- Yenagoa and Sagbama LGAs to serve as sample frame for **Bayelsa State**.
- Rivers State is divided into twenty-three LGAs and the study will cover **Tai, Bonny Island, Khana, Obio-Akpor, Ikwerre and Port Harcourt**.

## **2.2 STUDY POPULATION**

The study was designed to collect the baseline data on the following targeted value chain actors so that MADE can measure the impact of the interventions:

- a) Fish farmers
- b) Fish farmers' associations
- c) Input suppliers (hatcheries & feed companies)
- d) Other relevant stakeholder groups (particularly ADP/FADAMA officers)

The target population for this project is defined as male/female of 18 – 64 years olds who are **fish farmers, fish farmer's associations, feed companies, and hatcheries** resident in the study locations.

## **2.3 BASELINE STUDY METHODOLOGY**

In conducting the baseline study, a multi-pronged approach was adopted which included desk research, interviews with key stakeholders in the aquaculture sector, focus group discussions with small/medium fish farmers and quantitative survey among fish farmers.

The implementation of the baseline study was carried out in two phases – the first phase involved desk research and qualitative research which provided inputs for development of tools and methodology for the second phase – the quantitative baseline survey.

The following specific activities were undertaken:

### **Desk Research – Review of Secondary Literature**

At the preparatory stage, the research team reviewed a number of existing documentation, including:

- a) Concept note for intervention in fresh fish channel
- b) Other context specific published and unpublished documentation that would provide a good understanding of the value chain and context of the demo activities.

Based on the information available from the desk research, the study team first developed key question guides for qualitative research among the value chain actors. The information from the desk research also assisted in the development of draft questionnaire for the quantitative baseline survey and also helped to finalize sampling design and data collection approach for the survey.

### **Exploratory/Key Informant Interviews (KII)**



Interviews were conducted among key stakeholders in the aquaculture value chain using a checklist with open questions, to focus on important characteristics about each stakeholder, about why and how things happen, attitudes, etc. that are often difficult to obtain through enumerator conducted surveys; and get more specific information from the various key stakeholders on their experience and issues of existing smallholder models and issues in the palm oil sector in general. Other players such leaders of stakeholder associations and agricultural development agency staff were also interviewed to provide insights and offer leads to some important issues that will be covered in the survey.

A total of 15 KIIs were conducted as shown below:

**Table 1: Number of Key Informant Interviews by State and Target Group**

TARGET GROUP	Bayelsa State	Rivers State	TOTAL
Fish Farmers Associations	1	2	3
Fish Hatcheries	2	2	4
Fish Feed Companies	2	2	4
Other Relevant Stakeholder Group	2	2	4
<b>TOTAL</b>	<b>7</b>	<b>8</b>	<b>15</b>

#### **Focus Group Discussions (FGDs)**

Four FGDs were conducted among female and male fish farmers in Yenegoa, Bayelsa state and Port Harcourt, Rivers State. A total of 38 participants attended the FGDs shown below:

**Table 2: Number of Focus Groups Discussions Participants by State**

Category	Yenegoa Participants	Port Harcourt Participants
Female Fish farmers Group	10	7
Male Fish farmers Group	11	10
<b>TOTAL</b>	<b>21</b>	<b>17</b>

Participants came from Yenegoa and Sagbama LGAs for the Bayelsa group. The Port Harcourt group was held in Obio Akpo LGA.

## **2.4 FISH FARMERS SURVEY METHODOLOGY**

The fish farmers' baseline survey was conducted in the two participating states. A multi-stage sampling procedure was used to select the samples in this study. First was the purposive selection of Yenegoa and Sagbama LGAs in Bayelsa State; and Tai, Khana, Bonny, Obio-Akpor, Ikwerre, and Port Harcourt LGAs in Rivers state. Second phase involved purposive selection of 401 commercial fish farmers from fish farm clusters. The selected LGAs were rated to have high population of commercial oriented fish farms. In the third stage, 200 fish farmers were selected from fish farm clusters across

2 LGAs in Bayelsa State and 200 fish farmers from fish farm clusters across 6 LGAs in River State as shown in the table below. The selection of the final respondents was carried out using snowball sampling (otherwise known as chain sampling, chain-referral sampling or referral sampling) because no comprehensive registers or contact lists for fish farmers were available from all the sources contacted, such as the Agricultural Development Programme offices and ministries of agriculture in the two states.

**Table 3: Sample Distribution for Aquaculture Baseline Survey in Bayelsa and Rivers States**

Bayelsa State			Rivers States						
Yenagoa	Sagbama	TOTAL	Bonny	Khana	Ikwerre	Obio-Akpor	Port Harcourt	Tai	TOTAL
170	30	200	10	17	62	30	72	10	201

Source: MADE Aquaculture Baseline Study, 2015

### The Survey Team

The core survey team included a team leader, a field research manager, a data quality manager, and four data collection supervisors. All the members had extensive experience in designing and implementing a variety of surveys that utilized both quantitative and qualitative data collection and all of them served as team leader in previous assignments. The data quality manager had special experience in overseeing data entry teams and programming with quantitative analysis software.

### Data and Data Collection Tools

The survey instrument included mostly structured questions and open-ended questions for field data collection. The core research team prepared the draft questionnaire which was jointly reviewed by MADE Aquaculture team and the Market Sight team. The questionnaire was made to be self-explanatory giving explanations and instructions to the enumerators underneath each question as far as possible. Once the questionnaire was approved it was pretested among actual beneficiaries of the survey by two data collection supervisors in a non-sample area to check its efficacy for data collection in this survey. Some sections of it were revised and reframed according to the field experience for more ease and clarity before it was finally accepted for data collection in this study.

### Orientation and Training of the Enumerators

Field data for this survey were collected by 20 enumerators who had at least bachelor degree and previous experience of collecting quantitative and qualitative data through face-to-face interview. All enumerators were hired from the states of the survey.

There was one day extensive training in Port Harcourt on goals and objectives of the survey, interview techniques, sampling, data collection instruments, monitoring procedures and field data collection using the final questionnaire. The next day, a field pilot test was conducted among actual beneficiaries of the project using the final questionnaire following which debriefing session was held and their performance were reviewed by the core survey team.

### Implementation of the Survey

The enumerators were divided into 8 groups in such a way that one group could complete data collection in one selected village in one day. Data were collected through face-to face interviews and

in each case the respondent's prior consent was obtained. The enumerators conducted the interviews, probed the responses where necessary, and recorded data taking maximum care for improved data reliability. The field supervisors accompanied the teams during data collection and visited the enumerators as they worked, and were available to all enumerators over phone to provide instant support and advice.

The field supervisors were responsible for drawing the sample and the enumerators interviewed the selected sample. The field supervisors were also responsible for preparing a deployment plan that detailed how the field enumerators would cover the sample, the number of interviews each enumerator would complete per day, and other pertinent details.

The field supervisors were specially coached during the training on how to assign work to the enumerators and how to keep track of their work in order to organize the fieldwork more effectively and efficiently. After the data collection each day, the supervisors and enumerators cross-checked all completed questionnaire of that day, reviewed the performances of the survey, resolved problems if any, and ensured that no pending work was left on data verification for the day. Thereafter, the team planned for the next day.

### **Quality Control and Internal Validity**

Quality control is built in every stage in this survey. The enumerators had previous experience of field data collection through interviews, they were given extensive training and field practice using the survey instruments, the questionnaire was pretested among actual project beneficiaries for clarity and comprehensiveness, samples were drawn by the senior researchers and the enumerators interviewed the given samples, and interviews were conducted without prior information to anyone and outside influence. Besides, four field supervisors worked with the enumerators in the field everyday and were available to them over phone for instant advice and support.

Each interview took no less than fifty minutes to complete, respondents replied freely and spontaneously, and non-response was not a serious issue in this survey. So the quality and validity of data is unlikely to be a major problem in this study.

### **Data Processing**

Data entry and analysis was carried out using SPSS and result tables submitted in Excel.



### 3 **QUALITATIVE RESEARCH FINDINGS**

This chapter presents the views which were gathered through FGDs with male and female fish farmers in Bayelsa and Rivers States. It also presents views gathered from in-depth interviews conducted among other aquaculture value chain actors – hatchery owners, feed dealers, leaders of fish farmers associations and representatives of Agricultural Development Programme (ADP) from the study states.

The first section presents the views gathered through FGDs on fish pond ownership, characteristics, preparation for stocking of fish seed, fish culture practices, harvesting and processing, knowledge and practices of best management practices, sales and marketing, business management practices, and membership of associations and linkages. The subsequent two sections discussed the supply and value chain contributions by key actors followed by point-wise problems and recommendations.

#### **3.1 FOCUS GROUP DISCUSSIONS FINDINGS**

##### **3.1.1 Ownership and Characteristics of Ponds**

FDGs on fish culture farm ownership revealed that most farmers own their fish ponds. Only one participant in each state claimed to lease fish ponds for their business.

The types of ponds commonly used by fish farmers in Bayelsa State are earthen and concrete ponds, while plastic and collapsible tarpaulin types are rare. Fish farmers in Port Harcourt, both male and female mostly use concrete, plastic and collapsible (tarpaulin) types of ponds. This is because Port Harcourt as a town is not as close to the river as towns in Bayelsa where earthen ponds are accommodated. The number of ponds owned by fish farmers ranged from 1 to 4. Common pond sizes available, especially for earthen ponds, were 25ft by 30ft and 22ft by 24ft with a depth of 4ft to 6ft. Some concrete ponds had the following dimensions, 13ft by 4ft, 3ft by 4ft and 5ft deep. The plastic tank volumes ranged from 1000 litres to 3,000 litres with a capacity for 200kg of fish.

Equipment used during fish farming includes a pumping machine, hand net, dragnet, generator, digger, shovel and cutlass.

##### **Water Sources and Management**

Water supply is a primary necessity for fish farming. In Bayelsa, the major sources of water for fish ponds are boreholes and natural water (rain and well water). The water is pumped to the pond using a pumping machine powered either by generator or electricity, but most often by generator. There is a shared believe that any water good for drinking is good for fish rearing. Bayelsa is described to be a low land, so there is water everywhere. In some places, an excavation of 3 to 4 feet of earth yields enough water for the earthen ponds. However, to prevent the earthen pond from collapsing or overflow during raining seasons, channels for diverting excess water are built around the pond during construction.

In Rivers State, the main source of water for fish farming is borehole water. Water from the river or well is considered unsuitable for fish culture, due to possible contamination.

The practice of water treatment for fish culture is uncommon in Bayelsa as compared to Rivers State. In Bayelsa, the fish farmers lack basic knowledge of water treatment, as little is known about water acid level and how to test for it. They even consider the frequent changing of water stressful. In Port Harcourt, however, both male and female farmers consider the treatment of water for fish culture with alkaline solution and salt mandatory practices before the stocking of fish seed.

### ***Pond Preparation***

In Bayelsa, few of the fish farmers tend to prepare their earthen ponds ready for stocking of fish seed by pumping all the water out from the pond, removing the mud inside and applying lime. This practice is more common among the male farmers in Bayelsa. The female farmers displayed little knowledge about pond preparation. Lack of adequate preparation of pond for stocking fingerlings or juveniles is a contributory factor to the high mortality rate of fish seed within few weeks of arriving in the pond.

However, the farmers with concrete or plastic ponds usually wash their ponds and then apply lime before stocking of fish seed. Both men and women farmers also use table salt to treat their concrete ponds before stocking the fingerlings. The salt is applied for 2 to 3 days to make it ready to accommodate the fingerlings. These are common practices also among farmers in Rivers State.

### **3.1.2 Fish Seed Input**

Catfish is commonly grown by all fish farmers. Tilapia fish is rarely cultured by the fish farmers because it does not grow fast unlike catfish and it consumes a lot of feed.

#### ***Source of Seed***

Most fish farmers in Bayelsa buy fish seed from private farms in Yenegoa and sometimes travel to other states like Rivers and Delta to source fingerlings. Also, most farmers in Rivers state buy fish seed from private hatchery. It was reported that fingerlings bought from the government hatchery sometime in the past did not survive. The farmers reported high mortality rate of locally sourced fish seed lamenting that they rarely survive beyond 2 weeks.

One of the major suppliers of fingerlings is African Research Aquaculture Center (ARAC). It was gathered that fish farmers who source fish seed from ARAC were trained on how to transport, stock and manage their fingerlings. The male farmers believed that ARAC supplied the best fingerlings because of the high growth and survival rate of the fish seeds. In the Bayelsa group discussion, male farmers confirmed that they receive information and support from ARAC on feed and farm management. Some even claimed to receive replacement for high fingerlings mortality rate. In contrast, the female fish farmers seem not to have access to or do not seek much information on how to manage fish seeds from source of purchase to the time of stocking their ponds.

In Rivers, fish feed are first quarantined using alkaline water before being loaded into the pond. This trend is well established among fish farmers in the state. When the fingerlings arrive, they are first put into a smaller pond from which they are later transferred to the bigger ponds. It was also learnt

from the Rivers discussion group that it is more appropriate to convey fingerlings in early hours of the morning or later around 7 to 8 pm in the night; and on arrival at the final destination, fingerlings should be allowed to rest for 30 minutes before being put into the pond.

### ***Price of Seed***

Majority of fish farmers in the study states buy fingerlings for N15 to N30 per seed. Few other farmers in Bayelsa mentioned the price per fingerling to be N50 per seed. The farmers often receive extra free fingerlings such as additional 100 pieces on purchase of 1000 pieces of fingerlings against possible losses during transportation or as a result of change of environment. The farmers are physically present during the purchase of fingerlings in order to count the numbers purchased. They receive some advisory information from the sellers of seed on feeding of fingerlings and water management. Sometimes, some farmers also use consultants to get quality fingerlings, because they do not know how to identify quality fingerlings.

### ***Stocking Capacity/Density***

Stocking capacity varied widely among fish farmers. Farmers who participated in the group discussions in Bayelsa and Rivers claimed to stock from 1,000 to 15,000 fingerlings at a time. An attempt was made to know if the farmers do follow any stocking density pattern. It was only in the male farmer's group discussion in Rivers that one participant acknowledged that there is a formula for stocking fingerlings but also expressed that it is hardly ever followed by farmers. According to him, the recommended stocking density for catfish is 100 fingerlings in 1 cubic metre of water that is 100 seeds in a pond size of 1 square meter and 1 meter deep.

## **3.1.3 Sources of Fish Feeds and Other Inputs**

### ***Fish Feeds***

The fish farmers use floating feeds bought from local feed sellers to feed their fish. The brands of feeds used by most farmers include Vital Feeds, Zeigler, Muddy, Topfeeds and Coppens. Farmers identify the ingredient in the feed they use as palm kernel, fishmeal, soya and beans. The cost of the floating feeds vary from N5,000 to N6,000 per 50kg bag. For Zeigler the farmers buy for N5000 naira, for Coppens N5200.

Most farmers feed the fish twice daily - around 8am – 9am in the morning and 5pm – 7pm in the evening. Some apply feed three times daily. Twice daily feeding of fish is most common among farmers from Bayelsa and Rivers because of the high cost of feeding.

### ***Knowledge and Attitudes towards Biomass Feeding Methodology***

Most fish farmers who participated in FGDs in Bayelsa and Rivers were not aware of the biomass method of feeding fish. Few male farmers from the groups in both states acknowledged the existence of a standard method of fish feeding called biomass. To women generally, there are no specific formulas; common sense is used to judge the ratio of feeding. The women usually do compare the growth of fish with that of a new-born baby, and increase the feed as the fish grow.

Fish farmers also feed fish with supplementary feeds such as bread, indomie (noodles), overripe plantain, ripped oranges. The farmers complained that this supplementary feed contaminate their pond.

Generally, lack of adequate advisory support and information from extension agents, hatchery, and feed sellers contribute to fish farmer's lack of knowledge about biomass feeding method. However, while some male farmers in Bayelsa get advisory support from the state ADP office on request, their counterparts in Rivers sometimes go as far as Animal feed care laboratory in Asaba to get information on fish feeds and feeding.

#### **3.1.4 Current Fish Health Management Practice**

A majority of farmers discern the health status of their fish through physical observation. Farmers most often rely on their co-farmers who sell fingerlings to them or call upon the feed dealers when they notice critically ill fish. Generally to treat ailing fish, the farmers use antibiotics and multivitamins, although without knowledge about the functions of the drugs and method of application. The male farmers believe that fish often start getting ill or die when they are not fed regularly or when changes are made to its feeding time of their fish. The female farmers believe that changing pond water frequently make fish stay alive and healthy. The farmers also mix salt in water and apply to their fish when they observe symptoms of sickness.

Access to the Nigerian Agricultural Enterprise Curriculum (NAEC) aquaculture business management and record keeping training manual with contact details for care line and free counselling via phone would be helpful to existing and aspiring fish farmers.

#### **3.1.5 Employment Opportunity and Labour Costs**

Male and female workers find employment at fish ponds. The farmers in Bayelsa and Rivers employ between two to five full time workers depending the commercial size of the business. Industrial trainees also get engaged as daily part-time workers at fish ponds. The roles played by these workers generally include fish feeding, and general farm management. The fish pond managers receive between N15,000 (for graduate of senior secondary school) and N30,000 (for university graduates); while other support workers receive N7,000 to N10,000. Workers were usually not employed based on any prior knowledge of fish farming nor are they sent for any training upon engagement, but only receive instruction on the job.

#### **3.1.6 Knowledge, Attitude and Practice of Improved Fish Cultivation Technology (HACCPS)**

World's demand for high quality aquaculture products makes control of diseases increasingly important. Good bio-security measures are vital to maintaining healthy animals, reducing the risk of acquiring diseases in aquaculture facilities and harvest high quality good yield.

An attempt was made to know if the farmers were aware of and practiced improved fish cultivation technology with particular attention to the hazard analysis critical control points system (HACCPS). Discussions held revealed that the farmers did not engage in proper pond management practices or proper feeding regimes. Fish culture practices were often based on consultation with co-farmers or consultants hired to help set up the farm. There were absolutely no established extension services to support and provide advisory information to farmers. It is not surprising therefore that the farmers

were not aware of specific methods or practices enshrined in the improved fish cultivation technology with particular attention to the hazard analysis critical control points (HACCPs).

Based on the analysis of fishing technology/or methodology currently practiced by farmers which showed nonconformity with the improved fish cultivation technology, the establishment of demonstrations ponds or demo ponds - model fish ponds which will be utilized to train fish farmers on the technical and managerial aspects of a successful fish farming business as embarked upon by MADE will go a long way to improve the fish-farmer production knowledge and their understanding of business management

### **3.1.7 Fish Harvesting and Processing**

Most of the farmers target certain seasons and festival periods like the months of April and December for the harvest and sale of fish. These farmers start their harvest beginning 4 months after stocking.

Most of the farmers sell fresh fish during harvesting while only a few claimed to smoke some of their fish for sale. Some farmers also smoke or dry fish on specific order. The farmers widely acknowledged that some non-farmers mostly women, were engaged solely in the smoking of fish for sale. However, some of the farmers showed strong interest in smoking fish before selling. The farmers did not use any processing equipment such as the smoking kiln but used the drum and firewood drying system. After harvest, the fish were processed using traditional kiln which comprise of local drum, wire gauze and firewood. A female farmer from Rivers group explained that she smoked all her fish because she had a market for it at Ikot Abasi in Akwa Ibom State. Also, one female farmer from Yenegoa claimed to have bought a smoking kiln for N250,000 – which uses sawdust as source of energy.

Selling smoked fish is argued to be more profitable than selling fresh fish. According to a female farmer from Port Harcourt, smoking a quantity of fresh fish that is valued at N25,000 – N30,000 could yield up to N60,000.

### **3.1.8 Fish Sales and Marketing**

Selling price for grown-out fish varied by size of fish, location and season of the year. In Bayelsa, fresh fish is sold by the farmers for N500 to N600 per kg during high harvest season which often coincides with festive seasons around the year; and sold for N700 to N1000 per kg during low or off season. In Rivers, 1 kg of fresh fish is sold by the farmers for N700 to N800 during high harvest season while same size of fresh fish is sold for average of N1000 per kg during low harvest season.

The farmers expressed dissatisfaction with their inability to sell fresh fish above the rates dictated by the market women who were in the habit of pricing lower than the farmers offered, knowing fully well that the farmers lacked storage facility for fresh fish. The farmers in Port Harcourt also noted that fresh fish were being transported into Port Harcourt city from nearby states for sale at prices lower than the local farmers' prices. Specific mention was made of farmers who brought in fish from Edo, Delta, Oyo and Ogun states to sell at Rumuokoro market at 500 naira for 1 kg. This affects the local farmers, causing loses to their businesses.

The farmers attested to the fact that there was a huge demand for their produce but complained about the prices at which market women bought their fish. Some farmers sold one kg of fish within a price range of N1000 to N1700 because people placed value on the cultured fish as compared to the

common natural fish. The farmers sold their fish at farm site. The majority of the buyers were individuals and middle men (widely known as market women). The farmers inform their customers through phone calls before and during harvest. Fish were not sold outside Rivers State due to large consumption within the state, rather farmers from other states brought in fish. Some farmers have about 4 to 10 customers who buy their fish products. Some buy at 15kg, 30kg, 40kg, 50 kg and 1 ton. Big farmers have about 200 customers patronizing their farms. Such farmers sell about 1.5 tons of fish in two weeks.

### **3.1.9 Business Management Practices**

#### ***Sources of Finances***

Most of the farmers used their personal savings to start their fish farm business. Other sources of funds available to them are microcredit from Lift Above Poverty (LAPO). Some of the farmers borrowed as much as N150,000. Other sources the farmers look to get credit to finance their businesses are international centres for micro-finance.

#### ***Records Keeping***

Farmers keep records of their finances. They do not weigh their fish to determine the daily or weekly weight. The growth of fish is done by observation.

#### ***Insurances***

Farmers never engage in any type of insurance and they show no interest in any form of insurance. They believe God is the insurance.

#### ***Training and Skills***

Female farmers get training from their farmer friends. Some of them read books on fish farming and find information on the internet. Few of them were trained at ARAC.

### **3.1.10 Membership of Associations/Cooperatives**

#### ***Group membership***

Most of the farmers do not belong to any farmer's group because they believe that there is no benefit in joining fish farmers group and more so, groups are there to exploit them. Farmers express disinterest in joining associations due to:

- Lack of sincerity on the part of organizers or leaders of the associations,
- Lack of trust and commitment from members
- Unfulfilled promises from the government past programs or agents, and
- Inability to access loans from the associations

At present most fish farmers seemed not to belong to any association and even those who belong lack serious commitment. Therefore a major step to attract fish farmers to demo ponds might be to first organize them into community groups or clusters for mobilization. Such groups could be offered free return rides to demo pond sites.

Lot more direct efforts will be required to develop linkages among feed companies, hatcheries, extension services, farmer associations etc. These include but not limited to orientation of key actors, formation of associations with leadership orientation and membership commitment and of course catalytic support by necessary government institutions for hassle free registration, limited tax burden (at most annual market levy).

### **3.1.11 Problems and Constraints**

Farmers identify the main challenges to their fish farming business as follows:

- The farmers find it very difficult in getting quality fingerlings. Most fingerling bought from fellow farmers do not survive after two weeks.
- The cost of buying floating feeds is very high for farmers. Many farmers tend to rely more on supplementary feeds to reduce their cost of production. This high cost of production has quit many farmers from business.
- The farmers do not have knowledge on how to manage their water. They assume any water good for drinking is also good for the fish.
- Bank loans are inaccessible to farmers. The interest rate and terms of condition on micro credits tends to be too high for farmers to afford.
- Water disposal is a major challenge to fish farmers. Most places where fish are reared do not have water ways to drain waste.
- Lack of formal training is also a constraint for good performance in farmers' aquaculture practice. Farmers do not have access to entrepreneurial training for aquaculture practices. Some rely on books and information from the internet to acquire knowledge on their business management.
- The competitive prices of fish from Edo and Delta States are lower than what the farmer can afford to sell their own fish. Fishes that come from nearby states are sold at N500 as compared to the profitable price of N600-700 per kg sold by farmers from Rivers state.
- The women mentioned that doing fish business was not always predictable, because sometimes a farmer could wake up to see some fish already dead in water without knowing what actually went wrong with them.

### **3.1.12 Recommendations**

One of the major problems farmers have is the deficiency of relevant skills and the capacities to be in business. Fish consumption is on high demand within and outside the Niger Delta region - in Nigeria and even overseas but farmers lack the financial and business skills needed to sustain their business. They therefore need to be trained as aquaculture entrepreneurs as against subsistence practices.

Another major challenge farmers face is finance. The cost of running the business seems rather too high and some farmers quit the business along the line. An intermediary organisation can be established to function as a-go-between the farmers and the lending institution. The intermediary



organisation can serve as asurety for farmers and as the same time be responsible for credit recovery for the lending institution.

Farmers should be encouraged to join associations. These can help meet some technical and financial needs.



## 4 BAYELSA STATE AQUACULTURE BASELINE SURVEY FINDINGS

### 4.1 HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS

About 30% of the fish farmers interviewed were females while 70% were males. This suggests that there are more male fish farmers than female in Bayelsa State. More females are involved in the wholesale and retail distribution of fish than their male counterpart. Most of the farmers (60%) are over 21 years of age and the average age is 40 years. Fifty-four percent were currently married while 31% had never been married. Only 4% of the farmers had no school education, 5% had primary education, while 33% completed secondary school and over 47% were university graduates.

Overall, 30% of farmers have aquaculture as primary and main source of income, while 70% are engaged in other jobs such as civil service (20%), entrepreneur (11%) and other occupations (69%). Thus, nearly one-third have aquaculture as the main occupation and around two-third have it as secondary occupation. The results indicate that majority of the fish farmers combine fish farming with other occupations and therefore may not devote required or appropriate attention to management and maintenance of their fish farm; a practice that often leads to loss of revenue due to fish mortality.

Average size of the fish farmers' households was 3 members and 45% live with at least two other persons. The average annual income of the farmers' households was N301,724.

About half of the farmers also had attended up to 4 workshops or seminars/training in fish cultivation in the last three years. The trainings were focused on pond construction (67%), feeding (65%), stocking (56%), breeding (47%) and training of trainers for farmers (35%). Fifty-eight percent of the training was provided by non-governmental organisations followed by Ministry of Agriculture (34%) and Agricultural Development Programme (26%). Interestingly, more female fish farmers (65%) had attended training than the male counterpart (50%).

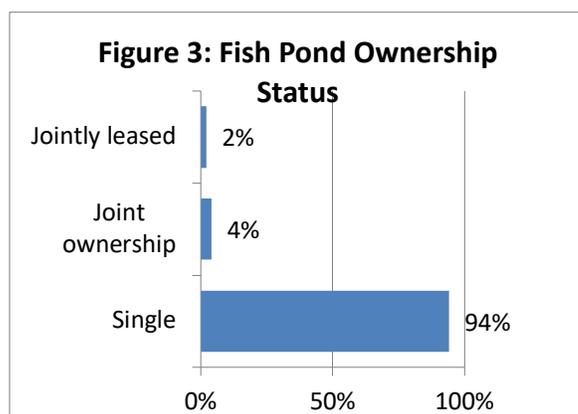
**Table 4: Household Characteristics Fish Farmers in Bayelsa**

Characteristics	Bayelsa State	
	Freq.	%
<b>Average household size</b>	3	
<b>Gender of the farmer</b>		
Male	143	72
Female	57	28
<b>Age of the farmer</b>		
18 - 21 years	10	5
22 - 34years	75	38
35 - 44years	43	22
45 - 54years	35	18
55 - 65years	16	8
66 years and above	4	2
<b>Level of Education</b>		
No school	7	4
Primary school	2	1

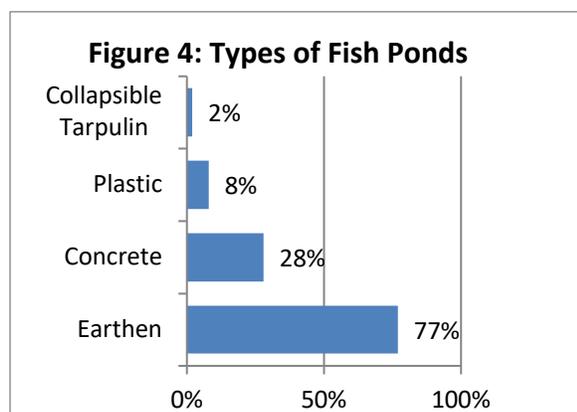
Secondary school	40	20
University	94	47
<b>Average Household Income in N</b>		
100,000 and below	36	18
100,001-200,000	24	12
200,001-300,000	20	10
300,001-400,000	8	4
400,001-500,000	5	3
500,001-600,000	13	7
600,001-700,000	9	5
700,001-800,000	4	2
800,001-900,000	8	4
900,001-1,000,000	5	3
1,000,001 and above	36	19
Refused	25	13

#### 4.2 OWNERSHIP AND CHARACTERISTICS OF PONDS

In Bayelsa State, survey findings show that majority of fish farmers (94%) own their ponds while only few are in joint ownership (Figure 3). Earthen ponds are used by majority of farmers (77%) followed by concrete ponds (28%), and plastic ponds (8%). Some farmers have concrete and plastic ponds to support their earthen ponds in fish culture (Figure 4). The average age of the ponds is 6 years.

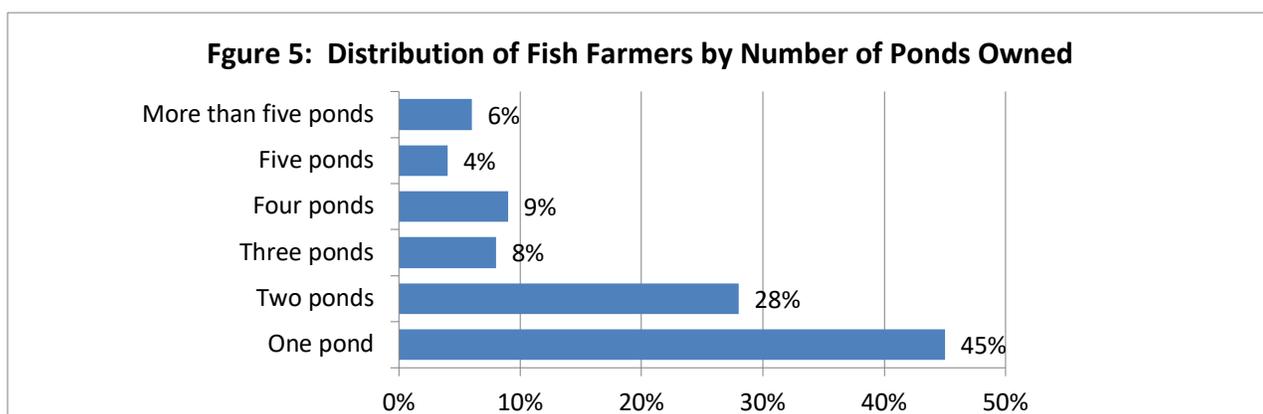


**Figure 3: Fish Pond Ownership Status**

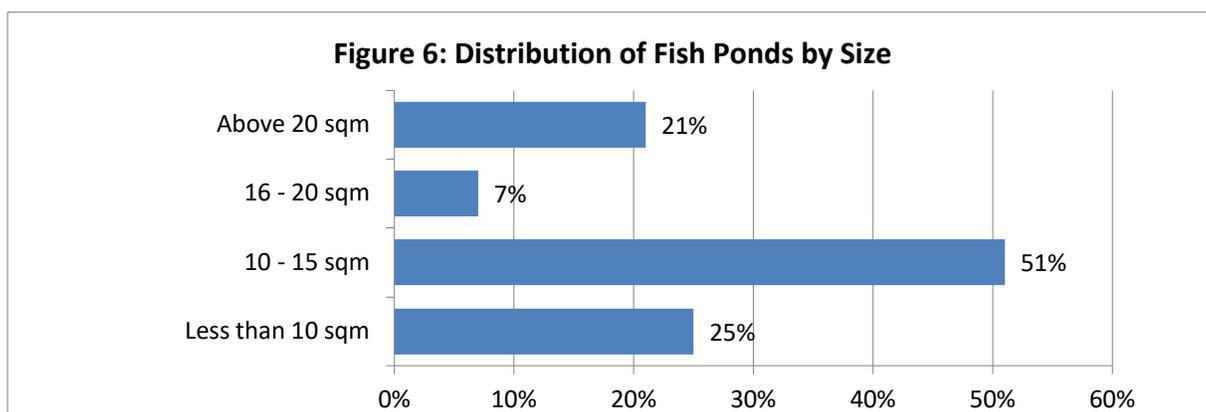


**Figure 4: Types of Fish Ponds**

Average number of fish ponds available per fish farm is 2.4 ponds. Forty-five percent of fish farmers in Bayelsa cultivated only 1 earthen pond, while 38% had 2 – 3 earthen ponds per fish farm (Figure 5). For earthen ponds, about half (51%) cover a land area of 10 – 15sq. m while 28% cover more than 15sq. m (Figure 6).

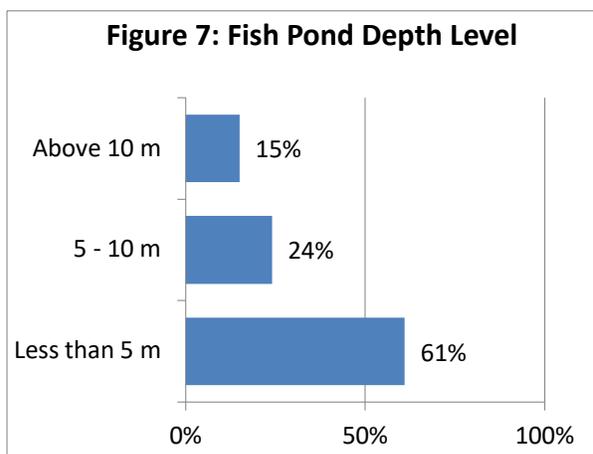


**Figure 5: Percentage Distribution of Fish Farmers by Ponds Owned**

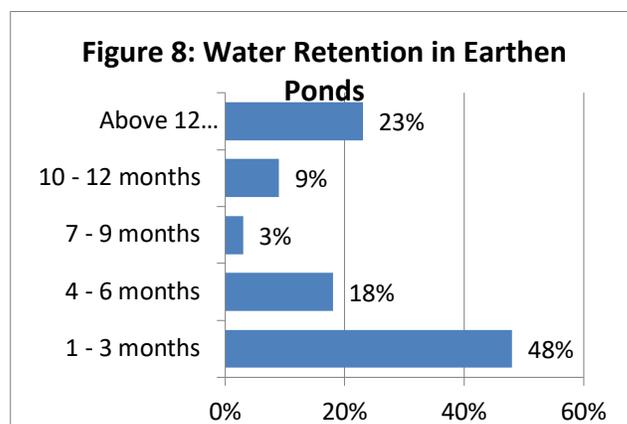


**Figure 6: Distribution of Fish Ponds by Size**

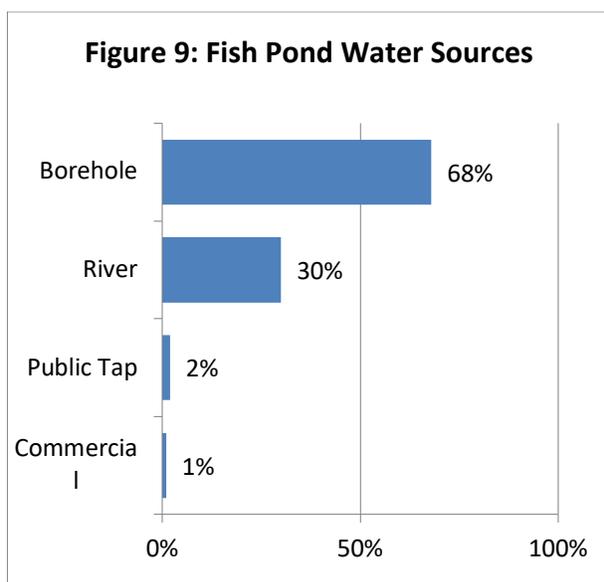
Majority of the ponds are less than 5 metres deep (Figure 7). The average duration for water retained in the earthen ponds for fish culture is 10 weeks (Figure 8) while majority of farmers (64%) using concrete or plastic ponds change water every 4.2 weeks. Water for fish pond culture is sourced mainly from boreholes (68%) followed by rivers (30%) (Figure 9). Majority of the farmers (72%) treat water for fish culture with chlorine, carbon lime powder, iron eraser, soda ash and salt (Figure 10).



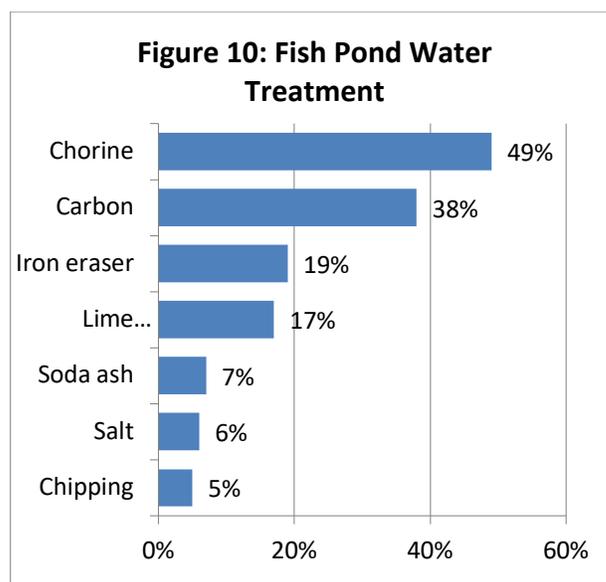
**Figure 7: Fish Pond Depth Level**



**Figure 8: Water Retention in Earthen Ponds**



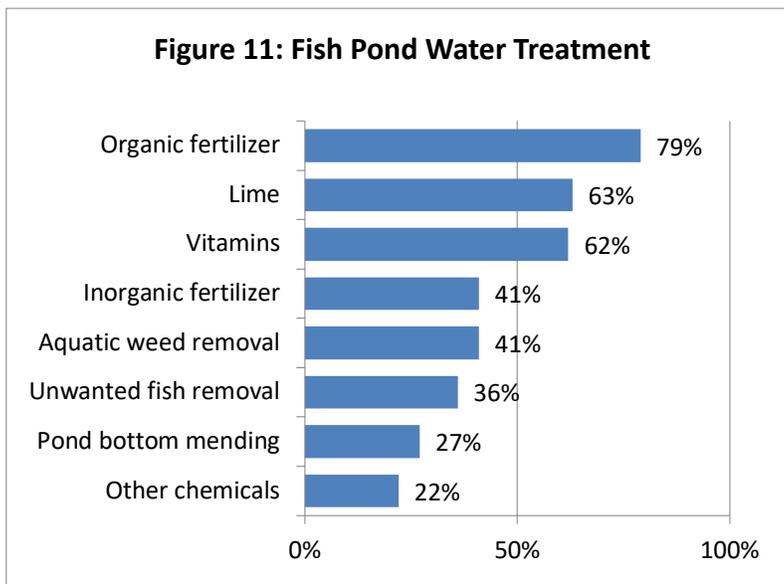
**Figure 9: Fish Pond Water Sources**



**Figure 10: Fish Pond Water Treatment**

### 4.3 FISH POND PRE-STOCKING PREPARATION

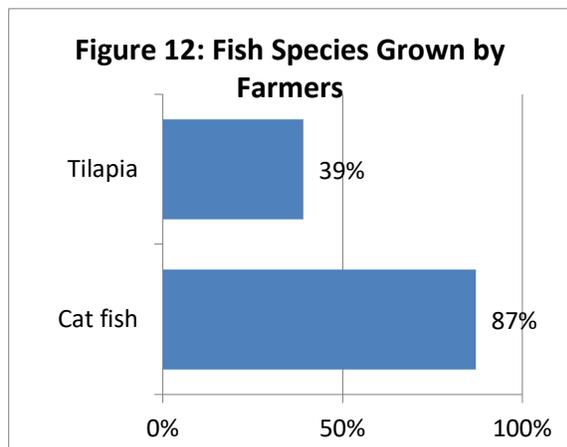
Commonly used inputs cost items for commercial fish farms are organic fertilizer (particularly poultry dung, fish intestine, and animal dung), lime, vitamins inorganic fertilizer, other chemicals (medicines) and other pre-stocking preparations like aquatic weed removal, unwanted fish removal and pond bottom mending, etc (Figure 11). **Average cost of pond pre-stocking preparation by fish farmers for 2014 was N110,761.70 per farmer.**



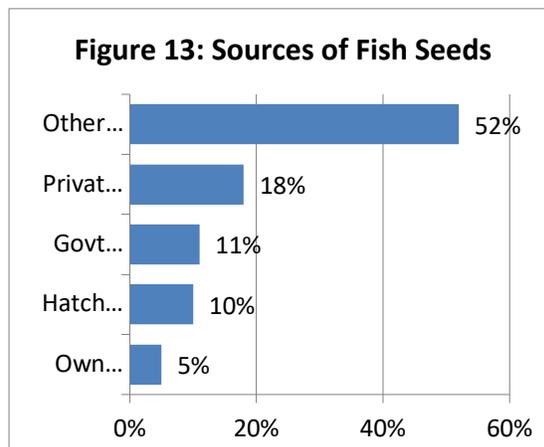
**Figure 11: Fish Pond Water Treatment**

### 4.4 INPUT USE AND COSTS

Majority of farmers (87%) grow catfish while 39% also claim to grow tilapia fish species. Half of fish farmers in Bayelsa buy fish seed from other farmers while 39% source from private or government nursery and hatchery. However, when it comes to sources of information on fingerlings processing, 31% of male fish farmers claimed to source for useful information from their fellow farmers while 28% of their female counterparts claimed to source information from trained farmers.

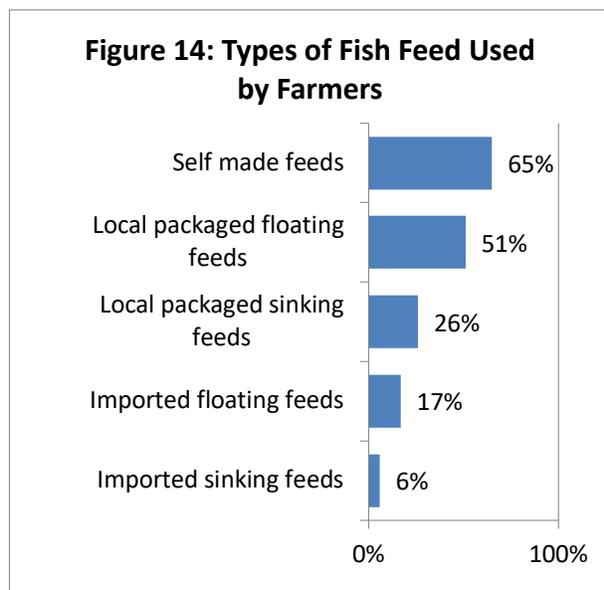


**Figure 12: Fish Species Grown by Farmers**

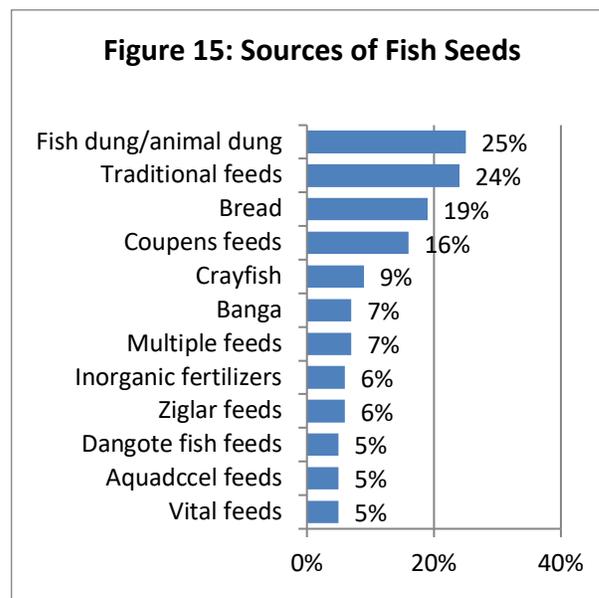


**Figure 13: Sources of Fish Seeds**

Majority of farmers (65%) apply homemade feeds to their fish while some 51% also apply local packaged floating feeds.

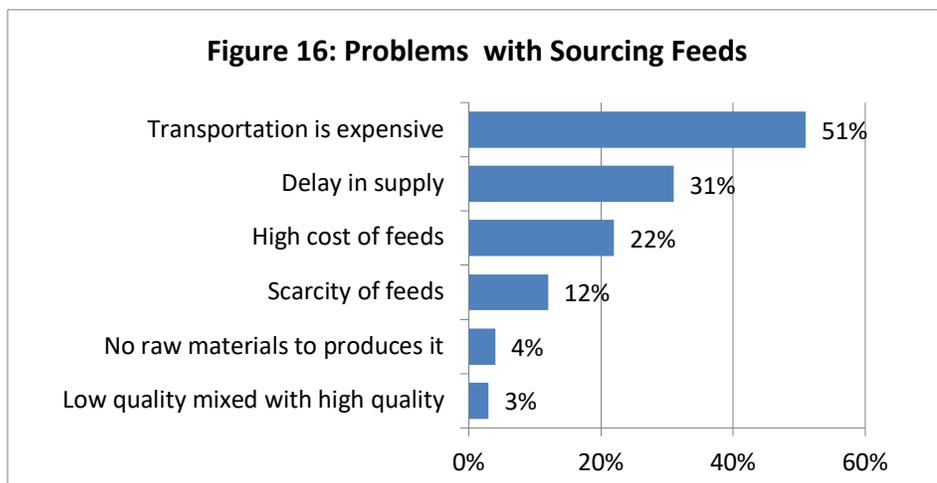


**Figure 14: Types of Fish Feed Used by Farmers**



**Figure 15: Sources of Fish Seeds**

Sixty-three percent of fish farmers in Bayelsa expressed satisfaction with fish seed they currently apply to grow their fishes while the remaining 37% complained of constraints and challenges faced in feeding their fishes such as:



**Figure 16: Problems with Sourcing Feeds**

In the area of giving drugs to fish, 50% of male fish farmers claimed to be buying from open market while 57% of female fish farmers sourced from FADAMA/ADP office.

#### **4.5 FISH HARVESTING AND PROCESSING**

About 80% of the harvest was sold as fresh fish while only 20% was sold as smoked fish in 2014. All the farmers who smoked fish for sale used traditional method of wire gauze and firewood, although 45% of farmers claimed to own traditional kiln, while 43% did not have at all. Also 12% of farmers used to rent kiln when needed.

More farmers (54%) believe that few people are engaged in fish smoking in their area while 46% think otherwise. This suggests that there is opportunity for smoked fish business in the state. However, 75% of farmers believe that selling fresh fish is more profitable.

#### **4.6 PRODUCTION INPUT COSTS, YIELDS AND REVENUE OF AQUACULTURE**

The average cost of fingerlings in 2014 was N21.8 per seed while the average fingerlings stocking per farmer at a time was 2,482 fingerlings. Thus total amount spent on fingerlings per stocking would be N54,107.60. On the average, 35 bags of feeds were applied to complete a full cycle of 6 months to culture 2,482 fingerlings. **At an average of N4,566.40 per bag of feeds, the total cost of feeding would be amount N159,810.**

In addition, an average of **N1,462 is spent on transportation per month** in the process of sourcing for fish feeds **while an average of N8,627.70 is spent on drugs** during the fish culture cycle.

Also, the results show an average yield of 2,170kg per cycle per farmer. On average, 12% of total harvest was used for family consumption, 7% as gift to people, 6% lost to mortality while 75% was sold. At an average price of N606 per kg obtained from the survey, the estimated revenue on **sales of 1628kg fresh fish per farmer in 2014 was N986,265.**

Average permanent staff employed by farmers is 1.6 persons and they are remunerated at an average salary of N9,203 per month; while an average of 3.1 persons are employed on part-time/daily basis with an average of 3 work days per month at a daily wage rate of N1,633.80. Using a total of 6 months per fish culture cycle, the labour costs for six months would be **N179,514.84**.

Based on inputs use and costs and return data collected above, the following basic income statement was prepared for an average small/medium fish farmer from Bayelsa State in 2014.

**Table 5: Basic Income Statement for a Small/Medium Fish Farmer in Bayelsa State**

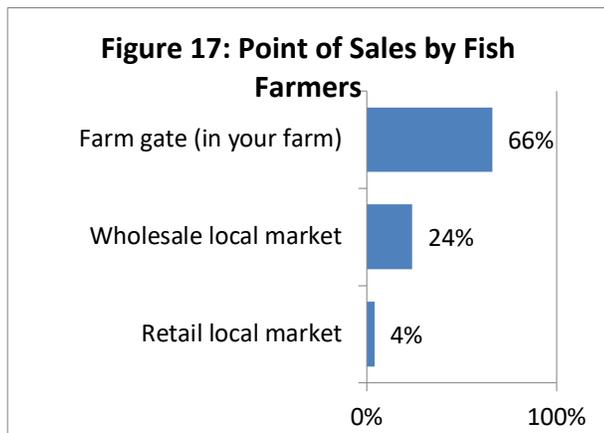
Table 3: Basic Income Statement for a Small/Medium Fish Farmer in Bayelsa State in N			
Revenue			
	Sale of 1,628kg fish @ N606 per kg	986,568	
	<b>Total revenue</b>		986,568
Production Expenses			
	Cost of 2,482 fingerlings @ N21.80	54,108	
	Pond preparation cost	10,762	
	Cost of feeding	159,810	
	Cost of labour for 6 months	179,515	
	Cost of medicine/drugs	8,628	
	Transportation	8772	
	Association costs	5798	
	<b>Total production cost</b>		<b>527,393</b>
	<b>Total revenue</b>		<b>986,568</b>
	<b>Gross margin</b> (Total revenue less Total production cost)		<b>459,175</b>
	Production cost/kg		324
	<b>Operating ratio</b> (Total production cost ÷ Total revenue)		<b>0.5</b>

With the operating ratio of less than 1, it shows that fish farming is a good, efficient and profitable business for the producers. However, a higher operating efficiency would be achieved if the fish farmers adopted best management procedure for aquaculture which includes developing and maintaining hazard analysis of critical control points system (HACCPS). Improving fish farmers' awareness about the best management procedure and motivating them to adopt HACCPS would be a catalytic intervention required to enhance productivity in aquaculture sector in the region.

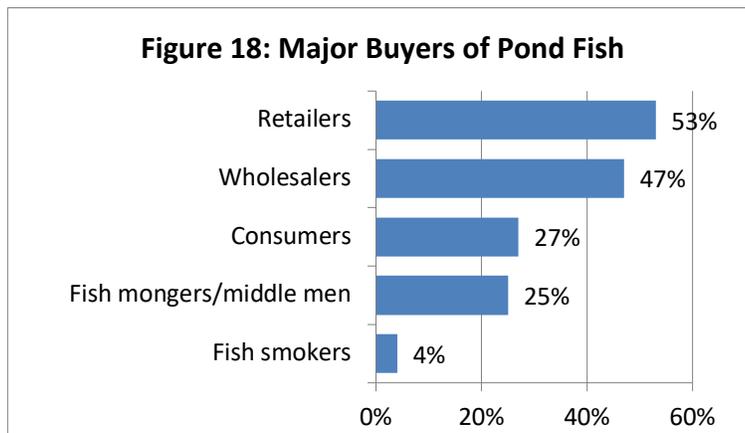
#### 4.7 SALES AND MARKETING

Majority (66%) of the fish farmers in Bayelsa sell their produce to buyers at the farm gate while another one-quarter of the farmers transport fish to local markets for sale to buyers.

Wholesalers/fish mongers or middlemen or agents are the predominant buyers of farmers fish when pull together followed by retailers (Figure18).



**Figure 17: Point of Sales by Fish Farmers**



**Figure 18: Major Buyers of Pond Fish**

#### 4.8 KNOWLEDGE, ATTITUDE AND PRACTICE OF IMPROVED FISH CULTIVATION TECHNOLOGY/ (HACCPS)

Findings on knowledge, attitude and practice of improved fish cultivation technology and focus on HACCPs indicate that about half of fish farmers in Bayelsa are not aware of the recommended practices for improve fish yield and profitability. On the average, less than 50% of the farmers claimed to know about while some practice testing natural food adequacy in earthen ponds, maintaining stock density, lime application, fish health monitoring and disease management, sorting, grading and post-harvest fish handling. On the other hand, between 50 – 57% of the farmers claimed to be aware of and practice how to select quality seed, weed control in earthen ponds, recommended feeding application, supplementary feeds, water management, fish growth monitoring and record keeping. The farmers' depth of knowledge and appropriate practice of these methodologies could not be vouched for as majority of them (over 60%) linked their source of information to their co-farmers in their villages. Farmers who are acquainted but either never practice or have stopped practicing improved fish cultivation technology cited similar reasons such as – non-availability of required inputs, lack of capital, and lack of enough technical knowledge.

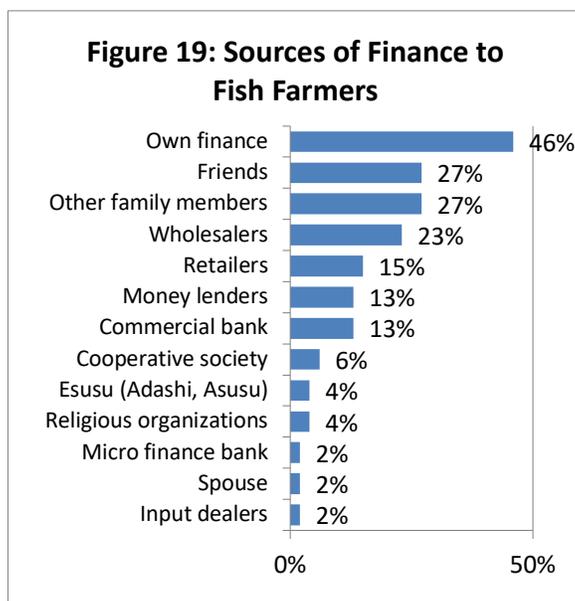
Of greater concern is the lower level of knowledge and practice of the hazard analysis of critical control points system (HACCPS). About 40% or less of the farmers claimed to know about control of vertical transmission, restrictions on fish movement between farm sites, restriction on movement of tools/equipment, human traffic control, disposal of mortalities, monitoring procedures and record keeping of hazard critical control measures and points. Again, co-farmers in the village emerging as major source of information puts a question mark on the veracity of methods practiced.

Creating mass awareness through public enlightenment and demonstration will go a long way to improve small/medium fish farmers' knowledge and practice of improved fish cultivation technology and the HACCPs.

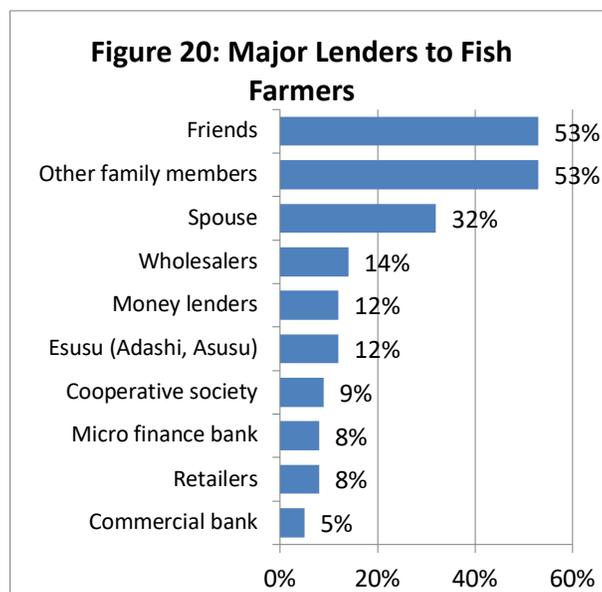
#### 4.9 BUSINESS MANAGEMENT PRACTICES

##### *Sources of Finances*

Farmers generally complained about limited access to credit facilities. In Bayelsa, only 24% of fish farmers had received advance payment for fish sales from customers. The major sources of finance readily available to the fish farmers, like every other SMEs, are friends and relatives (Figure 20). As shown in figure 21, friends, relatives and spouses make funds available to the fish farmers whenever the need arises.



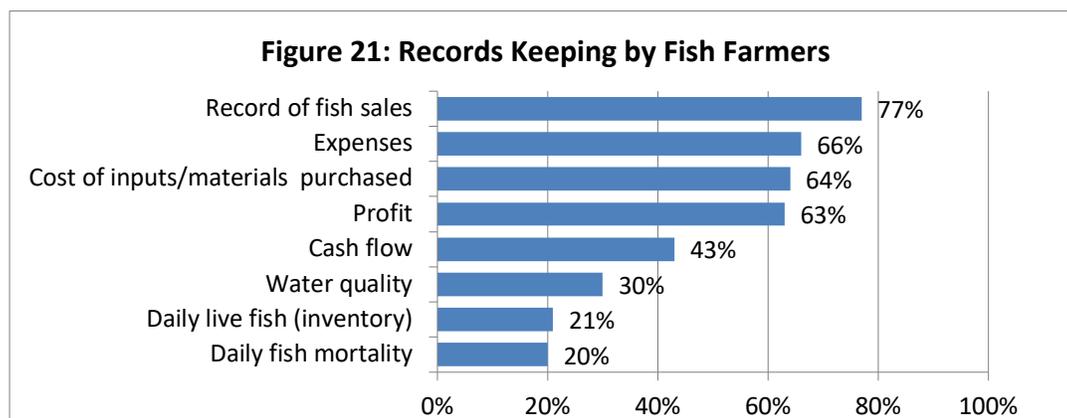
**Figure 19: Sources of Finance to Fish Farmers**

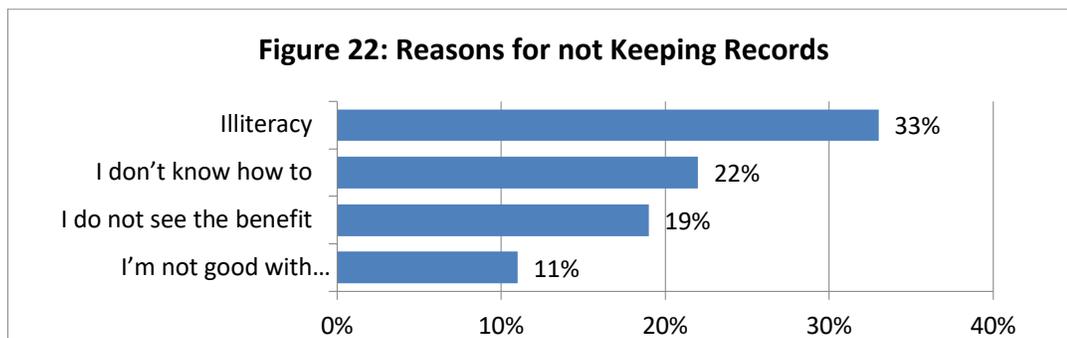


**Figure 20: Major Lenders to Fish Farmers**

##### *Records Keeping*

Majority (68%) of fish farmers in Bayelsa keep business records which include record of sales and expenses, profit and cashflow, etc (Figure 22). The remaining 32% farmers who do not keep records gave some reasons for their action which include illiteracy (33%), lack of basic knowledge of financial record keeping (33%), lack of interest 19% (Figure 23).

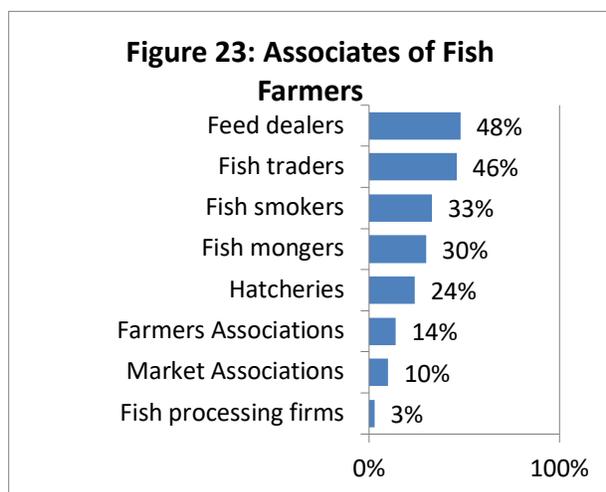
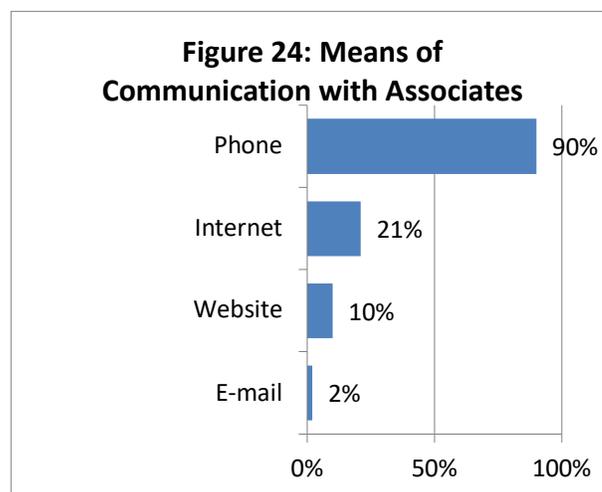


**Figure 21: Records Keeping by Fish Farmers****Figure 22: Reasons for not Keeping Records*****Insurances***

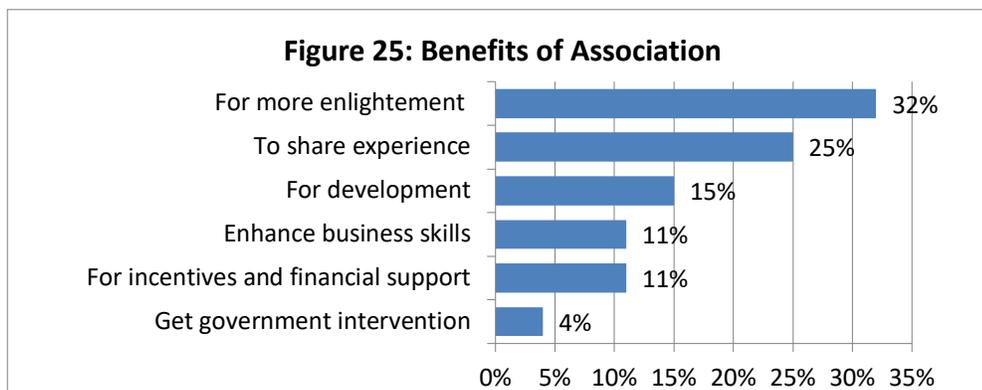
While 47% of the fish farmers presently have some form of insurance, additional 16% would consider undertaking an insurance cover for their fish business in the future. However, 37% of the farmers are not interested in taking insurance for any reason.

**4.10 MEMBERSHIP OF ASSOCIATIONS/COOPERATIVES*****Business Linkages***

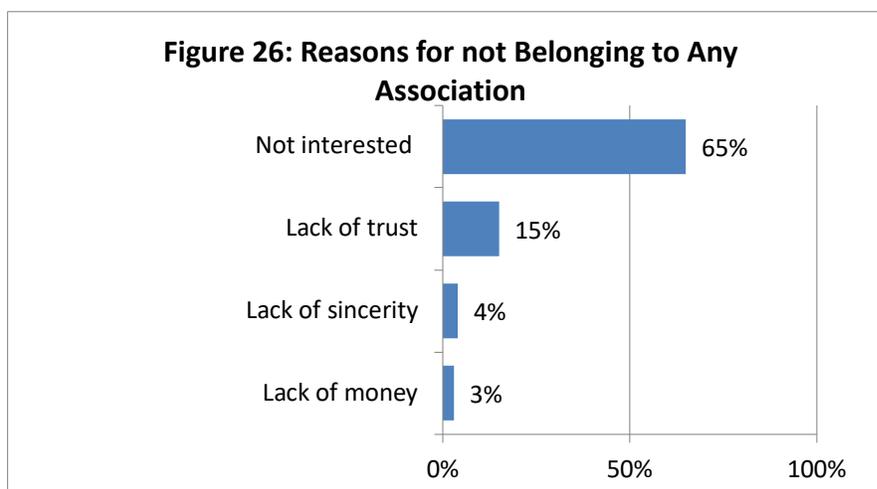
Feed dealers and fish traders dominate the group of people fish farmers are connected with (Figure 24) and they stay in contact with their associates mostly through phone communication. Also, few fish farmers also seek or follow their contacts through the internet via websites or email.

**Figure 23: Associates of Fish Farmers****Figure 24: Means of Communication with Associates*****Membership of Associations/Cooperatives***

Most of the farmers do not belong to any farmer's group because they believe that there is no benefit in joining fish farmers group and more so, groups are there to exploit them. Findings from the survey reveal that show that only 26% of the farmers are aware of the presence of an association or cooperative in their area while 73% are not aware. When asked further if there is a need to an association among farmers, only 32% consented while majority 68% disapproved. Those who clamour for an association wanted to be more enlightened for self-development and receive social and financial support among other benefits (Figure 26). However, over 70% of the farmers do not belong to any association at present cited reasons which include lack of interest (typically a cover up for undisclosed factors), lack trust among others (Figure 27).



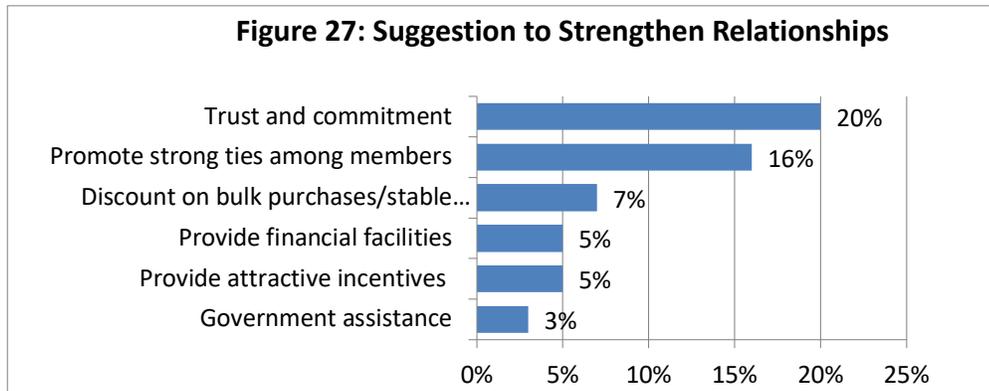
**Figure 25: Benefits of Belonging to Associations**



**Figure 26: Reasons for not Belonging to Any Association**

### ***Suggestions to Strengthen Relationships & Linkages***

To strengthen relationships/linkages among fish farmers, input dealers as well as fish traders, various suggestions made by farmers can be summarized to cover access to credit facilities, promotion of strong relationships and availability/access to inputs like seeds and feeds.



**Figure 27: Suggestion to Strengthen Relationships**



## 5 RIVERS STATE AQUACULTURE SURVEY FINDINGS

### 5.1 HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS

Thirty-two percent of the fish farmers interviewed were females while 68% were males. Most of the farmers (87%) were over 21 years of age and the average age is 49 years. Fifty-two percent were married while 24% had never married. Only 2% of the farmers had no school education, 5% had primary education, while 33% completed secondary school and over 47% were university graduates.

Overall, 71% of farmers had aquaculture as primary and main source of income, while 29% were engaged in other jobs such as civil service (16%), entrepreneur (17%) and poultry farming (12%) and other occupations. On the average the farmers in Rivers had been involved in pond fish culture for more than two years and up to 17 years.

Average size of the fish farmers' households was 4 members and the average annual income of the farmers' households was N950,000.

About half of the farmers also had attended up to 3 workshops or seminars/training in fish cultivation in the last three years. The trainings were focused on pond construction (31%), feeding (78%), stocking (34%), breeding (48%) and training of trainers for farmers (49%). Forty-nine percent of the training was provided by non-governmental organisation followed by Ministry of Agriculture (34%) and Agricultural Development Programme (20%).

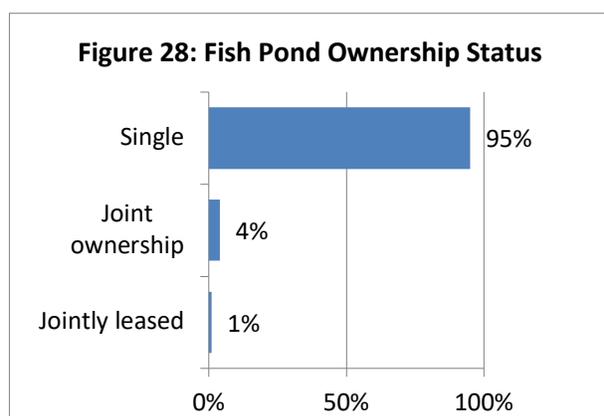
**Table 6: Household Characteristics Fish Farmers in Rivers State**

Characteristics	Rivers State	
<b>Average household size</b>	4	
<b>Gender of the farmer</b>	<b>Freq.</b>	<b>%</b>
Male	136	68
Female	65	32
<b>Age of the farmer</b>		
18 - 21 years	6	3
22 - 34years	47	23
35 - 44years	69	34
45 - 54years	42	21
55 - 65years	14	7
66 years and above	4	2
<b>Level of Education</b>		
No school	4	2
Primary school	6	3
Secondary school	39	19
University	94	47
<b>Average Household Income in N</b>		
100,000 and below	3	1
100,001-200,000	16	8

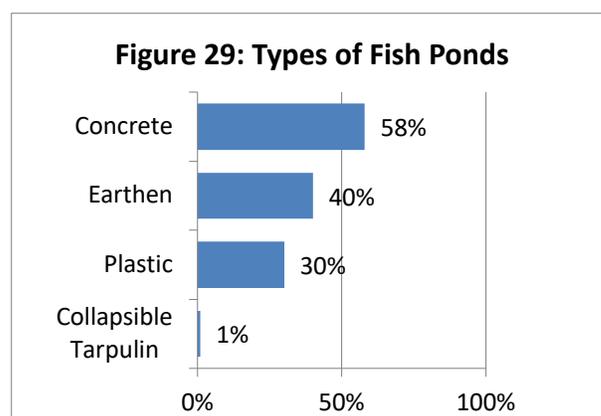
200,001-300,000	16	8
300,001-400,000	24	12
400,001-500,000	5	2
500,001-600,000	8	4
600,001-700,000	7	3
700,001-800,000	7	3
800,001-900,000	10	5
900,001-1,000,000	10	5
1,000,001 and above	33	15
Refused	41	20

## 5.2 OWNERSHIP AND CHARACTERISTICS OF PONDS

In Rivers state, survey findings show that majority of fish farmers (95%) own their ponds while only few were in joint ownership (Figure 29). Concrete ponds were used by majority of farmers (58%) followed by earthen (40%) and plastic pond (8%). Some farmers had concrete and plastic ponds to support their earthen ponds in fish culture (Figure 30). The average age of the ponds is 6 years.



**Figure 28: Fish Pond Ownership Status**



**Figure 29: Types of Fish Ponds**

Average number of ponds per farm vary by type of pond used – farmers using earthen ponds had an average of three ponds per farm, concrete ponds were 5 per farm, plastic ponds were 6 per farm, while tarpaulin ponds were 4 per farm. However, 45% of fish farmers in Rivers cultivated only 1 earthen pond, while 38% had 2 – 3 earthen ponds per farm. Pond sizes vary with the type of ponds, and ranges between 5sq.m to 20sq.m.

Majority of the ponds were 1 – 6 metres deep. The average duration for water retained in the earthen ponds for fish culture was 13 weeks (Figure 31) while majority of farmers (64%) using concrete or plastic or tarpaulin ponds change water every 2.8 weeks. Water for fish pond culture was sourced mainly from boreholes (84%) followed by rivers (9%) and public taps (7%). Only 43% of the farmers treated the water for fish culture with chlorine, carbon lime powder, iron eraser, soda ash and salt (Figure 32).

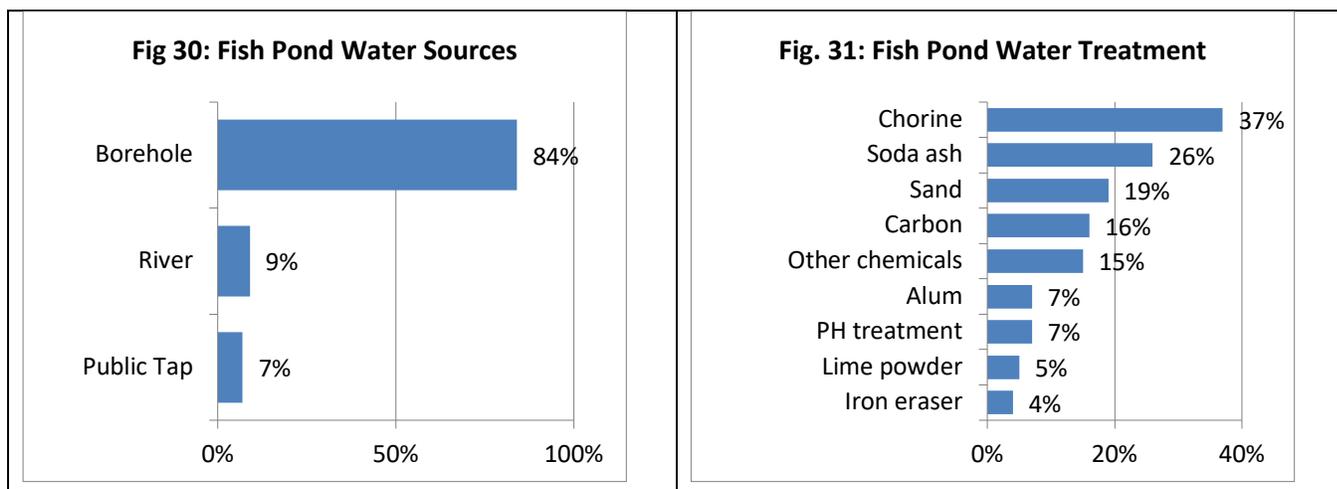


Figure 30: Fish Pond Water Sources

Figure 31: Fish Pond Water Treatment

### 5.3 FISH POND PRE-STOCKING PREPARATION

Commonly used input cost items for commercial fish farms are organic fertilizer (particularly poultry dung, fish intestine, and animal dung) lime, vitamins inorganic fertilizer, other chemicals (medicines) and other pre-stocking preparations like aquatic weed removal, unwanted fish removal and pond bottom mending, etc (Figure 33). **Average cost of pond pre-stocking preparation by fish farmers for 2014 was N100,304 per farmer.**

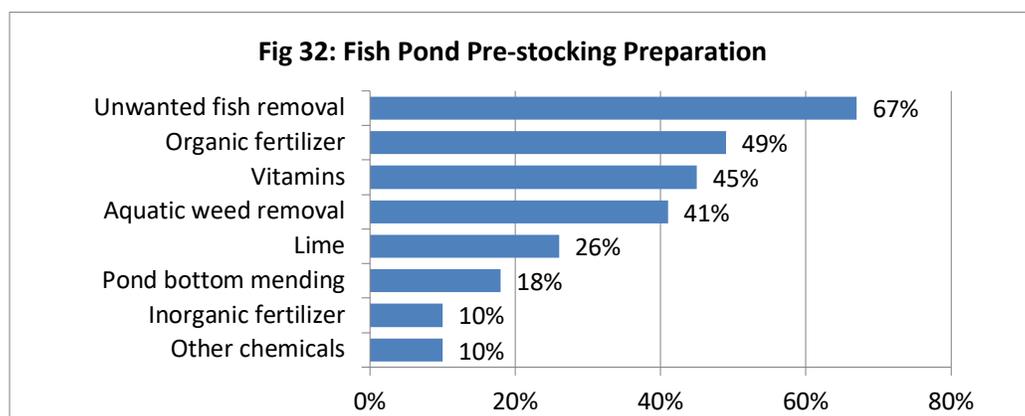
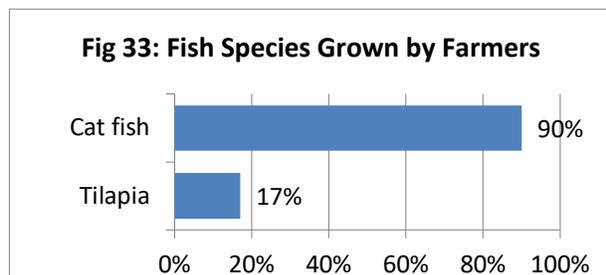


Figure 32: Fish Pond Pre-stocking Preparation

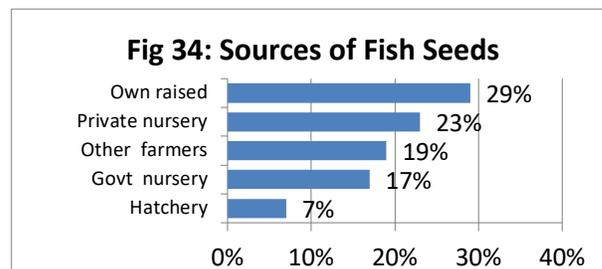
### 5.4 INPUT USE AND COSTS

Majority of farmers (90%) grow catfish while 17% claim to grow tilapia fish species (Figure 34). Half of fish farmers in Rivers buy fish seed from fellow farmers while 39% source from private or government nursery and hatchery (Figure 35). Furthermore, male fish farmers in Rivers State claimed to have bought fingerlings at a rate of N13 per fingerling while their female counterparts said they bought at a rate of N25 per fingerling. This variance in price may be due to the fact that, apart

from large number of both male and female fish farmers sourcing fingerlings from their respective owned nursery, 26% of male fish farmers claimed to source from private nursery while 20% of female fish farmers claimed to source from government nursery.

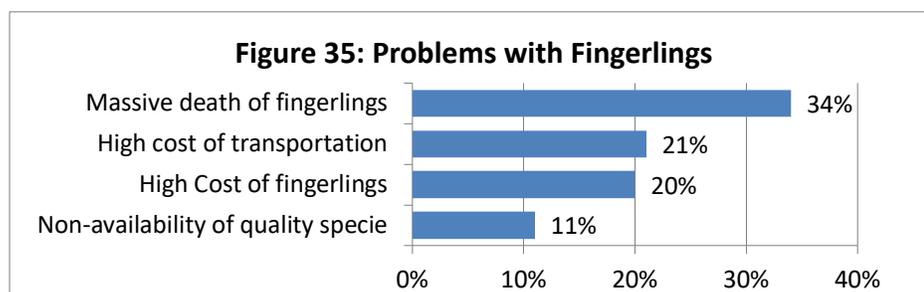


**Figure 33: Fish Species Grown by Farmers**



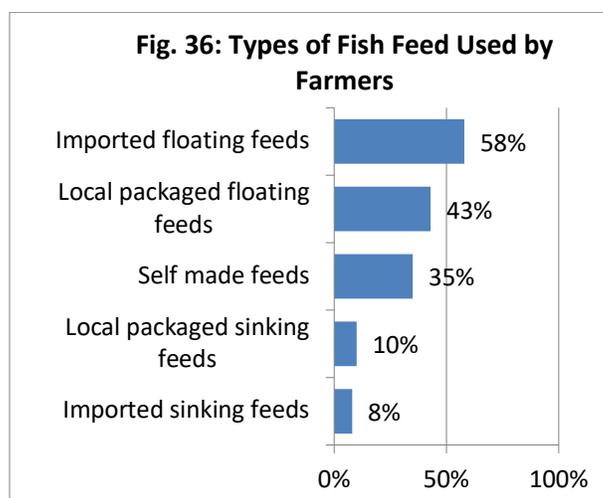
**Figure 34: Sources of Fish Seeds**

Overall, 74% of farmers expressed satisfaction with fish feeds while only 26% were not satisfied citing reasons which include massive death of fingerlings, high cost of transportation, etc. (Figure 36)



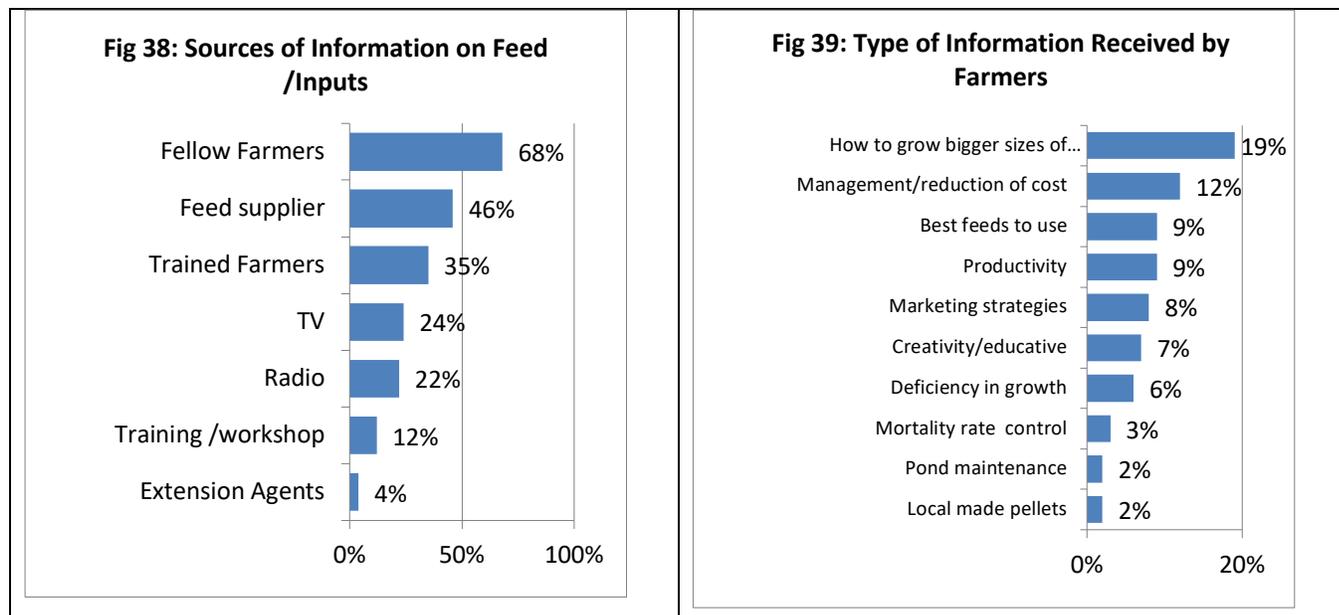
**Figure 35: Problems with Fingerlings**

Majority of farmers (58%) apply imported floating feeds to their fish while some 43% also apply local packaged floating feeds (Figure 37). Leading brands of feeds used by farmers include Vital, Coppens, Multiple and Top feeds.



**Figure 36: Types of Fish Feed Used by Farmers**

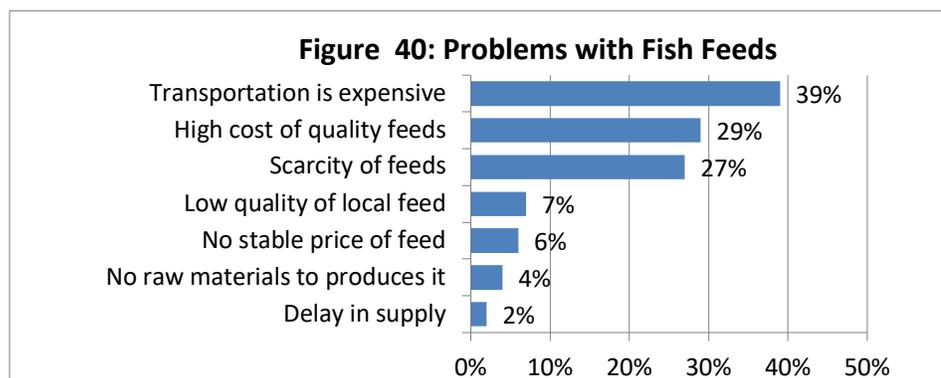
Furthermore, 63% apply supplementary food to their fish such as bread (78%), indomie (38%), crayfish (31%), banga (24%), beans (19%), over-ripe plantain (12%), overripe oranges (9%) and bean pudding (*moin moin*) (9%). Information on fish feed and other inputs are sourced mainly from fellow fish farmers (68%), followed by feed suppliers and trained farmers (Figure 39). Most information received by farmers is focused on how to improve production of grown-out fish and cost management/reduction (Figure 40).



**Figure 38: Sources of Information on Feed /Inputs**

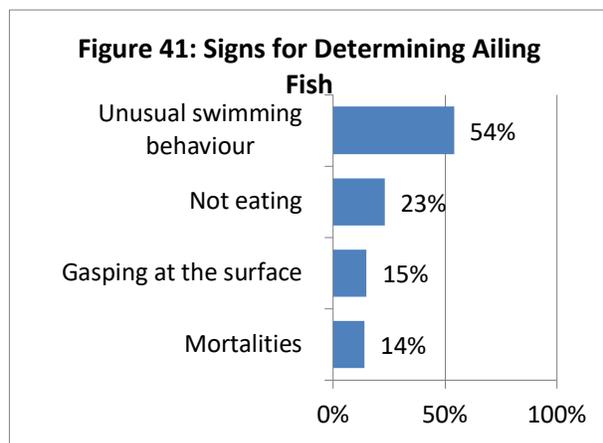
**Figure 39: Type of Information Received by Farmers**

Only 33% of the farmers mentioned that their feed company usually visits their farms once in a month on the average. Over 68% of fish farmers in Rivers expressed satisfaction with fish feed they currently apply to grow their fishes in terms of availability (78%), quality (86%), and price (62%); while the remaining 32% complained of constraints and challenges faced in feeding their fishes such as high cost of transportation, high cost of quality feeds and non-availability of feeds (Figure 41).

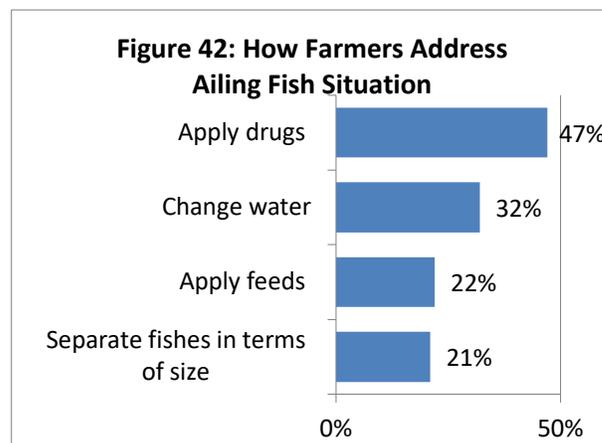


**Figure 40: Problems with Fish Feeds**

A key factor for achieving high yield in fish farming is monitoring and managing the health of pond fishes. Half of fish farmers in Rivers get to know that pond fish is distressed or ailing when they observe unusual swimming pattern while less than one-quarter of the farmers know when some fishes are not eating or are gasping at the water surface or dead (Figure 42). About half of the farmers respond to ailing fish by applying drugs (47%), changing water (32%), feeds (22%), sorting (21%) (Figure 43).



**Figure 41: Problems with Fish Feeds**



**Figure 42: How Farmers Address Ailing Fish Situation**

## 5.5 FISH HARVESTING AND PROCESSING

The survey results show an average yield of 1,792 kg per cycle per farmer in 2014. At an average price of N607 per kg obtained from the survey, the estimated revenue on **sales of 1,792 kg fresh fish per farmer in 2014 was N1,087,744.**

On average, 10% of total harvest was used for family consumption, 6% as gift to people, 7% lost to mortality while 77% was sold. To reduce wastage, farmers advocate better pond fish management actions such as:

- Change of water regularly (21%)
- Proper planning/training of pond staff
- Constant observation and monitoring (9%)
- Smoking the ailing or dying fishes quickly (5%)

About 75% of the harvest was sold as fresh fish while only 25% was sold as smoked fish in 2014. All the farmers who smoked fish for sale used traditional method of wire gauze and firewood, although only 41% of farmers claimed to own traditional kiln, while 6% of farmers rent a kiln when needed.

The majority of fish farmers (61%) believe that few people are engaged in fish smoking in their area while 39% think a lot of people are involved in fish smoking business. However, 75% of farmers believe that selling fresh fish is more profitable than selling smoked fish.

## 5.6 PRODUCTION INPUT COSTS, YIELDS AND REVENUE OF AQUACULTURE

Average cost of fingerlings in 2014 was N17.20 per seed. The average fingerlings stocking per fish culture cycle per farmer in 2014 was 2,760 fingerlings. Thus total amount spent on fingerlings per stocking would be N47,472.

**On the average, 57 bags of feeds were applied to complete a full cycle of 6 months at an average cost of N4,566 giving an estimated feeding cost of N260,262.** In addition, an average of N3,471.40 was spent on transportation per month in the process of sourcing for fish feeds in 2014 (totaling N20,828 for one cycle of fish culture); while an average of N6,531 was spent on drugs during the fish culture cycle.

Average permanent staff employed by farmers is 2 persons and they are remunerated at an average salary of N8,920 per month; while an average of 2 persons are employed on part-time/daily basis with an average of 2 work days per month for at a daily wage rate of N2000. **Using a total of 6 months per fish culture cycle, the labour costs for six months would be N131,040.**

Based on inputs use and costs and return data collected above, the following basic income statement was prepared for an average small/medium fish farmer from Rivers State in 2014.

**Table 7: Basic Income Statement for a Small/Medium Fish Farmer in Rivers State in N**

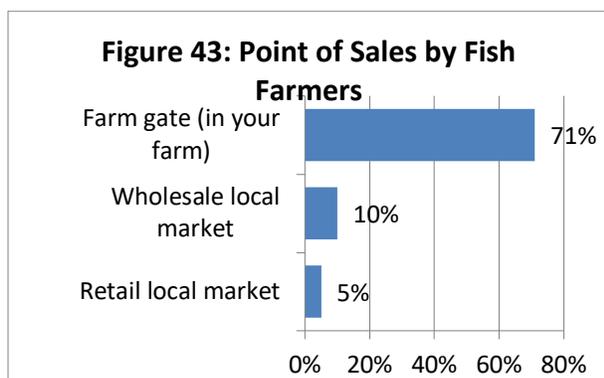
<b>Revenue</b>			
	Sale of 1,792kg fish @ N607 per kg	1,087,744	
	<b>Total Revenue</b>		1,087,744
<b>Production Expenses</b>			
	Cost of 2,760 fingerlings @ N17.20	47,472	
	Pond preparation cost	100,304	
	Cost of feeding (57 bags @ N4,566)	260,262	
	Cost of labour for 6 months	131,040	
	Cost of medicine/drugs	6,531	
	Transportation	20,828	
	Association costs	5000	
	<b>Total production cost</b>		<b>571,437</b>
	<b>Total revenue</b>		<b>1,087,744</b>
	<b>Gross margin</b> (Total revenue less Total production cost)		<b>516,307</b>
	Production cost/kg		319
	<b>Operating ratio</b> (Total production cost ÷ Total revenue)		<b>0.5</b>

With the operating ratio of less than 1, it shows that fish farming is a good, efficient and profitable business for the producers. However, a higher operating efficiency would be achieved if the fish farmers adopted best management procedure for aquaculture which includes developing and maintaining Hazard Analysis of Critical Control Points System (HACCPS). Improving fish farmers'

awareness about the best management procedure and motivating them to adopt HACCPs would be a catalytic intervention required to enhance productivity in aquaculture sector in the region.

### 5.7 SALES AND MARKETING

Majority of the fish farmers (66%) in Bayelsa sell their produce to buyers at the farm gate while another one-quarter of the farmers transport fish to local markets for sale to buyers. Wholesalers/fish mongers or middlemen or agents are the predominant buyers of farmers fish when pull together followed by retailers (Figure 45).



**Figure 43: Point of Sales by Fish Farmers**

### 5.8 KNOWLEDGE, ATTITUDE AND PRACTICE OF IMPROVED FISH CULTIVATION TECHNOLOGY

Findings on knowledge, attitude and practice of improved fish cultivation technology and focus on HACCPs indicate that about half of fish farmers in Bayelsa are not aware of the recommended practices for improve fish yield and profitability.

On the average, less than 50% of the farmers claimed to know and practice:

- Testing natural food adequacy in earthen ponds (35%)
- Maintaining stock density (47%)
- Weed control in earthen ponds (38%)
- Lime application (38%)
- Fish disease management (42%)
- Fish health monitoring (48%)
- Post harvest fish handling (43%)
- Water management (47%)
- Grading (38%)

On the other hand, more than half of the farmers claimed to be aware of and practice:

- Post harvest fish handling (43%)
- Selection of quality seed/fingerlings (57%)
- Recommended feeding application (55%)

- Supplementary feeds (67%)
- Fish growth monitoring (54%)
- Sorting (50%)
- Record keeping (58%)

The farmers' depth of knowledge and appropriate practice of these methodologies could not be vouched for as majority of them (over 60%) linked their source of information to their co-farmers in their villages. Farmers who are acquainted but never practiced or had stopped practicing improved fish cultivation technology cited similar reasons such as – non-availability of required inputs, lack of capital, and lack of enough technical knowledge.

Of greater concern is the lower level of knowledge and practice of the Hazard Analysis of Critical Control Points System (HACCPS) among the farmers. Less than 40% of the farmers claimed to know about:

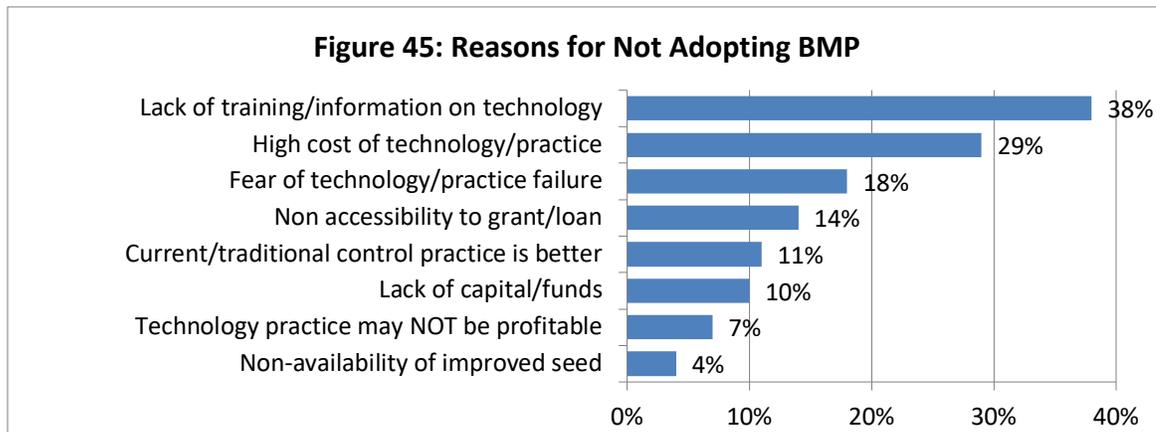
- Strict sanitation measures (37%)
- Water and effluent treatments (36%)
- Control of vertical transmission (35%)
- Separation of each unit within a facility/isolation of these units from each other (37%)
- Restrictions on movement of fish between farm sites of the same company (26%)
- Restrict movement of tools and equipment (28%)
- Traffic control -restrictions on visits to farm and access to farm site (28%)
- Record keeping of hazard critical control measures and points (48%)

However, above 50% of the farmers claimed to know and practice:

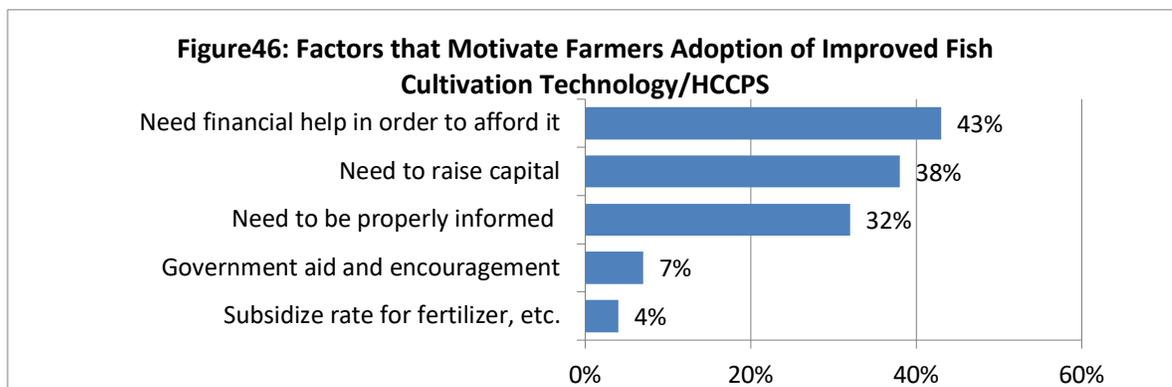
- Disposal of mortalities (59%)
- Monitoring procedures - observation and measurement of cleaning/disinfection (52%)

Again, co-farmers in the village emerging as major source of information puts a question mark on the veracity of methods practiced.

Various reasons were adduced for the inept attitude of farmers towards practice of improved fish cultivation technology and HACCPS as shown in (Figure 46). Factors that would make farmers adopt improved cultivation technology as enumerated by respondents are presented in Figure 47 below.



**Figure 45: Reasons for Not Adopting BMP**



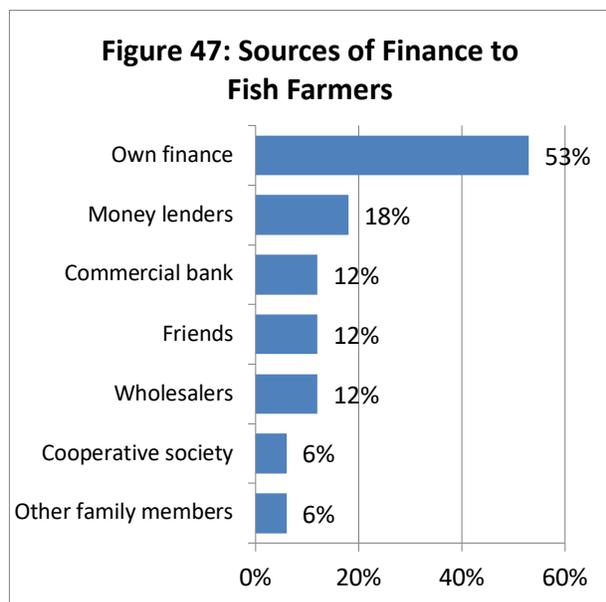
**Figure 46: Factors that Motivate Farmers Adoption of Improved Fish Cultivation Technology/HCCPS**

Creating mass awareness through public enlightenment and demonstration will go a long way to improve small/medium fish farmers' knowledge and practice of improved fish cultivation technology and the HACCPS.

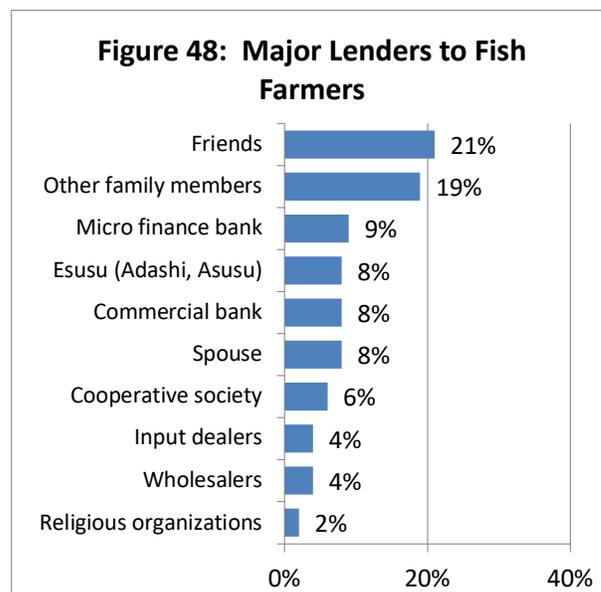
## 5.9 BUSINESS MANAGEMENT PRACTICES

### *Sources of Finances*

Farmers generally complain of limited access to credit facilities. In Rivers, only 8% of fish farmers had received advance payment for fish sales from customers. Apart from their own savings, the major sources of financing readily available to the fish farmers in Rivers are money lenders, commercial banks and friends (Figure 48). And as shown in Figure 49, friends, relatives and microfinance banks make funds available to the fish farmers whenever the need arises.



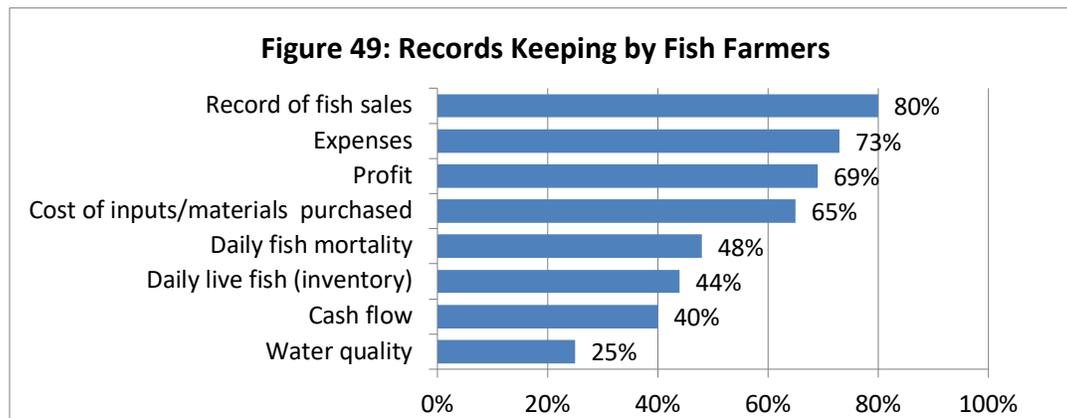
**Figure 47: Sources of Finance to Fish Farmers**



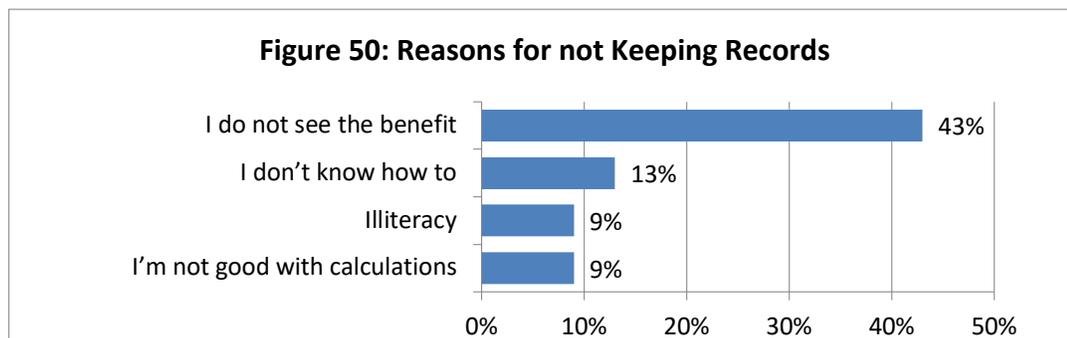
**Figure 48: Major Lenders to Fish Farmers**

### **Records Keeping**

The majority of fish farmers (76%) in Rivers keep business records which include record of sales and expenses, profit and cash flow, etc (Figure 50). The remaining 32% farmers who do not keep records gave some reasons for their action which include illiteracy (9%) lack of basic knowledge of financial record keeping (22%), lack of interest 43% (Figure 51).



**Figure 49: Records Keeping by Fish Farmers**



**Figure 50: Reasons for not Keeping Records**

### **Insurance**

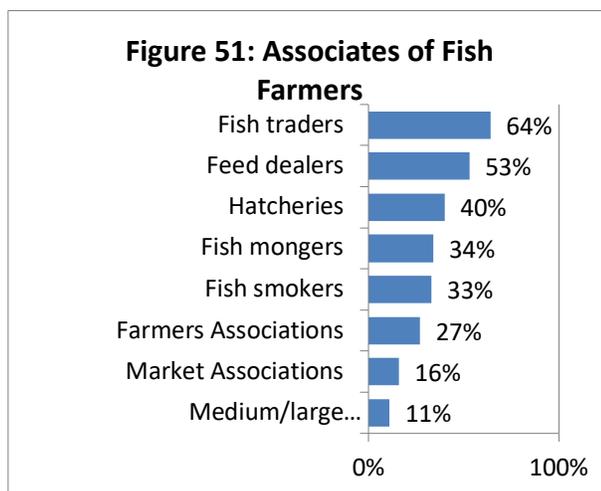
While 27% of the fish farmers presently have some form of insurance, additional 64% would consider undertaking an insurance cover for their fish business in the future. However, 37% of the farmers are not interested in taking insurance for any reason.

## **5.10 MEMBERSHIP OF ASSOCIATIONS/COOPERATIVES**

### **Business Linkages**



Feed dealer and fish traders dominate the group of people fish farmers are connected with (Figure 52) and they stay in contact with their associates mostly through phone communication. Also, few fish farmers also seek or follow their contacts through the internet via websites or email (Figure 53).

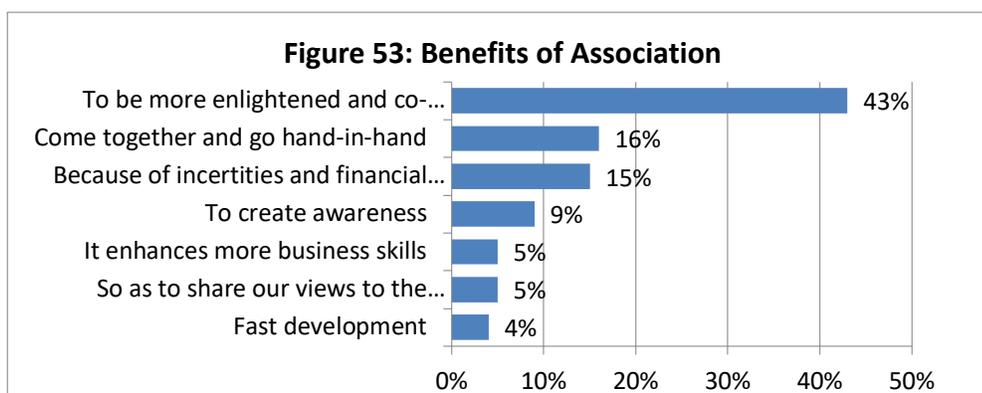


**Figure 51: Associates of Fish Farmers**

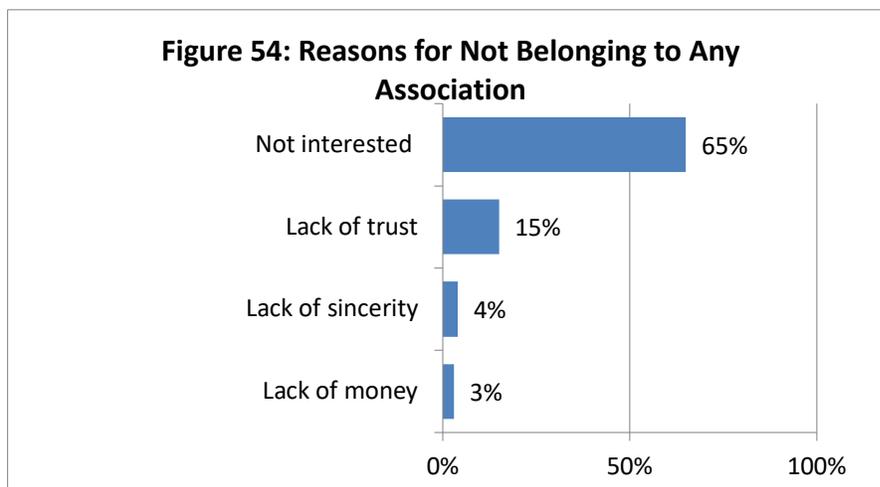
### ***Membership of Associations/Cooperatives***

Most of the farmers (80%) do not belong to any farmer's group because they believe that there is no benefit in joining fish farmers group and more so, that the groups are there to exploit them.

Findings from the survey reveal that only 18% of the farmers are aware of the presence of an association or cooperative in their area while 73% were not aware. When asked further if there was a need for an association among farmers, only 46% consented while majority (53%) disapproved. Those who clamoured for an association, saw it as a platform for enlightened and for social and financial support among other benefits (Figure 54). However, over 70% of the farmers do not belong to any association, and cited reasons which include lack of interest (typically a cover up for undisclosed factors), lack of trust among others (Figure 55).



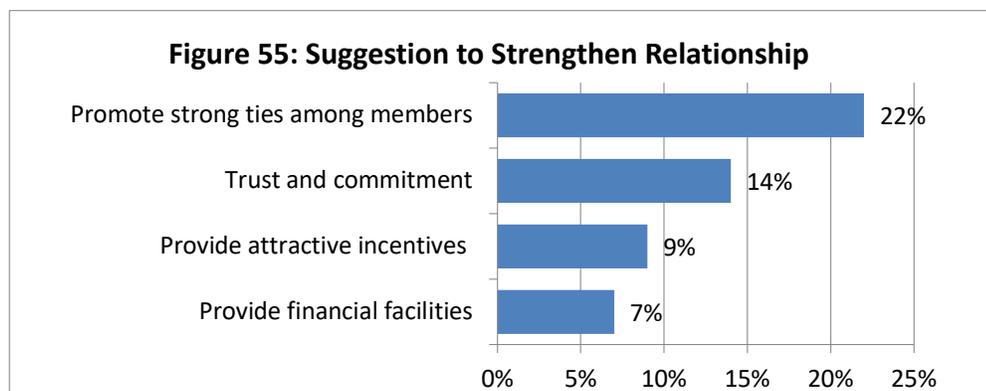
**Figure 53: Benefits of Belonging to Associations**



**Figure 54: Reasons for Not Belonging to Any Association**

### ***Suggestions to Strengthen Relationships & Linkages***

To strengthen relationships/linkages among fish farmers, input dealers as well as fish traders, various suggestions made by farmers can be summarized to cover access to credit facilities, promotion of strong relationships and availability/access to inputs like seeds and feeds.



**Figure 55: Suggestion to Strengthen Relationship**



## 6 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 6.1 SUMMARY OF FINDINGS

#### **Household Demographic Characteristics**

The study revealed that about one-third of fish farmers in Bayelsa State have aquaculture as their main occupation and source of income while two-thirds practice it as secondary occupation. The average family size for the farmers in the state was 3 members with average annual household income of N301,724. In contrast, aquaculture was found to be the occupation of nearly two-thirds fish farmers in Rivers state, while one-third practice aquaculture as a secondary occupation. The average family size for the farmers in the state was 4 members with an annual income of N950,000 per household. Nine out of ten fish farmers in the participating states had completed secondary school education while close to half are university graduates.

#### **Pond Ownership and Characteristics**

Over two-thirds of farmers in Bayelsa use earthen ponds while one-third use concrete ponds. Whereas in Rivers State, concrete ponds are used by more than half of the farmers while earthen ponds are used by less than half. The average number of ponds per fish farm is 3 ponds.

#### **Water Sources and Management**

Water for fish culture is sourced mainly from boreholes in both states. Close to three-quarters of fish farmers in Bayelsa treat water for fish culture using mostly chlorine, lime and soda ash, while less than half of fish farmers in Rivers apply treatment to water used for fish culture. Water treatment is practiced without regards to testing for acidity level of water.

#### **Fish Pond Pre-stocking Preparation**

Commonly used inputs cost items for pre-stocking pond preparation by commercial fish farmers are organic fertilizer (particularly poultry dung, fish intestine, and animal dung), lime, and vitamins. In 2014, pond preparation cost was estimated at N100,304 and N110,761.70 per small/medium scale fish farm for Rivers and Bayelsa respectively. Thus, pond pre-stocking preparation cost contributed 18% and 21% to total production cost for fish culture in the two states respectively. Lack of adequate preparation of pond for stocking fingerlings or juveniles is a contributory factor to the high mortality rate of fish seed within few weeks of arriving in the pond.

#### **Fish Seed Input and Costs**

Catfish is commonly grown by all fish farmers. Tilapia fish is rarely cultured by the fish farmers because it does not grow fast like catfish and it consumes a lot of feed. Fish seeds are sourced mainly from other farmers followed by private or government nursery and hatchery. One of the major places where farmers buy their fingerlings is African Research Aquaculture Center (ARAC) located in Aluu, Port Harcourt. The center supports its customers with training on how to transport stock and feed their fingerlings. In 2014, average cost of fingerlings was N17.20 per seed and N21.80 per seed in Bayelsa and Rivers respectively. In 2014, the average number of fingerlings stocked per fish culture cycle per farmer was 2,482 for farmers in Bayelsa and 2,760 for farmers in Rivers. The cost of fish

seeds contributed 10% and 9% of total production cost for fish culture in Bayelsa and Rivers respectively in 2014.

### **Fish Feed Input and Costs**

Homemade fish feeds are used by most farmers in Bayelsa while majority of farmers in Rivers apply imported floating feeds to grow their fish. Average cost per bag of fish was N4,566 for Bayelsa and Rivers. In 2014, cost of feeding was estimated to contribute 30% and 47.5% of total production cost for fish culture in Bayelsa and Rivers State respectively.

Generally, most fish farmers in Bayelsa and Rivers were not aware of the biomass method of feeding for fish. Lack of adequate advisory support and information from extension agents, hatchery, and feed sellers contribute to fish farmers' lack of knowledge about biomass feeding method.

### **Employment Opportunity and Labour Costs**

In total, 1 to 2 permanent persons work per farm and another 2 to 3 persons are engaged as daily labourers. The daily workers typically work at least for 2 -3 days per month. The roles of these workers generally include fish feeding, and general management of the farm. On the average, a minimum of 3 people are employed per fish farm. So aquaculture has been contributing a lot to create employment opportunities for the people in both states. The average monthly salary for permanent staff was N9,200 per staff in Bayelsa state and N8,920 in Rivers state; while average daily wage was N1,800 and N2,000 across in Bayelsa and Rivers states respectively.

### **Current Fish Health Management Practice**

Half of fish farmers in Rivers get to know that pond fish is distressed or ill when they observe unusual swimming pattern while less than one-quarter of the farmers know when some fishes are not eating or are gasping at the water surface or dead. Farmers most often rely on their co-farmers who sell fingerlings to them or call upon the feed dealers when they notice critically ill fish. Generally to treat ailing fish, the farmers use antibiotics and multivitamins, although without good knowledge about the functions of the drugs and method of application

### **Fish Harvesting and Processing**

The survey results showed an average fish yield of 2,170kg per cycle per farmer in Bayelsa and 1,792kg in Rivers. About 80% of the harvest was sold as fresh fish while only 20% was sold as smoked fish in 2014. All the farmers who smoked fish for sale used traditional method of wire gauze and firewood.

### **Fish Sales and Marketing**

Over two-thirds of the fish farmers in Bayelsa and Rivers sell their produce to buyers at the farm gate. Wholesalers/fish mongers, middlemen or agents are the predominant buyers of fresh fish. Selling price for grown-out fish varies by size of fish, location and seasons of the year. However, the survey revealed that grown-out fish was sold for average of N607 per kg in 2014.

### **Production Input Costs, Yields and Revenue of Aquaculture**

Based on inputs costs and revenue data collected from the survey, the basic income statement for an average farmer showed a potential profit margin of 87% in Bayelsa state and 90% in Rivers state.

### **Knowledge, Attitude and Practice of Improved Fish Cultivation Technology/ (HACCPS)**



Findings on knowledge, attitude and practice of improved fish cultivation technology and focus on hazard analysis of critical control points system (HACCPs) indicate that over half of fish farmers in Bayelsa and Rivers were not aware of the recommended practices to improve fish yield and profitability. For the farmers who claimed to be aware and practice improved technology, their depth of knowledge and practice of these methodologies could not be vouched for as over two-thirds of them linked their source of information to their co-farmers in their villages.

### **Business Management Practices**

Apart from own finance, the major sources of finance readily available to fish farmers were money lenders, friends, relatives and microfinance banks; also, only about one-quarter of fish farmers in Rivers had some form of insurance, while close to two-thirds considered undertaking insurance for fish farming business in future. In Bayelsa, close to half of the farmers had some form of insurance while less than one-fifth considered using insurance cover for their fish business in the future.

While three-quarters of farmers in Rivers keep business records which include record of sales and expenses, profit and cash flow, about two-thirds in Bayelsa did so.

### **Training and Skills**

About half of the farmers interviewed had attended up to 4 workshops or seminars/trainings that focused on pond construction, fish feeding, stocking, and breeding in the past three years before this survey. Most of the trainings were provided by non-governmental organisations followed by Ministry of Agriculture, and Agricultural Development Programmes.

### **Membership of Associations/Business Linkages**

Over two-thirds of fish farmers in Bayelsa and Rivers do not belong to any farmers' association or group because they believe that there was no benefit in joining fish farmers group and more so, groups were established to exploit them. On business linkages or networks, feed dealers and fish traders dominated the group of people fish farmers were in contact with and maintained contact with them mostly through phone communication. However, few fish farmers sought to follow their contacts through the internet via websites or email. To strengthen relationships/linkages among fish farmers, input dealers as well as fish traders, various suggestions made by farmers can be summarized to cover access to credit facilities, promotion of strong relationships and availability/access to inputs like seeds and feeds.

## **6.2 CONCLUSIONS – PROBLEMS/CONSTRAINTS**

MADE's work in the aquaculture sector is driven by a strategy to improve the productivity and competitiveness of fish farmers by addressing the sector's key constraints: (a) poor fish-farmer production knowledge; (b) poor business management knowledge; (c) low market penetration by some feed companies and hatcheries and (d) limited access to new markets.

The study has shown that fish farmers from the participating states are faced with some problems/constraints that limit the farmers' capacity to achieve business growth and profitability. These problems and constraints are highlighted below:

- (a) **Poor knowledge of improved fish cultivation technology** covering testing natural food adequacy in earthen ponds, maintaining stock density, weed control in earthen ponds, lime

- application, fish disease management, fish health monitoring, post-harvest fish handling, water management, grading, post-harvest fish handling, selection of quality seed/fingerlings, recommended feeding application, and fish growth monitoring, sorting, and record keeping
- (b) **Lack of awareness of the Hazards Analysis of Critical Control Points Systems (HACCPs)** which includes, strict sanitation measures, water and effluent treatments, control of vertical transmission, separation of each unit within a facility/isolation of these units from each other, restrictions on movement of fish between farm sites of the same company, restrict movement of tools and equipment, traffic control -restrictions on visits to farm and access to farm site
  - (c) **Lack of formal training on Aquaculture Entrepreneurship** is also a constraint for good performance in farmers' aquaculture practice. Farmers do not have access to entrepreneurial training for aquaculture practices. The majority rely on co-farmers for information on farm management. Some rely on books and information from the internet to acquire knowledge on their business management.
  - (d) **Lack of proper extension program** and dissemination of new technologies and advisory information regarding fish culture from Government MDAs and NGOs.
  - (e) **Poor access to financial facilities** - the interest rate and terms of condition on micro credits tends to be too high for farmers to afford.
  - (f) **Poor access to quality fish seeds** from recognized nursery/hatchery which forces farmers to buy fingerlings from co-farmers - the farmers find it very difficult in getting quality fingerlings.
  - (g) **High cost of floating fish feeds** which resulted in low market penetration by some feed companies and hatcheries - because of these farmers rely more on supplementary feeds to reduce their cost of production.
  - (h) **Poor communication system between fish farms and distant markets** - there is low participation of farmers in associations which could provide linkage with distant markets through shared costs of marketing and transportation.

### 6.3 *RECOMMENDATIONS*

- (a) To address the problems of poor knowledge of improved fish cultivation technology, lack of awareness of HACCPs, and lack of formal training on aquaculture entrepreneurship, training on improved fish culture technology should be arranged for fish farmers to enrich practical knowledge and create awareness for HACCPs. The establishment of demonstration ponds or demo ponds - model fish ponds - as embarked upon by MADE could be utilized to train fish farmers on the technical and managerial aspects of a successful fish farming business. This will go a long way to improve the fish-farmer's production knowledge and their understanding of business management. A major constraint that might limit the use of demo ponds is its distance from locations of majority of farmers.

Furthermore, creating mass awareness through public enlightenment and demonstration will go a long way to improve small/medium fish farmers' knowledge and practice of improved fish cultivation technology and the HACCPs.

- 
- (b) At present most fish-farmers do not belong to any association or those who belong may not have serious commitment. Therefore a major step to attract fish-farmers to demo ponds is to first organize them into community groups or clusters for mobilization. Such groups could be offered free return rides to demo pond sites. Another strategy is to encourage or facilitate existing strong associations to setup branches in nearby communities.
  - (c) To address the problem of lack of proper extension program, farmers call centres could be established to provide quick and immediate free advisory solutions via phone to fish farmers. Access to the Nigerian Agricultural Enterprise Curriculum (NAEC) aquaculture business management and record keeping training manual would be helpful to existing and aspiring fish farmers.
  - (d) To improve access to financial facilities for fish farmers, fish farmers' associations/cooperatives should be formed and strengthened through provision of revolving loan facilities guaranteed by group savings. Such credit for fish farmers should be introduced without or at low interest with agreeable grace period.
  - (e) Access to quality fish seeds could be improved through farmers' interaction with feed and hatchery companies participating in the demo pond project as well as through production and distribution of telephone directory for hatcheries in the two states.
  - (f) Finally, lot more direct efforts will be required to develop linkages among feed companies, hatcheries, extension services, farmer associations etc. These include but not limited to orientation of key actors, workshops on formation of associations with leadership orientation and membership commitment and of course catalytic support by necessary government institutions for hassle free registration, limited tax burden (at most annual market levy).
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## 8 APPENDIX 1: CONTACT LIST FISH FARMERS

## MALE FISH FARMERS –BAYELSA

S/N	NAME	ADDRESS	PHONE NO	AGE
1	Inamamu C. Temo	Charfex Farm Okutukutu	07031158786	28
2	Allen Dan	L Allen Dan Farm Yenagoa	08034306048	54
3	Shadrack Addy	Niger Delta Bay Bridge Yenagoa	081055202880	45
4	John Ayoro	Ayoro Comp.Ibelebini Town Ogbia	08064942686	35
5	Obuma Worukumo	Azikoro Housing Estate Rd 3,Bkl 13ekeki Yenagoa	07031040149	26
6	Douglas Kenneth	Azikoro Town Yenagoa	08168590185	39
7	Tari Jeremiah	Jeremiah Comp, Ibelebini Town	08130015714	31
8	Bruce Ogoni	Bruce Swamp Ward Fereries Famer,Ogu Village	NIL	60
9	Odaderia Williams	Erhuvwu(Ofoni) Famers Cooperative Society, Ofoni Village	08067930014	56
10	Abasi Sorbo Helpme	Hetero Lake Ogu- Yenagoa	08036881952	61
11	Ochogu Ebi	Ebi Farm Eteawe Bossy Water Biseni Village- Yenagoa	08037439232,080 66121536	37

## FEMALE FISH FARMERS -BAYELSA

S/ N	NAME	ADDRESS	PHONE NO	AGE
1	Juliet E.Agbanson	Nil	08033131234	50
2	Emmanuel Oviemoteti	O'lord Basua Rd,Unique Integrated Farmers,Off Mater Die Imiringi	08038826847	46
3	Ebiasuode Tari Beauty	Ebiasuode 'S Fish Farm Near Zarama Market	07058782812	57
4	Janet Albert	Odoni Town,Sagbama Lga	08037375830	55
5	Edidi Iteimoere	Kpinsia-Epie Bay Bridge ,Sagbama	08067107016	54
6	Owi Maria Inibiye	Tuksmari Fish&Snail Farm Kolo Iii,Kpansia Town	08037047835	62
7	Ugbaje Vivien	Sagbama	08064457591	37
8	Patricia Lloyo Jr.	Edepie Village	08033440718	36
9	Okpako Marian	Peace Farm, Ofoni Village	08063337376	50
10	Ebiede Blessing	Blessed Farm Azikoro Town Yenagoa	0806666257	38

## MALE FISH FARMERS-RIVERS

S/ N	NAME	ADDRESS	PHONE NO	AGE
1	James Komi	Manah Fish Farm New Layout Irumuigbo	08034734513	38
2	Eng.A.C Uchime	Jay Tech Farms 12 Ologo Str.Rumuomoi	08033561980	64
3	Birthright Worusa	Queenbite Farm Obele-Emo Lga.	08034701088	45
4	Noble Cheta Chukwu	Plot 6 Shetton Rd Atari Enoch Farm	08184926428	38
5	Johnston Johnson	42 Freedom Str.Oh Aker Rd.Iwofe	07089857629	48
6	Udo Noble	Eze's Farms Obigwe Community Onelga	08062866608	29
7	Emeka Okoro	Komsale Farms 6b Redemption Avenue Akpajo	08030540125	52
8	Udo Prince.	Prince Farm	08037943225	32
9	Nkanta Emmanuel	All-Saint Farm Elingbu-P/H	08055625756	48
10	Ogwe Eze	No 11 Estate Rd.Orgip	08064247719	29

#### FEMALE FISH FARMERS-RIVERS

S/ N	NAME	ADDRESS	PHONE NO	AGE
1	Iche Joy Rumuola	Abbanah Fish Farm	08037986887	35
2	Rosemary Jackson	P.Rossy Fish Farm No 3 Ounda Close Elio Paranklo	08034831771	30
3	Sandra Baridor	Barrisan Farm	08038890280	NIL
4	Amasi Hope	Amasi Farm Isiokpo	08168664152	23
5	Weli .N.Salome	Victory Farm No 15b Oroekpor Rd Off Adegenor Rumuepirikom	070313851	55
6	Kala Sunju Pappa	Aak Fish Farm Obio-Akpor	08030404287	30
7	Salome Dappas	Wofiu Dappa's Comp.Opobo Town	08036771186	35

## 9 APPENDIX 2: DATA COLLECTION TOOLS

## GUIDE 1: FISH FARMERS GROUP

## BACKGROUND INFORMATION ON PARTICIPANTS

*For each participant of the FGD, please take down the following background information*

1. Full Name of Farmer	2. GSM No.	3. Age	4. Sex	5. Marital Status
6. Position: Owner or Manager or Both	7. Date of Employment	8. Level of Education		
9. Name & Address of Fish Farm		10. Date of Establishment		
11. Type of Ownership	12. Farm Size	13. Village/ Town	14. LGA	

TOPIC	FISH FARMERS GROUP
Introduction:	<p><b>MODERATOR:</b></p> <ul style="list-style-type: none"> <li>• Introduce self</li> <li>• Purpose of research - to help in the development of fish farm sector which may be of interest to you. This is a study for an independent research project and it is not linked to any local or national authority or government.</li> <li>• Explain expectation from Respondents - We are only interested in your thoughts and opinions; no special knowledge is needed; no answer is right or wrong</li> <li>• The information you provide is strictly confidential and your name or identity will not be linked to the responses.</li> <li>• Explain the use of recording gadgets – to enable the listen over and understand your views</li> <li>• Obtain respondent consent</li> <li>• Do you have any question please? We are going to start recording now.</li> </ul> <p><b>Guidelines:</b></p> <p>So let's talk about a few guidelines for our discussion today.</p> <ul style="list-style-type: none"> <li>• Please try to <u>talk one at a time</u>, so that we can hear everyone's comments.</li> <li>• We're very <u>interested in your opinions</u>. There are no right or wrong answers, only different ideas. So please be <u>honest</u> and <u>share</u> what you think.</li> <li>• Also at this time please turn off cell phones if you are able to do so.</li> <li>• Are there any more questions before we begin? (<i>Moderator/Nonverbal note taker will start the audiotape recording.</i>)</li> </ul>
TOPIC	QUESTIONS
Ice – breaking Questions	<p>Since most of us may not know each other, let's start off by introducing ourselves. Let's say our first name, our farm's name, town/village, and farm size. [<i>Calls on first person.</i>] ___, will you begin?</p> <p>1. Generally, what motivated you to start fish farming?</p>
Pond Types/Ownership	<p>2. What types of pond are available in this area? Are the ponds earthen or concrete?</p> <p>3. Could you tell the average size of pond/s in this area? <i>PROBE FOR: Size by hectare; Production volume/unit</i></p>

	4. Do you own, rent or lease farms for fishing? <i>PROBE FOR: cost of land, cost of rent, lease value/terms, etc per size</i>
Pond Preparation	5. How do you prepare pond for fish farming? <i>PROBE FULLY FOR: Pond bottom mending, unwanted fish removal, aquatic weed removal, etc</i> <ul style="list-style-type: none"> <li>• Which equipments (if any) are involved? <i>PROBE FULLY FOR: Pumps, blowers, spade/sickle, drum/box/fishing trap, generators – make list of machinery</i></li> </ul> 6. What is the Source of water (public, borehole, river) / Have there been any problems with water availability (and if so, for how long)? Is the water treated before it is released (describe process)
Fish Seed Input	7. Which species of fish do you grow in your farms? 8. What is average stocking density per pond size? How many fingerlings per pond? <i>PROBE: differentiate if different for different species</i> 9. Where do you usually get your fish seed (fingerlings)? <i>PROBE FULLY FOR: Different sources – government hatchery, private hatchery, etc – specific names</i> 10. Do you source from one source or multiple sources? <i>IF YES, PROBE FOR: % of seed amount from different sources</i> 11. What kind of supply arrangement do you have with your fingerlings suppliers? Do you have a contractual arrangement based on purchase orders, etc? 12. Do you currently receive any support or incentives from your fingerlings suppliers? <i>PROBE FULLY FOR: discount on bulk purchases, in-kind loans, etc.?</i> 13. How much do you usually pay per quantity (specify)? <i>PROBE FOR: cost per unit, other costs associated with sourcing of seed, etc.</i> 14. Have there been any problems with fingerlings or getting fingerlings? What are these problems? How have you solved them/ what are your suggestions to solve the problems? 15. How long typically is the period between stocking and harvest (in months)? 16. How satisfied have you been with fish seed in terms of grown out fish output? <i>PROBE FULLY FOR: fish health, grown out size, etc.</i> 17. What are the sources of your information on fish seed – quality? Costs? Etc? <i>PROBE FULLY:</i> <ul style="list-style-type: none"> <li>• Do you receive any information or advice from the source (hatchery)? Extension Agents? Fellow Farmers? Trained Farmers? Etc?</li> <li>• What type of advice or information do you receive? How often? How useful are these information? How satisfied are you with the information?</li> </ul>
Fish Feed & Other Inputs	18. Where do you usually get your fish feed? <i>PROBE FULLY FOR:</i> <ul style="list-style-type: none"> <li>• Different sources of feed and % from different sources (obtain specific names)</li> <li>• Types of feed, readymade commercial/imported or homemade pilets or mixture</li> <li>• Name of company (in case of commercial/imported ready feed)</li> <li>• Ingredients of feed</li> </ul> 19. What kind of supply arrangement do you have with your input suppliers? Do you have a contractual arrangement based on purchase orders, etc? 20. Do you currently receive any support or incentives from your input suppliers? <i>PROBE FULLY FOR: discount on bulk purchases, in-kind loans, etc.?</i> 21. How do you determine the quality of feed you apply to your ponds? <i>PROBE FULLY: Does your feed supplier visit your farm to advise you on fish feeding, etc.? How often?</i> 22. How much do you usually pay per quantity (specify) and types? 23. How often do you apply feeds per day? Why? In what quantity at a time? <i>PROBE FOR: Volume and frequency of usage</i> 24. On basis of what do you decide how and when to apply feeds?

	<p>25. What other inputs are used in fish farming? <i>PROBE FULLY FOR:</i></p> <ul style="list-style-type: none"> <li>• Lime application – types, sources, costs, usage/application</li> <li>• Fertilizer application - types, sources, costs, usage/application</li> <li>• Supplementary feeding - types, sources, costs, usage/application</li> <li>• Others, etc?</li> </ul> <p>26. Do you practice feeding by <u>biomass methodology</u>? Why or why not? <i>PROBE FOR:</i> Volume and frequency of usage</p> <p>27. What are the sources of your information on fish feed and other inputs – fertilizer, medicine, liming, etc? <i>PROBE FULLY</i></p> <p>28. Do you receive any information or advice from the source feed marketer/dealer? Extension Agents? Fellow Farmers? Trained Farmers? Others</p> <p>29. What type of advice or information do you receive? How often? How useful are these information? How satisfied are you with the information?</p> <p>30. In particular, how would you describe the roles played by Agric Extension Agents in fish farming? What sort of extension services do they provide or do you receive from them? How often do you receive them in your fish farms? Where are they from? How helpful have they been to your business?</p>
Critical Factors Impacting Inputs for Fish Farming	<p>31. Are there any particular problems at the moment or risks for the future in terms of a) costs, b) availability, c) reliability, d) government policy, etc affecting any of the inputs for farming?</p> <p>32. Could you please explain for each problem why you think these problems occur? What do you think could be done to solve the problem and/or what are you doing to try to solve the problem? Who else could help solve the problem?</p>
KAP – Pond Management	<p>Besides selection of fingerlings, fish feed and other inputs, how do fish farmers in this area carry out the following pond management practices? <i>PROBE FULLY FOR:</i></p> <p>33. Testing natural food adequacy in water – <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>34. Maintaining stock density 40-70 fingerling per decimal– <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>35. Weed control – <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>36. Liming 0.5 to 1.5 kg per decimal– <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>37. Following recommended feeding application procedures (feeding time, frequency feeding etc) – <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>38. Providing supplementary feed– <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>39. Employing fish disease management - Have there been any problems with fish diseases and how was it treated (and by who)? Do you apply drugs? On what basis do you decide on which drug to apply?</p> <p>40. What types of drugs? Where do your source them from? Are there specific timings for applications or are there signs on fish or other signs they have to pay attention to?</p> <p>41. Fish health monitoring - How do you know when fish is distressed? What signs do you look out for? <i>PROBE FOR:</i> unusual swimming behaviour; not eating; gasping at the surface; mortalities. How do you revive fish of stress? <i>Probe fully</i></p> <p>42. Fish growth monitoring– <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p>

	<p>43. Post harvest handling– <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>44. Water management– <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>45. Sorting– <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>46. Grading (size, quality, cost per unit)– <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p> <p>47. Record keeping - <i>Know or don't know? Practice, How &amp; Why? Or Don't Practice, Why?</i></p>																																										
Harvesting	<p>48. Which months are the main harvest/sales periods?</p> <p>49. What is the typical size of fingerlings at the time of loading into the pond?</p> <p>50. What quantity of fry/fingerlings is typically loaded per unit of area (cages)?</p> <p>51. What is the typical size of the fish when you sell them? (kg)</p> <p>52. How do you sell your fish - is it sold fresh, smoked, or dried? <i>PROBE FOR: How much do you sell per kg if sold fresh; if sold smoked or dried?</i></p> <p>53. Have you tried processing the fish to add value? <i>PROBE FOR:</i></p> <ul style="list-style-type: none"> <li>• % of fish volume is sold as fresh and what % of fish volume is sold as smoker size?</li> <li>• Smoking activity by the farmer - kilns ownership or other process used by farmers</li> </ul> <p>54. What proportion (%) of the total amount of fish that you harvest are you typically unable to sell because of a) wastage, spoiling b) other reasons (specify what e.g. family consumption)</p> <p>55. How do you think wastage can be reduced?</p>																																										
Human Resources	<p>56. How many people do you typically employ in a fish farm? <i>PROBE FOR: How many work as full time, part-time all year, or occasional; Type of people employed – men, women, and children less than 18 yrs.</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Type of people employed</th> <th>Full time</th> <th>Part-time</th> <th>Seasonal/Occasional</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Adult Male</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult Female</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Children</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>57. What are the roles of each worker and how much do you pay the farm workers? <i>PROBE FOR:</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Worker Type</th> <th rowspan="2">Roles/Activity</th> <th rowspan="2">Total No. of days worked/month</th> <th colspan="2">Wage</th> </tr> <tr> <th>Daily</th> <th>Mont</th> </tr> </thead> <tbody> <tr> <td>Full Time</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Part-time</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Seasonal/Occasional</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>58. What are the technical skills/qualifications of the staff?</p>	Type of people employed	Full time	Part-time	Seasonal/Occasional	Total	Adult Male					Adult Female					Children					Worker Type	Roles/Activity	Total No. of days worked/month	Wage		Daily	Mont	Full Time					Part-time					Seasonal/Occasional				
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			Daily	Mont																																							
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Part-time																																											
Seasonal/Occasional																																											
Marketing & Distribution	<p>59. Where do you usually sell your fish? <i>PROBE FOR: Farmgate, wholesale local markets, retail local market, Buyers from within the state and around the region (specific names)</i></p> <p>60. Who are the main buyers of your fish – consumers, retailers, fish mongers/middlemen, wholesalers, others? <i>PROBE FOR: What % of the total value of your sales do you sell to Fish traders, Fish wholesalers, Retailers, consumers?</i></p>																																										

	<p>61. What kind of supply arrangement do you have with your buyers/customers? Do you have any assured customer for your fish? If yes, what form of the fish products – fresh or smoked do they buy from you? How many are they? What is the average volume of fish you sell to each customer? Are you on any contractual arrangement based on purchase orders, etc?</p> <p>62. In particular, how would you describe the roles/activities of fish mongers or middlemen selling and distribution of fish in your markets? Who are they? Are they mostly men or women? Where are they from? How helpful have they been to your business?</p> <p>63. How do you create market awareness for fish business?</p> <p>64. How do you determine the price to sell your fish to the buyers? Who has the most influence on the price you sell your fish – you or the fish mongers/middle men or other buyers? How or why? <i>PROBE FULLY.</i></p> <p>65. How satisfied are you (the farmers) with the prices you sell to customers? How satisfied are the buyers?</p> <p>66. Information sources – where do you get the marketing information? <i>PROBE: Radio, Television, Newspaper, Neighbors/friends, Agriculture Extension Personnel, Farmer Trainer, Local Facilitator? Where are they from?</i></p> <p>67. Do you receive any information or advice from the buyers? <i>PROBE FULLY: Extension Agents? Fellow Farmers? Trained Farmers? Others</i></p> <p>68. What type of advice or information do you receive? How often? How useful are these information? How satisfied are you with the information?</p> <p>69. Selling cost – how much do you usually pay for the following expenses? <i>PROBE FULLY:</i></p> <ul style="list-style-type: none"> <li>• Transportation to market - (types, cost per unit)</li> <li>• Load-unloading</li> <li>• Association</li> <li>• Market toll per unit</li> </ul> <p>70. How would you feel if there is an arrangement whereby after harvesting an intermediary/vendor comes to your farm to buy? <i>PROBE FULLY: Attitude in favor or against?</i></p>
<p>Critical Factors Impacting On The Delivery Or Sales Of Fish To Traders Or Markets</p>	<p>71. Are there any particular problems at the moment or risks for the future in terms of a) methods b) information c) logistics/transport, d) negotiating of delivering or selling your fish to those you sell it to?</p> <p>72. Could you please explain for each problem why you think these problems occur? What do you think could be done to solve the problem and/or what are you doing to try to solve the problem? Who else could help solve the problem?</p>

<p>Yields, sales and income per product</p>	<p>Based on our discussion so far, I would like the group to provide costs estimates and revenues for a fish pond with 1000 fingerlings as stocked density:</p>			
	<p>Cost item</p> <p><i>Fingerlings Cost 1000</i></p> <p><i>Fish feed (bought)</i></p> <p><i>Fish feed (made)</i></p> <p><i>Pond Preparation</i></p> <p><i>Fertilizers, Lime etc.</i></p> <p><i>Electricity/fuel</i></p> <p><i>Labour (regular)</i></p> <p><i>Labour (harvesting)</i></p> <p><i>Water Management costs</i></p> <p><i>Sales commission to agents</i></p> <p><i>Transport costs to market</i></p> <p><i>Other (specify)</i></p> <p>Total Production Cost</p> <p>Revenue</p> <p>Total sales</p> <p>Gross margin</p> <p>Revenue per kg</p> <p>Production cost/kg</p> <p>% profit margin</p>	<p>Underlining assumptions/factors</p> <p>Estimated Amount (N)</p>		
	<p>73. How have costs, sales volumes, revenue and prices over the past 3 years?</p>			
	<p>Production Costs</p>	<p>Annual production volume</p>	<p>Annual sales value</p>	<p>Average annual price</p>
<p>Up</p>				
<p>Down</p>				
<p>Static</p>				
	<p>74. What are the causes or reasons for change in costs? Sales volume? Revenue? Prices? PROBE FULLY FOR REASONS.</p>			
<p>Business Management</p>	<p>Record keeping</p> <p>75. Do you keep business records? What type of records do you keep? PROBE FOR: Records of fish sales, purchases, expenses, water quality, etc? Why or Why not?</p> <p>Sources of Finance</p> <p>76. What are the main sources of finance used in your fish farming business? PROBE FOR: Own finance, Traders or other links in the value chain, Formal bank sources, others?</p>			

	<p>77. Have you ever had to borrow money for the fish farming business? Why or why not?</p> <p>78. IF YES, where did you borrow from? What was the loan used for? How much was borrowed and how much was paid back? How many weeks or months did you pay back?</p> <p>79. Do you often receive advance payment for fish farming/ or to meet working capital requirements? If Yes, from whom? Why?</p> <p>Training/Capacity Building</p> <p>80. Have you received any kind of training, attended workshops, or discussion meeting on fish farming? What kind of training did you get? PROBE FOR: Pond construction, Breeding, Feeding, Stocking, Training of other farmers</p> <p>81. Who provided this training? Who paid for the training?</p> <p>82. Are you satisfied with the training? Why or why not? Was it useful to your business? Why did you say that?</p> <p>83. Do you need further training? If yes, what sort of training do you think would be most useful, if any. Please provide details.</p> <p>84. Would you consider training on enterprise/business management? Are you willing to pay? Why or why not?</p>
Membership of BMO	<p>Now, I am interested in knowing how traders and farmers in this area help and cooperate with each other.</p> <p>85. Are you a member of any association or cooperative? What is the name of the association/coop? What is your status in the group? Can you give total number of members – how many are male/female</p> <p>86. What are the benefits you enjoy from the association? Why did you decide to join? PROBE FULLY</p> <p>87. What kind of activities do you do at your group/association/cooperatives? Who facilitates the learning/activities? PROBE FULLY FOR: <i>involvement in field demonstrations and training, farm activities, off farm activities, improved agricultural technologies, others.</i></p> <p>88. At individual levels, how many feed distributors are you involved with from other LGAs or states apart from those their businesses are located in your area? What about hatcheries, fish mongers, associations, smokers, medium/large processing firms?</p> <p>89. How do you communicate with these business partners or contacts? Do you communicate through phone? Internet or Email? Or website interactions? PROBE FULLY</p>
Final questions	<p>90. Do you have any other comments you would like to make about your activities, or how you think your livelihood and profits could be improved?</p> <p>Close</p> <ul style="list-style-type: none"> <li>• Thank you for joining us today. We're almost out of time. I am going to step out and check with the observers about any last questions they may have. I'll be right back and will let you go just a few minutes after I return.</li> </ul> <p>91. Thank you again! We really appreciate you taking the time to meet with us.</p>

## GUIDE 2: LEADERS OF ASSOCIATIONS

(FISH FARMERS ASSOCIATION & MARKETERS ASSOCIATION)

### BACKGROUND INFORMATION ABOUT ASSOCIATION

*For each participant of the IN-DEPTH, please take down the following information in your notebook*

15. Full Name of Respondent	16. GSM No.	17. Age	18. Sex	19. Marital Status
20. Position in Association:	21. Date of Appointment	22. Level of Education		
23. Name & Address of Association		24. Date of Establishment		
25. Membership Size	26. State	27. Village/ Town	28. LGA	

TOPIC	FISH FARMERS ASSOCIATION & MARKETERS ASSOCIATION
Introduction:	<p>INTERVIEWER:</p> <ul style="list-style-type: none"> <li>• Introduce self</li> <li>• Purpose of research - to help in the development of fish farm sector which may be of interest to you. This is a study for an independent research project and it is not linked to any local or national authority or government.</li> <li>• Explain expectation from Respondents - We are only interested in your thoughts and opinions; no special knowledge is needed; no answer is right or wrong</li> <li>• The information you provide is strictly confidential and your name or identity will not be linked to the responses.</li> <li>• Explain the use of recording gadgets – to enable the listen over and understand your views</li> <li>• Obtain respondent consent</li> <li>• Do you have any question please? I am going to start recording now.</li> </ul>
Membership	<p>92. How did this association form and how has it evolved over time? PROBE FULLY</p> <p>93. What are the advantages of being a member of this association? PROBE FULLY</p> <p>94. What are the requirements for one to join or leave the association? PROBE FULLY</p> <p>95. How many members are you in this association? How many women presently (%) and how many men %? PROBE FULLY</p> <p>96. Is Member number gradually increasing/decreasing? And why? PROBE FULLY</p> <p>97. How do you share responsibilities in the group? And who determines who does what? PROBE FULLY</p> <p>98. Are there special roles done by men and or women? Which ones and why? PROBE FULLY</p>

Membership Services	<p>99. What services do you provide to your members? PROBE FULLY</p> <p>100. What are the present business activities of your association? PROBE : Any activity for improved access of production inputs/fish seed/feed; etc.</p> <p>101. What are the social activities? PROBE FULLY</p> <p>102. Has your association received any kind of training, attended workshops, or discussion meeting on fish farming? Was the training for leaders or general members? What kind of training did you get? PROBE FOR: Pond construction, Breeding, Feeding, Stocking, Training of other farmers, etc?</p> <p>103. Who provided this training? Who paid for the training? PROBE FULLY</p> <p>104. Are you satisfied with the training? Why or why not? Was it useful to your members individual businesses? Why did you say that? PROBE FULLY</p>
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	<p>105. Was the training useful to your association as a group? Why did you say that? PROBE FULLY</p> <p>106. Do you need further training? If yes, what sort of training do you think would be most useful, if any. Please provide details. PROBE FULLY</p> <p>107. Would you consider training on enterprise/business management? What are your expectations of such capacity building? Are you willing to pay? Why or why not? PROBE FULLY</p> <p>108. What kind of other support do you provide to your members? PROBE FULLY</p> <p>109. Do you operate any form of financial support as under cooperative arrangement or otherwise? PROBE FULLY</p>
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**LEADERS/ASSOCIATION MEMBERS' KAP - HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCPs)**

Next, I am going to read some measures and methods used by fish farmers to secure a disease free environment in all phases of aquaculture practices (i.e hatcheries, nurseries, grow out farms etc) for improved profitability. Which of the following fish cultivation management practices are you aware of, have you ever practiced, have you ever shared or trained your members about?

		(a)	(b)	(c)		(d)
S/N	Farm management practices	Are you aware of the method or practice?	If aware, from who did you receive Information	If aware, have you ever practiced the method? Yes = 1 ; No = 2 ;	If aware, have you ever shared the knowledge of the method with your members ?	Are your members aware of the methods or practice? Yes = 1 ; No = 2 ;
19	Strict sanitation measures - protective clothing, leg dip, wheel dips and hand hygiene cleaning					
20	Water and effluent treatments - sanitize water and disinfect wastes-Farm: disinfection programme					
21	Control of vertical transmission -total ban on movement of fish from other farms					
22	Separation of each unit within a facility and isolation of these units from each other					
23	Restrictions on movement of fish between farm sites of the same company					
24	Restrict movement of tools and equipment					
25	Traffic control -restrictions on visits to farm and access to farm site (Strict measures for people entering the farm)					
26	Disposal of mortalities					
27	Monitoring procedures - observation and measurement of cleaning and disinfection					

28	Record keeping of hazard critical control measures and points					
+ Code for (b): 1=Farmers in the village, 2=Farmers in other villages, 3=Mass media (radio, newspapers), 4=Extension workers, 5=Local NGOs, 6=Research institutes, 8=Farmer Community Based Organizations (CBOs), 9 = Training/ workshops.						
Fish Processing	<p>Next, I would like ask you about your experience of fish processing in this area – smoked fish processing in particular.</p> <p>29. Would you say a lot or few people are engaged in fish smoking in this area? PROBES: Why?</p> <p>30. Which of the two methods are mostly used by the smoked fish processors? Traditional kiln method (wire gauze on fire) or mechanical kiln method. PROBES: Why?</p> <p>31. Why are most people not using mechanical kiln method? PROBES: Is this due to finance? Or due to lack of awareness? Or due to lack of knowledge? Etc.</p> <p>32. In you view, which one is more profitable to fish farmers – to process and sell smoked fish from his/her farm or to sell fresh fish from his/her farm? PROBE FULLY: Why? Why? Why?</p> <p>33. Are you aware of any of your members processing and selling smoked fish? Like how many of them? Where are they located? Can you please give me their contacts?</p>					
Market linkage	<p>34. Would you say your association has capacity to engage external bodies, agencies, or corporate organisation? PROBES: Which organisations have you engaged with in the past? In which area? What was the impact/outcome?</p> <p>35. Any linkage with other association (marketers/farmers) on marketing of products? PROBES: Which association (s) is this – obtain name and contact detail; Why not?</p> <p>36. As a group, would you say you can: PROBE FULLY</p> <p>37. Identify and analyze profitable market opportunities? How? Why or Why not?</p> <p>38. Collectively market their products? Why or Why not?</p> <p>39. Build a network of market relationships with buyers and suppliers? Why or Why not?</p> <p>40. Keep records that track their costs, income and profitability? Why or Why not?</p> <p>41. Adapt production and post-harvest practices to meet market demand? Why or Why not?</p> <p>42. Influence purchase/sales price? Why or Why not?</p>					
Sales and Markets	<p>43. Does the association coordinate the sales of their members' products? If so, how does this work? PROBE FULLY</p> <p>44. Where does the association sell their products? (PROBES: local markets, at the farm gate, export) PROBE FULLY</p> <p>45. How do you locate new buyers? PROBE FULLY</p> <p>46. Is your association involved with fish buyers in anyway? If yes, probe fully – does your involvement include signing of MOU or any agreement?</p> <p>47. Are individual members allowed to sell their products apart from the association? PROBE FULLY</p> <p>48. How is the role of the association different from the role of fish mongers/intermediaries? PROBE FULLY</p>					
Improved Production	49. Can some farmers produce more rapidly/efficiently than others? If so, why?					

Technology/ Business Management Practices	<p>50. How do members of the association learn about product requirements and quality standards that buyers want? PROBE FULLY: How do they learn about market taste? How do they learn about the changes customers want?</p> <p>51. What are the difficulties producers have in making these changes? PROBE FULLY</p> <p>52. In what ways (why?) are producers reluctant to make these changes? PROBE FULLY</p> <p>53. Are there any costs or risks to members in making changes? Do they earn more? PROBE FULLY</p> <p>54. How does being a member of this association help producers to learn about the changes buyers want and make these changes? PROBE FULLY</p>
Information Sources/Sharing	<p>55. How do you get information about new developments in the fish farm sector, especially on farm inputs? PROBE FOR: Sources of Awareness – State/Federal Min of Agriculture, State ADP, ADP Extension Agents, FADAMA, Worship Centres, Research Institutes, Friends, Relative, Government, Company/Individual, NGOs, etc.</p> <p>56. What kind of information do you seek or receive and from where? PROBE FULLY</p> <p>57. What is the best source of information about fish farming and inputs topics? PROBE FULLY</p> <p>58. How satisfied are you with the information received from these sources? PROBE FULLY</p> <p>59. What kind of information do you provide or share with the Fish Farmers? PROBE FOR: Do you advise them on when and how to apply feeds/how to care &amp; nurtured their fingerlings.</p>
Final questions	<p>60. How satisfied would say your members are with the leadership of this association? PROBE FULLY</p> <p>61. Would you say that it is sometimes hard for members to trust the leaders of the association? Why or why not? PROBE FULLY</p> <p>62. What would you say about members' commitment to the association's activities? Strong or weak? Why did you say that? PROBE FULLY</p> <p>63. What major challenges do you face in your fish farming /fish trading activities? PROBE FULLY</p> <p>64. What have you done to overcome such challenges? PROBE FULLY</p> <p>65. In your own opinion, what do you think could be done to sustain fish farming activities in Nigeria? PROBE FULLY</p> <p>66. Are there other players in this value chain that you think we should talk to? Could you give me referrals?</p> <p>67. Do you have additional observations or comments that we have not discussed?</p> <p>68. Thank you for your time. I really appreciate you taking the time to meet with us.</p>



## GUIDE 3: OFFICIALS OF AGRICULTURAL DEVELOPMENT PROJECTS/AGENCY

## BACKGROUND INFORMATION ABOUT ORGANISATION &amp; RESPONDENT

*For each participant of the IN-DEPTH, please take down the following information in your notebook*

29. Full Name of Respondent	30. GSM No.	31. Age	32. Sex	33. Marital Status
34. Position in Organisation:	35. Date of Appointment	36. Level of Education		
37. Name & Address of Organisation/Project:		38. Date of Establishment/ Commencement		
	39. State	40. Village/ Town	41. LGA	

TOPIC																																								
Ice - breaking Questions	<p>Introductions, purpose of research.</p> <p>110. How would describe your involvement in the aquaculture sector?</p> <p>111. What are the activities of your agency in aquaculture sector?</p> <p>112. Can you give an account of fish farming in Bayelsa/Rivers state? PROBE FOR:</p> <ul style="list-style-type: none"> <li>• Available statistics /number of small and medium scale fish farmers (obtain contact details)</li> <li>• Available contacts for fish farmers associations</li> <li>• Available contacts of feed companies and</li> <li>• Available contacts for hatcheries</li> <li>• Any reference or source for data on the sector?</li> </ul>																																							
Fish Farmers Spread/ Mapping	<p>113. Could provide an idea of the geographical spread of fish farmers in the state, particularly in the following local governments: PROBE FOR COMMUNITIES WITH HIGH DENSITY OF FISH FARMS:</p> <p>114. Based on your experience in the aquaculture sector: Where do you think we could find most of the fish farming communities (villages) among these local governments. Let's distribute on 100 point scale.</p> <table border="1"> <thead> <tr> <th colspan="3">AKWA IBOM</th> </tr> <tr> <th>LGAs</th> <th>Communities (Develop List)</th> <th>% Contribution</th> </tr> </thead> <tbody> <tr> <td>Sagbama</td> <td></td> <td></td> </tr> <tr> <td>Yenagoa</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td>100</td> </tr> <tr> <th colspan="3">RIVERS</th> </tr> <tr> <th>LGAs</th> <th>Communities (Develop List)</th> <th>% Contribution</th> </tr> <tr> <td>Bonny</td> <td></td> <td></td> </tr> <tr> <td>Ikwere</td> <td></td> <td></td> </tr> <tr> <td>Khana</td> <td></td> <td></td> </tr> <tr> <td>Obio-Akpor</td> <td></td> <td></td> </tr> <tr> <td>Port-Harcourt</td> <td></td> <td></td> </tr> <tr> <td>Tai</td> <td></td> <td></td> </tr> </tbody> </table>	AKWA IBOM			LGAs	Communities (Develop List)	% Contribution	Sagbama			Yenagoa			Total		100	RIVERS			LGAs	Communities (Develop List)	% Contribution	Bonny			Ikwere			Khana			Obio-Akpor			Port-Harcourt			Tai		
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	Total	100		
Value Chain Support	115. What strategies are being put in place to enhance the livelihoods of those that depend on fish farming? PROBE FULLY 116. What extension services do you provide to fish farmers? PROBE FULLY 117. What problems do extension worker encounter in extending their services to farmers? PROBE FULLY 118. What general problems do farmers encounter in trying to develop fish farming? PROBE FULLY 119. Do women face specific challenges and why? PROBE FULLY 120. Are you aware of other agencies or NGOs that support the development of fish farming in Rivers and what is their role? PROBE FULLY 121. In your opinion, what should be done to further develop aquaculture in Rivers? PROBE FULLY			
Critical Factors Impacting Inputs for Fish Farming	122. Are there any particular problems at the moment or risks for the future in terms of a) costs, b) availability, c) reliability, d) government policy, etc affecting any of the inputs for farming? PROBE FULLY 123. Could you please explain for each problem why you think these problems occur? What do you think could be done to solve the problem and/or what are you doing to try to solve the problem? Who else could help solve the problem? PROBE FULLY			
Critical Factors Impacting On The Delivery Or Sales Of Fish To Traders Or Markets	124. Are there any particular problems at the moment or risks for the future in terms of a) methods b) information c) logistics/transport, d) negotiating of delivering or selling your fish to those you sell it to? PROBE FULLY 125. Could you please explain for each problem why you think these problems occur? What do you think could be done to solve the problem and/or what are you doing to try to solve the problem? Who else could help solve the problem? PROBE FULLY			
LEADERS/ASSOCIATION MEMBERS' KAP - HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCPs)				
Next, I am going to read some measures and methods used by fish farmers to secure a disease free environment in all phases of aquaculture practices (i.e hatcheries, nurseries, grow out farms etc) for improved profitability. Which of the following fish cultivation management practices are you aware of, have you ever shared or advised your fish farmer customers about?				
		(a)	(b)	(d)
S/N	Palm management practices	Are you aware of the method or practice? 1-Yes. 2-No.	If aware, from who did you receive Information	If aware, have you ever shared the knowledge of the method with your customers?
17	Strict sanitation measures - protective clothing, leg dip, wheel dips and hand hygiene cleaning			Are your customers aware of the methods or practice? Yes. 1- Yes. 2- No.

18	Water and effluent treatments - sanitize water and disinfect wastes-Farm: disinfection programme				
19	Control of vertical transmission -total ban on movement of fish from other farms				
20	Separation of each unit within a facility and isolation of these units from each other				
21	Restrictions on movement of fish between farm sites of the same company				
22	Restrict movement of tools and equipment				
23	Traffic control -restrictions on visits to farm and access to farm site (Strict measures for people entering the farm)				
24	Disposal of mortalities				
25	Monitoring procedures - observation and measurement of cleaning and disinfection				
26	Record keeping of hazard critical control measures and points				

+ Code for (b): 1=Farmers in the village, 2=Farmers in other villages, 3=Mass media (radio, newspapers), 4=Extension workers, 5=Local NGOs, 6=Research institutes, 8=Farmer Community Based Organizations (CBOs), 9 = Training/ workshops.

Fish Processing	<p>Next, I would like ask you about your experience of fish processing in this area – smoked fish processing in particular.</p> <p>27. Would you say a lot or few people are engaged in fish smoking in this area? PROBES: Why?</p> <p>28. Which of the two methods are mostly used by the smoked fish processors? Traditional kiln method (wire gauze on fire) or mechanical kiln method. PROBES: Why?</p> <p>29. Why are most people not using mechanical kiln method? PROBES: Is this due to finance? Or due to lack of awareness? Or due to lack of knowledge? Etc.</p> <p>30. In you view, which one is more profitable to fish farmers – to process and sell smoked fish from his/her farm or to sell fresh fish from his/her farm? PROBE FULLY: Why? Why? Why?</p> <p>31. Are you aware of any of your customers who process and sell smoked fish? Like how many of them? Where are they located? Can you please give me their contacts?</p>
Membership of Association/ Linkage	<p>Now, I am interested in knowing how traders and farmers in this area help and cooperate with each other.</p> <p>GETTING FISH FARMERS TO FORM ASSOCIATIONS/GROUPS TO ENGAGE SUCCESSFULLY WITH MARKETS</p> <p>32. Identify the Driving Forces - What are the factors that will support fish farmers to form associations/groups to enable them engage successfully with markets, government agencies, corporate organisations, etc? PROBE FULLY</p> <p>33. Identify the Restraining Forces - What are the factors or pressures that hinder or prevent/resist fish farmers to form associations/groups to enable them engage</p>

	<p>successfully with markets, government agencies, corporate organisations, etc? PROBE FULLY</p> <p>34. Assess Impact - What business benefits will forming groups deliver? What other business processes will be affected by the change? PROBE FULLY</p> <p>35. Risks - What are the risks involved? How easy will it be to make the change? PROBE FULLY</p> <p>36. Drivers - Who would support the change? Who would likely go against it? Why? PROBE FULLY</p>
Final questions	<p>37. Are there other players in this value chain that you think we should talk to? Could you give me referrals?</p> <p>38. May I contact you by phone/email if I have any follow up questions?</p> <p>39. Thank you for your time and God bless you.</p>

#### GUIDE 4: HATCHERY

<p><b>BACKGROUND INFORMATION ON PARTICIPANTS</b></p> <p><i>For each respondents, please take down the following background information</i></p>
--

1. Full Name of Respondent	2. GSM No.	3. Age	4. Sex	5. Marital Status
6. Position: Owner or Manager or Both	7. Date of Employment	8. Level of Education		
9. Hatchery Name & Address		10. Date of Establishment		
11. Year of License Issue	13. Village/Town	14. LGA		
15. Interviewer		16. Date of Interview		

TOPIC	
Introduction:	<p><b>INTERVIEWER:</b></p> <ul style="list-style-type: none"> <li>• Introduce self</li> <li>• Purpose of research - to help in the development of fish farm sector which may be of interest to you. This is a study for an independent research project and it is not linked to any local or national authority or government.</li> <li>• Obtain respondent consent</li> <li>• Do you have any question please? I am going to start recording now.</li> </ul>

TOPIC	QUESTIONS
Ice - breaking Questions	<p>126. Since when have you been involved in fingerlings production?</p> <p>127. Do you have an idea of number of hatcheries in this area?</p> <p>128. Generally, how would you describe your hatchery process? <i>What are the major steps that you take from start to finish?</i> I would like us to take the step one by one.</p> <p>129. Who does the breeding activities? (Self, Appointed technician, others.)</p>
Pond Types	<p>130. What's the total area size for this hatchery?</p> <p>131. Please provide information about ponds used for hatchery operation. What type and size is used for brood rearing? Water settling/reservoir? Nursing pond?</p> <p>132. Do you own, rent or lease farms for hatchery? <i>PROBE FOR: cost of land, cost of rent, lease value/terms, etc per size</i></p>

	Purpose of Use						Type		No. Available		Area/Size		Construction cost/leased cost		When constructed/leased	
	Brood rearing ponds															
	Reservoir															
	Nursery															
Brood Stock Input	133. Please provide information about brood stock species used for hatchery operation. What quantity is used within a typical cycle of hatchery? What sex? What weight? At what costs? Which sources? How long is the cycle?															
	134.															
	S/N	Brood Species name		Quantity		Total Weight (kg)		Specify source of brood fish/mother species – wild source, govt farm, private farm, own farm, etc)				How old are species when you buy them?				
	1	Catfish		M	F	M	F									
2	Tilapia															
Other inputs for the hatchery	135. How much do you usually pay per quantity (specify)? <i>PROBE FOR: cost per unit, other costs associated with sourcing of seed, etc.</i>															
	136. Any records of the history regarding sources, parentage etc? Are they procured from the wild or from other farms?															
	137. Can you tell us Names of brood stock farms and location?															
	138. Why the choice of the brood stock farm?															
	139. Have there been any problems with brood stock or getting brood stock? What are these problems? How have you solved them/ what are your suggestions to solve the problems?															
	140. How long typically is the period between stocking and harvest (in months)?															
	141. Are you aware of standard certified brood stock banks which are HACCP compliant?															
	142. What type of feed do you use in hatchery? <i>PROBE FULLY FOR:</i>															
	<ul style="list-style-type: none"> <li>• Different sources of feed and % from different sources (obtain specific names)</li> <li>• Types of feed, readymade commercial/imported or homemade pellets or mixture</li> <li>• Name of company (in case of commercial/imported ready feed)</li> <li>• Ingredients of feed</li> </ul>															
	143. How much do you usually pay per quantity (specify) and types?															
144. How often do you apply feeds per day? Why? In what quantity at a time? <i>PROBE FOR: Volume and frequency of usage</i>																
145. On basis of what do you decide how and when to apply feeds?																
146. What other inputs are used in fish hatchery? <i>PROBE FULLY FOR:</i>																
<ul style="list-style-type: none"> <li>• Lime application – types, sources, costs, usage/application</li> <li>• Fertilizer application - types, sources, costs, usage/application</li> <li>• Supplementary feeding - types, sources, costs, usage/application</li> <li>• Hormones such as Ovaprim - types, sources, costs, usage/application</li> </ul>																

	<ul style="list-style-type: none"> <li>• Hormones from pituitary gland – types, sources, costs, usage/application</li> <li>• Others, etc?</li> </ul>																																																
Harvesting	<p>147. Which months are the main harvest/sales periods?</p> <p>148. What is the annual production capacity (kg) of the hatchery?</p> <p>149. What is the production cost of seed per Kg or per thousand?</p> <p>150. What contributes to quality of fingerlings? How do you improve quality of fingerlings?</p> <p>151. How would you relate the quality of fingerlings to growth and size of grown out fish? For instance if normal feeding regimes (timing, quantity and quality) were followed, what would be the average weight of grown out fish from poor quality fingerlings?</p> <p>152. What would be the average weight of grown out fish from high quality fingerlings?</p> <p>153. Sometime in 2013, there was shortage of pond fish due to dearth of fingerlings. What could you recall to be the reasons or factors that contributed to the event? What factors could lead to shortage of fingerlings? How could such be prevented in the future?</p>																																																
Critical Factors Impacting Inputs for Hatchery	<p>154. Are there any particular problems at the moment or risks for the future in terms of a) costs, b) availability, c) reliability, d) government policy, etc affecting any of the inputs for hatchery?</p> <p>155. Could you please explain for each problem why you think these problems occur? What do you think could be done to solve the problem and/or what are you doing to try to solve the problem? Who else could help solve the problem?</p> <table border="1"> <thead> <tr> <th>S/N</th> <th>PROBLEMS/CONSTRATINTS</th> <th>INTENSITY</th> <th>MEASURES TAKEN TO OVERCOME</th> </tr> </thead> <tbody> <tr> <td></td> <td>Shortage of quality broods</td> <td>Less, moderate, high, n/a</td> <td></td> </tr> <tr> <td></td> <td>Climate change and temperature fluctuation</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Irregular power supply</td> <td></td> <td></td> </tr> <tr> <td></td> <td>High cost of larval feed</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Product marketing</td> <td></td> <td></td> </tr> <tr> <td></td> <td>High mortality of larvae</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Social problems including theft, poisoning, etc.</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Source of water</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Water quality</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Rising cost of hormones</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Others</td> <td></td> <td></td> </tr> </tbody> </table>	S/N	PROBLEMS/CONSTRATINTS	INTENSITY	MEASURES TAKEN TO OVERCOME		Shortage of quality broods	Less, moderate, high, n/a			Climate change and temperature fluctuation				Irregular power supply				High cost of larval feed				Product marketing				High mortality of larvae				Social problems including theft, poisoning, etc.				Source of water				Water quality				Rising cost of hormones				Others		
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Marketing & Distribution	<p>156. Where do you usually sell your fingerlings? <i>PROBE FOR: Farmgate, wholesale local markets, retail local market, Buyers from within the state and around the region (specific names)</i></p> <p>157. Who are the main buyers of your fingerlings – fish farmers, middlemen, wholesalers, others? <i>PROBE FOR: What % of the total value of your sales do you sell to Fish farmers? Wholesalers/middlemen?</i></p>																																																

	<p>158. What kind of supply arrangement do you have with your buyers/customers? Do you have any assured customer for your fingerlings? If yes, how many are they? What is the average volume of fingerlings you sell to each customer? Are you on any contractual arrangement based on purchase orders, etc?</p> <p>159. What is your average volume of sale per day? Average sale price per 1000?</p> <p>160. How do you determine the price to sell your fingerlings to the buyers? Who has the most influence on the price you sell your fish – you or the fish farmers? How or why? <i>PROBE FULLY.</i></p> <p>161. How satisfied are you (the farmers) with the prices you sell to customers? How satisfied are the buyers?</p> <p>162. Do you give information about how to nurture/care for fingerlings to your customers? What kind of information do you provide to the customers?</p> <p>163. Do you give information about feed application to your customers? What kind of information do you provide to the customers?</p> <p>164. Selling cost – how much do you usually pay for the following expenses? <i>PROBE FULLY:</i></p> <ul style="list-style-type: none"> <li>• Transportation to market - (types, cost per unit)</li> <li>• Load-unloading</li> <li>• Association</li> <li>• Market toll per unit</li> </ul>																																										
Human Resources	<p>165. How many people do you typically employ in this hatchery? <i>PROBE FOR: How many work as full time, part-time all year, or occasional; Type of people employed – men, women, and children less than 18 yrs.</i></p> <table border="1" data-bbox="402 989 1511 1182"> <thead> <tr> <th>Type of people employed</th> <th>Full time</th> <th>Part-time</th> <th>Seasonal/Occasional</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Adult Male</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult Female</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Children</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>166. What are the roles of each worker and how much do you pay the farm workers? <i>PROBE FOR:</i></p> <table border="1" data-bbox="402 1251 1511 1486"> <thead> <tr> <th rowspan="2">Worker Type</th> <th rowspan="2">Roles/Activity</th> <th rowspan="2">Total No. of days worked/month</th> <th colspan="2">Wage</th> </tr> <tr> <th>Daily</th> <th>Month</th> </tr> </thead> <tbody> <tr> <td>Full Time</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Part-time</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Seasonal/Occasional</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>167. What are the technical skills/qualifications of the staff?</p>	Type of people employed	Full time	Part-time	Seasonal/Occasional	Total	Adult Male					Adult Female					Children					Worker Type	Roles/Activity	Total No. of days worked/month	Wage		Daily	Month	Full Time					Part-time					Seasonal/Occasional				
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Yields, sales and income per product	<p>Based on our discussion so far, I would like the group to provide costs estimates and revenues for a fish pond with 1000 fingerlings as stocked density:</p> <table border="1" data-bbox="402 1633 1435 1904"> <thead> <tr> <th>Cost item</th> <th>Underlining assumptions/factors</th> <th>Estimated Amount (N)</th> </tr> </thead> <tbody> <tr> <td><i>Seed Cost per 1000</i></td> <td></td> <td></td> </tr> <tr> <td><i>Feed</i></td> <td></td> <td></td> </tr> <tr> <td><i>Pond Preparation</i></td> <td></td> <td></td> </tr> <tr> <td><i>Fertilizers, Lime etc.</i></td> <td></td> <td></td> </tr> <tr> <td><i>Electricity/fuel</i></td> <td></td> <td></td> </tr> </tbody> </table>	Cost item	Underlining assumptions/factors	Estimated Amount (N)	<i>Seed Cost per 1000</i>			<i>Feed</i>			<i>Pond Preparation</i>			<i>Fertilizers, Lime etc.</i>			<i>Electricity/fuel</i>																										
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	<i>Labour (regular)</i>		
	<i>Labour (harvesting)</i>		
	<i>Water Management costs</i>		
	<i>Sales commission to agents</i>		
	<i>Transport costs to market</i>		
	<i>Other (specify)</i>		
	Total Production Cost		
	Revenue		
	Total sales	Sales price @XX/kg x Qty	
	Gross margin		
	Revenue per kg		
	Production cost/kg		
	% profit margin		

LEADERS/ASSOCIATION MEMBERS' KAP - HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCPs)					
Next, I am going to read some measures and methods used by fish farmers to secure a disease free environment in all phases of aquaculture practices (i.e hatcheries, nurseries, grow out farms etc) for improved profitability. Which of the following fish cultivation management practices are you aware of, have you ever shared or advised your fish farmer customers about?					
		(a)	(b)		(d)
S/N	Palm management practices	Are you aware of the method or practice? 1=Yes, 2=No	If aware, from who did you receive Information	If aware, have you ever shared the knowledge of the method with your customers?	Are your customers aware of the methods or practice?
43	Strict sanitation measures - protective clothing, leg dip, wheel dips and hand hygiene cleaning				
44	Water and effluent treatments - sanitize water and disinfect wastes-Farm: disinfection programme				
45	Control of vertical transmission -total ban on movement of fish from other farms				
46	Separation of each unit within a facility and isolation of these units from each other				
47	Restrictions on movement of fish between farm sites of the same company				

48	Restrict movement of tools and equipment				
49	Traffic control -restrictions on visits to farm and access to farm site (Strict measures for people entering the farm)				
50	Disposal of mortalities				
51	Monitoring procedures - observation and measurement of cleaning and disinfection				
52	Record keeping of hazard critical control measures and points				
<p>+ Code for (b): 1=Farmers in the village, 2=Farmers in other villages, 3=Mass media (radio, newspapers), 4=Extension workers, 5=Local NGOs, 6=Research institutes, 8=Farmer Community Based Organizations (CBOs), 9 = Training/ workshops.</p>					



Fish Processing	<p>Next, I would like ask you about your experience of fish processing in this area – smoked fish processing in particular.</p> <p>53. Would you say a lot or few people are engaged in fish smoking in this area? PROBES: Why?</p> <p>54. Which of the two methods are mostly used by the smoked fish processors? Traditional kiln method (wire gauze on fire) or mechanical kiln method. PROBES: Why?</p> <p>55. Why are most people not using mechanical kiln method? PROBES: Is this due to finance? Or due to lack of awareness? Or due to lack of knowledge? Etc.</p> <p>56. In you view, which one is more profitable to fish farmers – to process and sell smoked fish from his/her farm or to sell fresh fish from his/her farm? PROBE FULLY: Why? Why? Why?</p> <p>57. Are you aware of any of your customers who process and sell smoked fish? Like how many of them? Where are they located? Can you please give me their contacts?</p>
Final questions	<p>58. Do you have any other comments you would like to make about your activities, or how you think your livelihood and profits could be improved?</p> <p>59. What plans do you have for your business in the future? What changes would you like to make? Why are you interested in making these changes?</p> <p>60. What opportunities do you see?</p> <p>61. What challenges do you foresee?</p> <p>62. What advice would you give to promote the use of quality feeds/fingerlings for fish farming?</p> <p>63. May I contact you by phone/email if I have any follow up questions? Close Thank you for your time. I really appreciate you taking the time to meet with us.</p>

#### GUIDE 5: FEED PRODUCERS/MARKETERS

##### BACKGROUND INFORMATION ON PARTICIPANTS

*For each respondents, please take down the following background information*

42. Full Name of Respondent		43. GSM No.	44. Age	45. Sex	46. Marital Status
47. Position: Owner or Manager or Both		48. Date of Employment	49. Level of Education		
50. Hatchery Name & Address			51. Date of Establishment		
52. Year of License Issue	53. Farm Size	54. Village/ Town	55. LGA		
56. Interviewer			57. Date of Interview		

TOPIC	INPUT DEALERS (SELLING FEEDS or FINGERLINGS TO OIL FISH FARMERS)
Introduction:	<p>INTERVIEWER:</p> <ul style="list-style-type: none"> <li>• Introduce self</li> </ul>



	<ul style="list-style-type: none"> <li>• Purpose of research - to help in the development of fish farm sector which may be of interest to you. This is a study for an independent research project and it is not linked to any local or national authority or government.</li> <li>• Obtain respondent consent</li> <li>• Do you have any question please? I am going to start recording now.</li> </ul>
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TOPIC	INPUT DEALERS
Ice – breaking Questions	<p>168. Since when have you been involved in production and/or marketing of fish feeds?</p> <p>169. What different types and brands of feeds do you sell? Do you produce/market (a) Floating Feeds only (b) Sinking feeds only (c) Both? PROBES: If both – what contribution does floating feed make to your sales in % terms?</p> <p>170. Which variety of feeds is most preferred by farmers? Why?</p> <p>171. Like how much do you sell different types/brands of feeds? Probe for price of each type. PROBE FOR: Different types and brands for feeds.</p> <p>172. FOR PRODUCERS:</p> <ul style="list-style-type: none"> <li>• Where do you buy/get the raw materials you used in making the feeds you sell from?</li> <li>• IF imported, from which countries?</li> <li>• How about the costs of your inputs – how much per unit? How has the cost vary over time?</li> <li>• How is the changing world such as Boko Haram or other security activities impact on business?</li> <li>• How has the Naira value affect production and the business as a whole?</li> </ul> <p>173. FOR MARKETERS:</p> <ul style="list-style-type: none"> <li>• Where do you buy/get the feeds you sell from?</li> <li>• IF imported, from which countries?</li> <li>• How much do you buy per unit? How has the cost vary over time?</li> <li>• How is the changing world such as Boko Haram or other security activities impact on business?</li> <li>• How has the Naira value affect production and the business as a whole?</li> </ul>
Customer Relationship Development	<p>174. Who are your main customers (buyers)? Where and how did you find your customers for the first time? How do you source for customers? PROBE FOR: referrals, sponsored programmes, individual walk-in customers, etc</p> <p>175. How do you determine what type of feeds your customer needs? Do you ask about or visit your customer’s farm? Why or why not? PROBE FULLY PROBE FOR: How input dealers determines the needs of their customer’s fish/pond.</p> <p>176. Do you give information about feed application to your customers? What kind of information do you provide to the customers? PROBE FULLY</p> <p>177. Do you provide advice on feeding by biomass methodology? Why or why not? PROBE FOR: fish weight versus dosage of feed and frequency of feeding</p> <p>178. Do you give information about how to nurture/care for fingerlings to your customers? What kind of information do you provide to the customers?</p> <p>179. What are the steps you usually take to ensure that you meet your clients’ specifications, including delivery date and quality? (Normally, how difficult is it to comply with your clients’ requirements? What do you have to do?)</p>
Yields, sales and income per product	Based on our discussion so far, I would like you to give me an idea of sales performance for feeds:



Marketing & Distribution	<p>180. Who are the main buyers of your feeds? – Fish farmers, middlemen, wholesalers, others? <i>PROBE FOR:</i></p> <p>181. What % of the total value of your sales do you sell to Fish farmers? Wholesalers/middlemen?</p> <p>182. What % of the total sales volumes do you sell to small/medium scale farmers? What proportion to large scale farmers?</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%;">16. % of the total value of your sales</th> <th style="width: 25%;">17. % of the total sales volumes</th> </tr> </thead> <tbody> <tr> <td>small/medium scale farmers</td> <td></td> <td></td> </tr> <tr> <td>Wholesalers/middlemen</td> <td></td> <td></td> </tr> <tr> <td>Others</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>100%</td> <td>100%</td> </tr> </tbody> </table> <p>183. What kind of supply arrangement do you have with your buyers/customers? Do you have any assured customer for your feeds? If yes, how many are they? What is the average volume of feeds you sell to each customer? Are you on any contractual arrangement based on purchase orders, etc?</p> <p>184. What is your average volume of sale per day?</p> <p>185. Selling cost – how much do you usually pay for the following expenses? <i>PROBE FULLY:</i></p> <ul style="list-style-type: none"> <li>• Transportation to market - (types, cost per unit)</li> <li>• Load-unloading</li> <li>• Association</li> <li>• Market toll per unit</li> </ul>		16. % of the total value of your sales	17. % of the total sales volumes	small/medium scale farmers			Wholesalers/middlemen			Others			Total	100%	100%
	16. % of the total value of your sales	17. % of the total sales volumes														
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#### LEADERS/ASSOCIATION MEMBERS' KAP - HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCPs)

Next, I am going to read some measures and methods used by fish farmers to secure a disease free environment in all phases of aquaculture practices (i.e hatcheries, nurseries, grow out farms etc) for improved profitability. Which of the following fish cultivation management practices are you aware of, have you ever shared or advised your fish farmer customers about?

		(a)	(b)		(d)
S/N	Palm management practices	Are you aware of the method or practice? 1=Yes. 2=No.	If aware, from who did you receive Information	If aware, have you ever shared the knowledge of the method with your customers?	Are your customers aware of the methods or practice?
19	Strict sanitation measures - protective clothing, leg dip, wheel dips and hand hygiene cleaning				
20	Water and effluent treatments - sanitize water and disinfect wastes-Farm: disinfection programme				

21	Control of vertical transmission -total ban on movement of fish from other farms				
22	Separation of each unit within a facility and isolation of these units from each other				
23	Restrictions on movement of fish between farm sites of the same company				
24	Restrict movement of tools and equipment				
25	Traffic control -restrictions on visits to farm and access to farm site (Strict measures for people entering the farm)				
26	Disposal of mortalities				
27	Monitoring procedures - observation and measurement of cleaning and disinfection				
28	Record keeping of hazard critical control measures and points				

+ Code for (b): 1=Farmers in the village, 2=Farmers in other villages, 3=Mass media (radio, newspapers), 4=Extension workers, 5=Local NGOs, 6=Research institutes, 8=Farmer Community Based Organizations (CBOs), 9 = Training/ workshops.

Fish Processing	<p>Next, I would like ask you about your experience of fish processing in this area – smoked fish processing in particular.</p> <p>69. Would you say a lot or few people are engaged in fish smoking in this area? PROBES: Why?</p> <p>70. Which of the two methods are mostly used by the smoked fish processors? Traditional kiln method (wire gauze on fire) or mechanical kiln method. PROBES: Why?</p> <p>71. Why are most people not using mechanical kiln method? PROBES: Is this due to finance? Or due to lack of awareness? Or due to lack of knowledge? Etc.</p> <p>72. In you view, which one is more profitable to fish farmers – to process and sell smoked fish from his/her farm or to sell fresh fish from his/her farm? PROBE FULLY: Why? Why? Why?</p> <p>73. Are you aware of any of your customers who process and sell smoked fish? Like how many of them? Where are they located? Can you please give me their contacts?</p>
Membership of Association OR Registered Operation/ Linkage	<p>74. Do you belong to any association or work together with other farmers or marketers of farm inputs in the production, marketing, distribution, or other efforts? IF YES, which one? Why did you decide to join? What are the benefits of belonging to the association?</p> <p>75. IF YES, What are the activities you do together? PROBE FOR: what level of involvement in field demonstrations and training, farm activities, off farm activities, improved agricultural technologies, others.</p> <p>76. IF NOT, why not? What are barriers to your joining an association or working with other people?</p>
Capacity Building	<p>77. Have you received any kind of training, attended workshops, or discussion meeting on fish feed production and marketing? What kind of training did you get? PROBE FOR: Feeding methodologies, business management, etc?</p>

	<p>78. Who provided this training? Who paid for the training? PROBE FULLY</p> <p>79. Are you satisfied with the training? Why or why not? Was it useful to your business? Why did you say that? PROBE FULLY</p> <p>80. Do you need further training? If yes, what sort of training do you think would be most useful, if any. Please provide details. PROBE FULLY</p> <p>81. Would you consider training on enterprise/business management? What are your expectations of such capacity building? Are you willing to pay? Why or why not? PROBE FULLY</p>
Final questions	<p>82. What plans do you have for your business in the future? What changes would you like to make? Why are you interested in making these changes?</p> <p>83. What opportunities do you see?</p> <p>84. What challenges do you for see?</p> <p>85. What advice would you give to promote the use of quality feeds for fish farming?</p> <p>86. May I contact you by phone/email if I have any follow up questions?</p> <p>Close</p> <p>87. Thank you for your time. I really appreciate you taking the time to meet with us.</p>



## FISH FARMERS BASELINE SURVEY QUESTIONNAIRE

### INTRODUCTION

Good morning/afternoon/evening sir/madam, my name is \_\_\_\_\_. I am an interviewer from **MarketSight**, an independent research agency. We are carrying out a study on the fish farming and processing in fish producing states of the Niger Delta covering Bayelsa, Rivers, etc. The information you give us will help in understanding and designing appropriate interventions to develop market for people doing business in fish farm sector. Your business outfit has been selected through a purposeful search process and I will like to ask you some questions. All your responses will be held confidential and used for statistical purposes only.

### IF NECESSARY ADD:

Please, note that we are not connected with national or state government. Your answers will be treated with confidence and there are no "right" or "wrong" answers. We just want your personal opinion. All information is to be used for statistical purposes only.

QUALITY CHECKING				
Quality Check level	Name	Date	Signature	Rating
Level 1: Enumerator/Interviewer				
Level 2: Field Coordinator/Supervisor				
Level 3: Project Coordinator				
* If the rating of quality check 2 is poor, the enumerator must correct for the mistake at his/her own cost. Then a quality check 3 by Project Coordinator would be required. Any final form MUST be rated GOOD to pass through.				
*Rating: Good=1, Fair=2, Poor=3				

### MODULE A: RESPONDENT DETAILS

Q #	Questionnaire Code/ Respondent's ID No.				
A1	Questionnaire Code/ Respondent's ID No.				
A2	Interviewer's ID No.				
A3	Supervisor's ID No.				
A4	Date	Dd	Mm	Yr	
A5	Time Start	Hr	Mm		
A6	Time End <b>INTERVIEW END</b>	Hr	Mm		
A7	Name of the Farmer/Respondent				

A8	Position (Owner or Manager or Both)	Owner=1	Manager=2	Owner/Manager=3									
A9	Respondent's GSM No.												
A14	Name of Fish Farm												
A15	Contact Address: (Describe with Milestone spot)												
A16	Community/Village												
A17	Date of Establishment:												
A18	Bayelsa LGA	Yenagoa [1]				Sagbama [2]							
A19	Rivers LGA	Tai [1]				Khana [2]				Gokana [3]			
		Obio-Akpor [4]				Ikwerre [5]				Port-Harcourt [6]			

**MODULE B: POND DESCRIPTION & OWNERSHIP**

QN		Circle as appropriate	
B1	Are you the owner or manager of the fish farm?	Yes - - -1 No - - -2	SKIP TO QN B3 CONTINUE
B2	Is the owner presently available or not?	Yes - - -1 No - - -2	CONTINUE CLOSE INTERVIEW
Now I will like to ask the owner some questions on fish farming and related activities in this area			

**INTERVIEWER SHOULD INTRODUCE HERSELF/HIMSELF TO THE farm OWNER manager ALL OVER AGAIN**

I would like to begin by asking you some general questions about this farm.			
QN			RESPONSE
B3	When did you start your fish farm?		
B4	How many years have you been involved in fish farming?		
B5	When was the fish farm established i.e. dug or prepared?		
B6	What is the ownership status of the fish farm? Is the farm owned or leased by single person or group of people?		Single=1 Joint ownership=2 Singly leased=3 Jointly leased=4
B7	If multiple ownership, please how many persons are the owners of the fish farm?		
B8	What types of pond are available in your fish farm?		Earthen=1 Concrete=2 Plastic=3 Collapsible Tarpulin = 4
B9	How many fish ponds do you have at present?		

QN 10 – 12: Please tell me more about the ponds used in your farm

QN	Pond Type	How many available?	Average Size in square meters per pond	Water depth in culture season in meters) per pond	Stocking density /fingerlings per pond	Yield capacity for table-size fish per pond at harvest	
B10	Earthen						
B11	Concrete						
B12	Plastic						
B13	For earthen pond, what is average number of weeks water is retained for fish culture in the pond?						
B14	For concrete or plastic ponds, how often do you change water in the pond?						
B15	What is the source of water to your pond?				Public Tap=1 Borehole=2 River=3 Commercial=4 Don't know = 98 Refused =99		
B16	Is the water treated before it is channelled into the ponds?				Yes =1 No =2		
B17	What type of treatment do you apply to water before it is channelled into the ponds? PROBE FULLY – e.g. for addition of chemicals and type of chemicals (e.g. soda ash, etc.)						

### MODULE C: PRE-STOCKING /POND PREPARATION INPUT COSTS IN 2014

C1 – 10: What are the equipments and tools employed/used for your fish farming? For each equipment/tool, please tell me quantity and total cost.

	Equipments/Tools	Available		IF YES	Total cost
		Yes	No	Quantity	
C1	Pumps	1	2		
C2	Air Blowers for aeration (adding oxygen to water)	1	2		
C3	Spade	1	2		
C4	Drum/Box	1	2		
C5	Fishing Net	1	2		
C6	Generator	1	2		
C7	Sorting table	1	2		
C8	Water testing kit	1	2		
C9	Hatchery equipment	1	2		
C10	Smoking kiln for producing smoked fish	1	2		
C11	Others (specify)	1	2		

C12 – 22: I will now read to you a number of inputs or activities fish farmers apply to prepare fish ponds for stocking/seeding. For each item, please tell me whether you use or do not use the input:

	Activity/Input	Available		IF YES	Total cost in 2014	Mention Type/Name/Brand
		Yes	No	Quantity		
C12	Unwanted fish removal	1	2			
C13	Aquatic weed removal	1	2			
C14	Pond bottom mending	1	2			
C15	Apply organic fertilizer e.g. poultry dung etc	1	2			
		Yes	No	Quantity	Total cost in 2014	Mention Type/Name/Brand
C16	Apply inorganic fertilizer e.g. Urea, etc	1	2			
C17	Apply lime e.g. Quick lime, limestone etc	1	2			
C18	Apply other chemicals e.g. bleaching etc	1	2			
C19	Water supply	1	2			
C20	Others inputs(please specify)	1	2			
C21	Do you quarantine your fish before stocking in your farm ponds?	1	2			
C22	Use of vitamins, salt ?	1	2			

#### MODULE D: STOCKING COSTS IN 2014

QN		RESPONSE
D1	Which species of fish do you grow in your farms/ponds?	Cat fish=1 Tilapia=2 Others(specify)=3
D2	What type of fish seed do you load into your ponds at the start of a fish culture cycle – Fingerlings or Juvenile	Fingerlings =1 Juvenile =2
D3	Each time you buy fingerlings, how many fingerlings do you put per pond?	
D4	Each time you buy Juvenile, how many Juvenile do you put per pond?	
D5	And how many ponds do you stock for each cycle of fishing farming?	
D6	What was the total amount of fingerlings you bought In 2014	
D7	What was the total amount of Juvenile you bought In 2014	
D8	What was the average price you paid per fingerling in 2014	
D9	What was the average price you paid per Juvenile in 2014	
D10	Where do you usually obtain/buy your fish seed (fingerlings or Juvenile)? Please give me names and locations of the hatchery/nursery	Govt nursery=1 Private nursery=2 Other farmers=3 Hatchery=4 Own raised=5 Wild=6 Others (specify)=7 Don't know = 98

		Refused =99	
D11	What kind of support or incentives do you receive from your fingerlings suppliers? MULTIPLE ANSWERS ALLOWED	Loan=1 Discount=2 Drugs=3 Feeds=4 Training=5 Advice=6 Others(specify)=7 None=8 Don't know = 98 Refused =99	
D12	Have there been any problems with fingerlings or getting fingerlings?	Yes =1 No=2 Don't know = 98 Refused =99	
D13	What are these problems?		
D14	How have you solved the problems or what are your suggestions to solve the problems?		
D15	How many months does it take from stocking fingerlings to harvesting (in months)?		

D16 – 20: How satisfied have you been with fish fingerlings in terms of?

QN		Very satisfied	Somewhat satisfied	Neither satisfied nor satisfied	Not satisfied	Not satisfied at all	Don't know	Refused
D16	Availability of fish fingerlings from Port Harcourt/Rivers state	5	4	3	2	1	98	99
D17	Availability of fish fingerlings from other states	5	4	3	2	1	98	99
D18	Seed quality	5	4	3	2	1	98	99
D19	Fish health	5	4	3	2	1	98	99
D20	Growth out table-size	5	4	3	2	1	98	99

D21	What are your sources of information on fingerlings and seed stocking process? MULTIPLE RESPONSES ALLOWED	TV=1 Radio =2 Hatchery/fingerling supplier=3 Extension Agents=4 Fellow Farmers=5 Trained Farmers=6 Training/workshop = 7 Others(specify)=8 Don't know = 98 Refused =99	
D22	Which is your best source of information on fingerlings process? ONLY ONE RESPONSE ALLOWED	TV=1 Radio =2 Hatchery/fingerling supplier=3 Extension Agents=4 Fellow Farmers=5 Trained Farmers=6 Training/workshop = 7 Others(specify)=8 Don't know = 98 Refused =99	
D23	What type of advice or information do you receive?		
D24	How often do you receive the advice or information?	Every week = 1 Every 2 weeks=2 Once a month=2 Once in 3 months=3 Once in 6 months=4 Once in year=5 Don't know = 98 Refused =99	
D25	How useful are these advice or information?	Very useful=5 Useful=4 Neither=3 Not useful=2 Not at all useful=1	
D26	How satisfied are you with the information?	Very satisfied=5 Satisfied=4 Neither=3 Not satisfied=2 Not at all satisfied=1	
D27	Do you have access to discount on purchases from your fingerlings supplier	Yes=1 No=2	

**MODULE E: FARM INPUTS - FISH FEED, DRUGS AND OTHERS**


QN	RESPONSE									
E1	What type of fish feeds do you use for your fish? MULTIPLE RESPONSES ALLOWED									
E2	Please, can you give me the names or brands of fish feed you use for your fish?									
E3	Please, can you give me the grades of feed that you give from fingerling stage to grow out table size on periodic basis?									
	0-2 wks	3-4 wks	5-6 wks	7-8 wks	9-10 wks	11-12 wks	13 -16 wks	17-20 wks	21-24 wks	

E4	What was the total amount of fish feeds in Kg/Bags you bought in 2014? ESTABLISH KG/BAG									
E5	What was the average price you paid per bag of feed in 2014?									
E6	Where do you usually get your fish feeds from?									
E7	What kind of support or incentive do you receive from your fish feeds suppliers?									
E8	How do you determine the brand or quality of fish feed you apply to your ponds? PROBE FULLY									
E9	Which brand of fish feed do buy most often?									

E10	Does your feed supplier visit your farm to advice on fish feeding?	Yes =1 No=2	
E11	How often does your feed supplier visit your farm to advice on fish feeding?	Every week = 1 Every 2 weeks=2 Once a month=3 Once in 3months=4 Once in 6 months=5 Once in year=6 Don't know = 98 Refused =99	
E12	What is the distance between your farm and the nearest feed supplier?		
E13	How much does the transportation cost per month?		
E14	Have there been any problems with feeds or getting feeds?	Yes=1 No=2	
E15	What are these problems?		
E16	How have you solved the problems or what are your suggestions to solve the problems?		
E17	Do you have access to discount on purchases from your feed supplier		Yes=1 No=2



E18 -20: How satisfied have you been with fish feed in terms of?

QN		Very satisfied	Somewhat satisfied	Neither satisfied nor satisfied	Not satisfied	Not satisfied at all	Can't say
E18	Availability of feed	5	4	3	2	1	99
E19	Feed quality( in terms of smell, floatability, water pollution etc)	5	4	3	2	1	99
E20	Price	5	4	3	2	1	99

E14	Do you also apply supplementary foodstuff (home foodstuffs) to feed your fish?	Yes=1 No=2	
E21	What types of home foodstuffs do you give your fish? MULTIPLE RESPONSES ALLOWED	Banga =1 Beans =2 Bread =3 Cray Fish =4 Indomie = 5 Moin moin = 6 Over-ripped orange = 7 Over-ripped plantain =8 Others(Specify)=9 Don't know = 98 Refused =99	
E21	What are the sources of your information on fish feed and other inputs? MULTIPLE RESPONSES ALLOWED	TV =1 Radio=2 Feed supplier =3 Extension Agents=4 Fellow Farmers =5 Trained Farmers=6 Training /workshop =7 Others(Specify)=8 Don't know = 98 Refused =99	
E22	What type of advice or information do you receive?		
E23	How often do you receive the advice or information?	Once a week=1 Once in 2 weeks=2 Once a month=3 Once in 3 months=4 Once in 6 months=5 Once a year =6 Don't know = 98 Refused =99	
E24	What is the source of the advice or information you receive?		

E25	How useful are these advice or information?	Very useful =5 Useful =4 Neither =3 Not useful =2 Not at all useful =1	
E26	How satisfied are you with the information?	Very satisfied =5 Satisfied=4 Neither=3 Not satisfied=2 Not at all satisfied=1	
E27	How do you know when fish is distressed? What signs do you look out for?	Unusual swimming behaviour=1 Not eating=2 Gasping at the surface=3 Mortalities =4 Others (specify)=5 Don't know = 98 Refused =99	
E28	How do you revive fish of stress?	Apply feeds=1 Apply drugs =2 Change water=3 Separate fishes in terms of size=4 Others (Specify)=5 Don't know = 98 Refused =99	
E29	If apply drugs, Which types of drug do you apply to your fish pond/fish farm?		
E30	In 2014, how much did you spend on drugs for your fish?		
E31	Where did you buy the drug from?	FADAMA/ADP Office= 1 Open market =2 Farm input dealers=3 Extension Agents=4 Don't know = 98 Refused =99	

#### MODULE F: LABOUR COST FOR FISH CULTURE

QN	QUESTION				RESPONSE	
F1	How many people work as permanent staff in your fish farm?					
F2	How many people work as daily staff in your fish farm?					
QN	Labour Type	No. of Labour/	Total No. of Days worked per	Average wage per worker	Average Food/Kind cost	

		workers	month per worker in 2014			per worker per day	
				Daily	Monthly		
F3	Permanent / Full-time female						
F4	Permanent / Full-time male						
F5	Part-time/daily female						
F6	Part-time/daily male						
<b>QN</b>	<b>QUESTION</b>					<b>RESPONSE</b>	
F1	How many of the permanent/full-time female workers in your fish farm are members of your core family/relations?						
F2	How many of the permanent/full-time male workers in your fish farm are members of your core family/relations?						
F1	How many of the Part-time/daily female workers in your fish farm are members of your core family/relations?						
F2	How many of the Part-time/daily male workers in your fish farm are members of your core family/relations?						
F2	Is the fish farm operations managed by yourself or you employ a manager who supervises other workers on daily basis					Managed by myself = 1 Employed manager = 2	

**MODULE G: HARVESTING & MARKETING**

QN	RESPONSE												
G1.	Which months of the year did you stock or load fingerlings/seeding in 2014?												
	Jan=1	Feb= 2	Mar= 3	Apr= 4	May= 5	Jun=6	Jul=7	Aug= 8	Sep= 9	Oct=1 0	Nov= 11	Dec= 12	Don't know =99
G2.	On the average, what quantity of fingerlings did you load per month in 2014?												
G3.	Which months of the year did you harvest fishes in 2014?												
	Jan= 1	Feb= 2	Mar= 3	Apr= 4	May= 5	Jun= 6	Jul= 7	Aug= 8	Sep= 9	Oct=1 0	Nov=1 1	Dec=1 2	Don't know=9 9
G4.	How many times on the average did you harvest per month in 2014?											Less often =1 Once = 2 Two times = 3 Three times= 4 Four times=5	

		Don't know = 98 Refused =99	
G5.	On the average, how many kilograms of fish did you harvest per month in 2014? OBTAIN BEST ESTIMATE OF PRODUCTION (KG)		
G6.	In 2014, what was your total harvest of fish in kg? OBTAIN BEST ESTIMATE OF PRODUCTION (KG)		
G7.	For each harvest in 2014, what proportion was sold, consumed by your family, gifted out, lost (mortality)?		
	Total Production per Month	Family consumption (%)	Sold %
			Gifted %
			Spoilt/Wastage (%)

G8	How do you think wastage can be reduced?		
G9	What was the average size of the fish when you harvest them in 2014?Kg		
G10	How much did you sell per kg/unit of fish in 2014?		
G11	What was your total revenue/sales in Naira in 2014		
G12	How do you sell your fish - is it sold fresh, smoked or dried?	Fresh (kg)= 1 Smoked (kg)= 2 Dried (kg)= 3	

G13	What proportion(%) of your fish was sold fresh or smoked in 2014		
	Fresh (%)	Smoked (%)	Dried (%)
G14	Which method did you use to smoke your fish for sales?		
G15	Do you own or rent mechanical kilns to smoke you fish?	Own kilns= 1 Rent kilns= 2	
G16	Why don't you use mechanical kiln method to smoke your fish? PROBE FULLY		
G17	Based on your experience in this area, would you say a lot or few people are engaged in fish smoking in this area?	A lot of people =1 Few people = 2	
G17	In your area, which of the two methods are mostly used to process smoked fish - Traditional kiln method (wire gauze on fire) or mechanical kiln method.	Traditional kiln method (wire gauze on fire) = 1 Mechanical kiln method = 2	

G17	In you view, which one is more profitable to fish farmers – to process and sell smoked fish from his/her farm or to sell fresh fish from his/her farm?	Sell smoked fish is more profitable = 1 Sell fresh fish is more profitable = 2				
G18	Where do you usually sell your fish?	Farm gate (in your farm)=1 Wholesale local market=2 Retail local market =3 Others (Specify) =4 Don't know = 98 Refused =99				
G19	Who are the main buyers of your fish?	Consumers =1 Retailers= 2 Fish mongers/middle men =3 Wholesalers =4 Fish smokers = 5 Others (Specify) =6 Don't know = 98 Refused =99				
QN		Wholesaler	Fish mongers/ middle men	Retailers	Fish Smokers	Consumers
G20	How many are they?					
G21	What type of fish do they buy – Fresh Fish = 1; Smoked Fish = 2					
G22	What is the average volume of fish you sell to each customer?					
G23	Who has the most influence on the price you sell your fish?	Self =1 Fish mongers/middle men =3 Retailers = 2 Wholesalers =4 Others (Specify)=5 Don't know = 98 Refused =99				
G24	What are the sources of your marketing information? MULTIPLE RESPONSES ALLOWED	TV =1 Radio=2 Feed supplier =3 Extension Agents=4 Fellow Farmers =5 Trained Farmers=6 Training /workshop = Others(Specify)=7				

		Don't know = 98 Refused =99	
G25	Which is your best source for marketing information? SINGLE RESPONSE	TV =1 Radio=2 Hatchery =3 Extension Agents=4 Fellow Farmers =5 Trained Farmers=6 Others(Specify)=7 Don't know = 98 Refused =99	
G26	What type of advice or information do you receive or need?		
G27	How often do you receive the advice or information?	Once a week=1 Once in 2 weeks=2 Once a month=3 Once in 3 months=4 Once in 6 months=5 Once a year =6 Don't know = 98 Refused =99	
G28	How useful are these advice or information?	Very useful =5 Useful =4 Neither =3 Not useful =2 Not at all useful =1	
G29	How satisfied are you with the information?	Very satisfied =5 Satisfied=4 Neither=3 Not satisfied=2 Not at all satisfied=1	



G30 – 38: E15 -18: Now, tell me about other expenses you pay for when selling your fish?

		Do you pay?		How much do you pay per month?	How much did you pay in 2014?	
		Yes=1	No=2			
28	Loading of fish at harvest	1	2			
29	Transport to market	1	2			
30	Unloading of fish in the market	1	2			
31	Market Association levy	1	2			
32	Any government levy	1	2			
33	Sales commission to agents	1	2			
34	Other expenses (specify)	1	2			

#### MODULE H: FARMER'S KAP - BEST MANAGEMENT PRACTICE FOR IMPROVED FISH CULTIVATION TECHNOLOGY

Now I am going to read some fish cultivation management practices that have been tested and found to produce better quality table size fish, thereby leading to higher profits for farmers. Which of the following fish cultivation management practices are you aware of and what is your current use status?

S/N		(a)	(b)	(c)	(d)	(e)	(f)	(g)
	Pond management practices	Are you aware of the practice? 1=Yes; 2=No	If aware, from who did you receive	If aware, do you presently practice = 1? Have you stopped practicing = 2?;	If currently using, since when did you	When did you stopped using it_	Why did you stop using it? ++	Why have you never used it?+++
1	Testing natural food adequacy in water (earthen ponds only)							
2	Maintaining stock density 100 fingerlings per meter square							
3	Selection of quality seed/ fingerlings							
4	Weed control (earthen ponds only)							
5	Liming 0.5-1.5 kg per decimal							
6	Following recommended feeding application procedures(feeding time, frequency feeding,etc)							
7	Providing supplementary feed							

8	Employing fish disease management							
9	Fish health monitoring							
10	Fish growth monitoring							
11	Post harvest handling							
12	Water management							
13	Sorting							
14	Record keeping							
15	Grading (size, quality, cost per unit)							

**+ Code for (b):** 1=Farmers in the village, 2=Farmers in other villages, 3=Mass media (radio, newspapers), 4=Extension workers, 5=Local NGOs, 6=Research institutes, 8=Farmer Community Based Organizations (CBOs)

**++ Code for (f) & (g):** 1=inputs not easily available; 2=lack of capital; 3=not serious about it; 4=lack of enough technical knowledge; 5=fear of losing profit; 6=practice is considered expensive;

**MODULE I: FARMER'S KAP - HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCPs)**

Next, I am going to read some measures and methods used by fish farmers to secure a disease free environment in all phases of aquaculture practices (i.e hatcheries, nurseries, grow out farms etc) for improved profitability. Which of the following fish cultivation management practices are you aware of and what is your current use status?

S/N	Pond management practices	(a)	(b)	(c)	(d)	(e)	(f)	(g)
		Are you aware of the practice? 1=Yes; 2=No	If aware, from who did you receive Information or Demonstration? +	If aware, do you presently practice = 1? Have you stopped practicing = 2?; Never practiced = 3?	If currently using, since when did you start_	When did you stopped using it (year)?	Why did you stop using it? ++	Why have you never used
2	Strict sanitation measures - protective clothing, leg dip, wheel dips and hand hygiene cleaning							
3	Water and effluent treatments - sanitize water and disinfect wastes-Farm: disinfection programme							
4	Control of vertical transmission -total ban on movement of fish from other farms							
5	Separation of each unit within a facility and isolation of these units from each other							
6	Restrictions on movement of fish between farm sites of the same company							



7	Restrict movement of tools and equipment							
8	Traffic control -restrictions on visits to farm and access to farm site (Strict measures for people entering the farm)							
9	Disposal of mortalities							
10	Monitoring procedures - observation and measurement of cleaning and disinfection							
11	Record keeping of hazard critical control measures and points							

**+ Code for (b):** 1=Farmers in the village, 2=Farmers in other villages, 3=Mass media (radio, newspapers), 4=Extension workers, 5=Local NGOs, 6=Research institutes, 8=Farmer Community Based Organizations (CBOs)

**++ Code for (f) & (g):** 1=inputs not easily available; 2=lack of capital; 3=not serious about it; 4=lack of enough technical knowledge; 5= fear of losing profit; 6=practice is considered expensive;



<b>12</b>	If you are aware of any of the best management practices but have not adopted any, what are the reasons for non-adoption? (Multiple answers possible)	
	<b>MULTIPLE CODING ALLOWED</b>	
	<b>Reason for non-adoption</b>	
	Lack of training/adequate information about the technology/practice	1
	Current/traditional control practice is better	2
	Fear of technology/practice failure	3
	High cost of technology/practice	4
	Non-availability of improved seed	5
	High cost of fertilizer	6
	Non-availability of fertilizer	7
	Technology practice may NOT be profitable	8
	Non accessibility to grant/loan	9
	Lack of capital/funds	10
	Others (e.g. cultural factors) (Specify).....	11
	Don't know	98
	Refused	99
<b>13</b>	What do you think can make farmers practice/adopt best management practice for fish farming?	
	<b>MULTIPLE CODING ALLOWED</b>	
	Need to be properly informed about the technology	1
	Need financial help in order for us to be able to afford it	2
	Need to raise capital	3
	Aid and encouragement from the government	4
	Subsidize rate for fertilizer, etc.	5
	Others (e.g. cultural factors) (Specify).....	6



	Don't know	98
	Refused	99
14	How likely are you to adopt and practice the best management methods?	
	<b>SINGLE CODING ALLOWED</b>	
	I definitely would adopt best management practice for my farm	1
	I probably adopt best management practice for my farm	2
	I might adopt best management practice for my farm	3
	I probably would not adopt best management practice for my farm	4
	I definitely would not adopt best management practice for my farm	5
	Don't know	98
	Refused	99

#### MODULE J: PROBLEMS AND CONSTRAINTS

Let's talk about the problems or constraints fish farmers like you face in this business. Which of the following problems or constraints do you currently face in your business and what is the intensity of your experience of the problem?

QN	PROBLEMS/CONSTRAINTS	INTENSITY Less=1 Moderate=2 High=3 None=4	MEASURES TAKEN TO OVERCOME PROBLEM
1	Short of quality seed/fingerlings		
2	Social problem (theft, poisoning, etc.)		
3	Credit problem		



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4	Natural calamities		
5	Financial problems		
6	High input cost		
7	Water pollution		
8	Low selling/producer price		
9	Poor road to the market		
10	Poor access to information		
11	Lack of reliable transport		
12	Others		



**MODULE K: BUSINESS MANAGEMENT**

Q N		RESPONSE	
	<b>RECORD KEEPING</b>		
1	Do you keep business records?	Yes=1 SKIP TO K3 No=2	
2	Why don't you keep records of your business or transactions? MULTIPLE RESPONSES	I don't know how to=1 I do not see the benefit = 2 I'm not good with calculations = 3 Illiteracy = 4 Others (specify).....= 5 Don't know = 98 Refused =99 <b>SKIP TO K4</b>	
3	What type of records do you keep? <i>Multiple Codes Possible.</i>	Record of fish sales = 1 Cost of inputs/materials purchased = 2 Daily fish mortality = 3 Daily live fish (inventory) = 4 Cash flow = 5 Profit = 6 Expenses =7 Water quality = 8 Others (Specify) =6 Don't know = 98 Refused =99	



SOURCES OF FINANCE		
4	Have you ever received or taken any money as advance for fish sales?	Yes=1 <b>ASK QN K6</b> No=2 <b>SKIP TO K7</b>
5	If Yes, from whom?	Agents =1 Wholesalers=2 Retailers =3 Customers = 4 Others (specify) = 5 Don't know = 98 Refused =99
6	What are the main sources of finance used in your fish farming business? <i>Multiple Codes Possible.</i>	Own finance=1 Wholesalers=2 Retailers =3 Input dealers =4 Spouse = 6 Other family members = 7 Friends = 8 Commercial bank = 9 Micro finance bank = 10 Cooperative society = 11 Religious organizations = 12 Esusu (Adashi, Asusu) = 13 Money lenders = 14 Others (specify)..... = 15 Don't know = 98 Refused =99



7	When you need money for your trade, are you able to borrow?	Yes = 1 No = 2 Don't know = 98 Refused =99	
8	Who do you borrow from? <b>MULTIPLE RESPONSES</b>	Wholesalers=2 Retailers =3 Input dealers =4 Spouse = 6 Other family members = 7 Friends = 8 Commercial bank = 9 Micro finance bank = 10 Cooperative society = 11 Religious organizations = 12 Esusu (Adashi, Asusu) = 13 Money lenders = 14 Others (specify)..... = 15 Don't know = 98 Refused =99	
9	Thinking about the last time you borrowed money for your business/trading activities, how much money did you borrow? ( <b>WRITE IN EXACT AMOUNT</b> )	Don't know = 98 Refused =99	
10	How long in months did you have to pay the money back?	Less than 1 month 1 month 2 months	



		3 months 4 months 5 months 6 months More than 6 months Don't know Don't know	
11	What interest/or extra money did you pay in addition to the original amount borrowed? (IF ANY)	Don't know = 98 Refused =99	
	Is fish farming usually a full-time or a part-time activity for you?	Yes=1 No=2	
12	Do you have other sources of income apart from this fish farming?	Yes=1 No=2	
6	If yes, what other sources of income do you have apart from fish farming?		
	TRAINING/CAPACITY BUILDING		
12	Did you receive any kind of training or attend workshops/ seminars on fish farming in the last 3 years?	Yes=1 No=2	
	If yes, what is the total number of training you received in last three years?		



13	If yes, what type of training did you receive? Multiple Responses	Pond construction=1 Breeding=2 Feeding=3 Stocking=4 Training of other farmers=5 Other (specify)..... Don't know = 98 Refused =99	
14	When did you receive the training? (RECORD MONTH AND YEAR FOR THE MOST RECENT TRAINING RECEIVED)	Month	
		Year	
13	How long in days was the training?		
15	Who provided the training? <b>MULTIPLE RESPONSES</b>	Research/Training institute = 1 Bank = 2 Non Governmental Org. = 3 Community based Org. = 4 Religious bodies = 5 Min. of Agric = 6 Agric Dev. Programme = 7 Family member = 8 Others (specify).....=9 Don't know = 98 Refused =99	



16	Who paid for the training? MULTIPLE RESPONSES	Self = 1 Research/Training institute = 2 Bank = 3 Non Governmental Org. = 4 Community based Org. = 5 Religious bodies = 6 Min. of Agric = 7 Agric Dev. Programme = 8 Family member = 9 Others (specify)..... =10 Don't know = 98 Refused =99	
17	How satisfied are you with the training quality?	Very satisfied =5 Satisfied=4 Neither=3 Not satisfied=2 Not at all satisfied=1	
18	Have you received any business skills training for your fish farming business?	Yes No (SKIP TO G1) Don't know = 98 Refused =99	
19	What type of training did you receive? Multiple Responses	Business planning Marketing=1 Book keeping = 2 Customer service = 3 Inventory management = 4	



		Other (specify)..... = 5 Don't know = 98 Refused =99	
20	When did you receive the training? (RECORD MONTH AND YEAR)	Month Year	
13	How long in days was the training?		
21	Who provided the training? <b>MULTIPLE RESPONSES</b>	Research/Training institute = 1 Bank = 2 Non Governmental Org. = 3 Community based Org. = 4 Religious bodies = 5 Min. of Agric = 6 Agric Dev. Programme = 7 Family member = 8 Others (specify).....=9 Don't know = 98 Refused =99	
22	Who paid for the training? <b>MULTIPLE RESPONSES</b>	Self = 1 Research/Training institute = 2 Bank = 3 Non Governmental Org. = 4 Community based Org. = 5 Religious bodies = 6	



		Min. of Agric = 7 Agric Dev. Programme = 8 Family member = 9 Others (specify)..... =10 Don't know = 98 Refused =99	
23	How satisfied are you with the training quality?	Very satisfied =5 Satisfied=4 Neither=3 Not satisfied=2 Not at all satisfied=1	
24	Do you think you need further training to manage your fish business more profitably?	Yes=1 No=2	
25	(If Yes) What type of training would you need If yes, what sort of training do you think would be most useful to fish farmers like you? (tick all applicable)?	Savings and credit management = 1 Marketing skills = 2 Costing and pricing = 3 Record keeping = 4 Using computers to receive/send information= 5 Training in numeracy and writing skills = 6 Others (specify)..... =7 Don't know = 98 Refused =99	
26	Are you willing to pay for further training to manage your fish business more profitably?	Yes=1 No=2	



27	Do you presently have any form of insurance cover whether personal or for your fish business	Yes=1 No=2	
28	Would you consider undertaking an insurance cover for your fish business in the future?	Yes=1 No=2	
29	Why did you say no to insurance cover for your fish business? PROBE FULLY		

#### MODULE L: MEMBERSHIP OF BMO

QN		RESPONSE	
1	Based on your experience in fish farming, how many of the following categories of actors in fish business are you involved with in this local government? READ LIST AND RECORD SIZE	Category	Size
		Hatcheries	
		Feed dealers	
		Fish mongers	
		Fish smokers	
		Fish traders	
		Market Associations	
	Farmers Associations		



		Medium/large processing firms		
2	Apart from those whose businesses are located in your area, how many of the following categories of actors in fish business are you involved with from other LGAs or states? READ LIST AND RECORD SIZE	Category	Size	
		Hatcheries		
		Feed dealers		
		Fish mongers		
		Fish smokers		
		Fish traders		
		Market Associations		
		Farmers Associations		
		Medium/large processing firms		
3	Which other local governments or states do these buyers or customers come from?			
4	How do you communicate with these business partners or contacts? <b>Multiple Codes Possible</b>	Phone =1		
		Internet =2		
		E-mail =3		
		Website =4		
		Others (Specify) =5		



		Don't know = 98 Refused =99	
5	Is your business currently registered?	Yes No	
6	What authority(s) is your business registered with?		
7	In your (this) area, are there any organisations (associations or cooperatives) or groups representing fish farmers like you?	Yes No	
8	How many groups are in the community or village		
9	If yes, can you please provide me with names of organisations (associations or cooperatives) of fish farmers in this area/village?		
10	If there is no organisation, is there a need for one?	YES=1 NO=2	
11	If yes, why?		
12	If no, why?		
13	Are you a member of any recognized association, group or cooperative?	YES=1 <b>SKIP TO 14</b> NO=2 <b>ASK 13</b>	
14	If no, what prevents you from joining an association or working with other people?		
14	How likely are you to join an association or cooperative in near future?		
	<b>SINGLE CODING ALLOWED</b>		
	I definitely would adopt best management practice for my farm		1
	I probably adopt best management practice for my farm		2
	I might adopt best management practice for my farm		3

	I probably would not adopt best management practice for my farm		4
	I definitely would not adopt best management practice for my farm		5
	Don't know		98
	Refused		99
15	If yes to <b>Question 13</b> , what is the name of the association, group or cooperative?		
	What is the contact address for the association, group or cooperative?		
16	How many members do you have? How many members are males or females	Female	
		Male	
17	Since you joined the group, would you say the members are gradually increasing or decreasing?	Decreasing = 1 Increasing=2 Stable = 3 Don't know = 98 Refused =99	
18	If decreasing, why?		
19	If increasing, why?		
20	What are the benefits or advantages of joining the organisation/ association/ cooperative?		
21	What are the services provided by the association/cooperative?	Field demonstrations and training = 1 Other farm activities = 2	



		Off farm activities = 3 Savings and loans = 4 Improved agricultural technologies = 5 Others (specify) Don't know = 98 Refused =99		
22	How many years has the association/cooperative been functioning?			
	Would you say that your association/cooperative's services have been stable, improving or declining	Declining = 1 Improving =2 Stable = 3 Don't know = 98 Refused =99		
23	Would you say that your association/group/cooperative members	Yes	No	Can't Say
24	.... Have a shared vision	1	2	99
25	Have mutual trust	1	2	99
26	Are capable of resolving internal conflicts	1	2	99
27	Source and share learning internally	1	2	99
28	Has democratic management	1	2	99
29	Has capability to follow its own internal rules	1	2	99
30	Has managed members money well	1	2	99
31	Has committed members	1	2	99
32	Has good relationship with other supplier or buyer associations/groups	1	2	99



	Operate cooperative pond facilities	1	2	99	
	Operate cooperative processing facilities	1	2	99	
32 b	Operate cooperative marketing efforts/supports	1	2	99	
33	What are your suggestions to strengthen relationships/linkages between fish farmers and input suppliers (a. feed suppliers, fingerlings suppliers)?				
34	What are your suggestions to strengthen relationships/linkages between fish farmers and retailers(fish mongers)/retailer association?				

#### MODULE M: RESPONDENT/HOUSEHOLD MEMBER PROFILE

QN									
<b>1</b>	How many members does the household have?								
	One	Two	Three	Four	Five	Six	Seven	Eight or more	Can't say
	1	2	3	4	5	6	7	8	99

#### INTERVIEWER: RECORD THE NAMES OF MALE OR FEMALE MEMBERS (AGED 15 -65) FROM THE OLDEST TO THE YOUNGEST BELOW.

	Name	Relationship with farmer+	Sex F = 1 M = 2	Age in Years	Years of schooling	Main occupation++
2	Farmer					
3	2					



4	3					
5	4					
6	5					

+Codes: Relationship	Husband = 1;    Wife = 2;    Son = 3;    Daughter = 4;    Father = 5, Mother = 6; Brother = 7;    Sister = 8;    Mother-in-law = 9;    Father-in-law = 10;    Son-in-law =11; Daughter-in-law = 12;    Grand son = 13;    Grand daughter = 14    Others = 15
++Codes: Occupation	House wife = 1;    Professional= 2;    Civil servants= 3; Big/medium business owner=4 Small business owner=5; Farm/factory worker= 6;    Transporter/Driver= 7; Farmer = 8; Artisan= 9; Student =10; Unemployed=11; Retired/minor child=12

QN			
10	Sex of the Respondent	Male=1          Female=2	
11	What is your current age (in years)?	Below 18 years=1 18-21 years=2 22-34 years=3 35-44 years = 4 ..... 45-54years = 5 55-65 years = 6 66 years and above = 7 Don't know = 98 Refused =99	
12	Marital Status	Never Married = 1 Currently Married = 2	



		Separated =3 Divorced = 4 Widowed =5 Don't know = 98 Refused =99	
13	Level of Education What is your highest level of qualification?	No school = 1 Some primary school = 2 Complete primary school = 3 Some secondary school = 4 Completed secondary school = 5 Pre-university = 6 Some university = 7 University graduate = 8 Some postgraduate studies = 9 Completed Postgraduate degree = 10 Don't know = 98 Refused =99	
14	Is fish farming your main source of income?	YES=1 <b>SKIP TO 14</b> NO=2 <b>ASK 13</b>	
15	If NO, can you please mention your other sources of income?		
16	How often do you receive money from these other source of income?	Daily = 1 Weekly = 2 Monthly = 3 Yearly = 4 Others (Specify).....= 5	



		Don't know = 98 Refused =99	
17	How much did you receive from these other source of income each time? <b>(WRITE IN EXACT AMOUNT)</b>	Don't know = 98 Refused =99	
18	Now I am going to read a list of income ranges. Which of these ranges best describes the total annual income of all the members of your household, including your income, as one combined figure?	N100,000 and Below = 1 N100,001 - N200,000 = 2 N200,001 - N300,000 = 3 N300,001 - N400,000 = 4 N400,001 - N500,000 = 5 N500,001 - N600,000 = 6 N600,001 - N700,000 = 7 N700,001 - N800,000 = 8 N800,001 - N900,000 = 9 N900,001 - N1,000,000 = 10 N1,000,001- N2,000,000 = 11 N2,000,001- N3,000,000 = 12 N3,000,001- N4,000,000 = 13 N4,000,001- NGN 5,000,000 = 14 More than NGN 5,000,000= 15 Don't know = 98 Refused =99	1.
15	What is your tribe? This could refer to tribe/race or whatever is applicable. <b>(READ ANSWER LIST)</b>	Annang =1 ..... Itsekiri =2 Efik =3 Kanuri = 4	2.



		Etsako = 5 Nupe = 6 Fulani = 7 Tiv = 8 Hausa = 9 Yoruba = 10 Ibibio = 11 Igbo = 12 Ijaw = 13 Other = 14 Don't know = 98 Refused = 99	
16	Interviewer to observe and record community as urban, semi-urban or rural? <b>(READ LIST IF NECESSARY)</b>	Urban = 1 Semi-urban = 2 Rural = 3 Don't know = 98 Refused = 99	3.





## 10 TERMS OF REFERENCE

### A. BACKGROUND

MARKET Development for the Niger Delta (MADE) is a DFID funded development programme that uses a ‘making markets work for the poor’ (M4P) approach to generate pro-poor and inclusive economic growth in the non-oil sectors of the Niger Delta Region.

The programme aims to improve market access for poor producers, increase economic activity and trade and raise the incomes of poor men and women. The ultimate goal being to address the causes of poverty with an expected impact of increased incomes for 150,000 poor people, 50% of which should be women in the nine states of the Niger Delta, over a four and half year period (2013-2018).

MADE interventions aim to facilitate change, improved performance and sustainable, pro-poor and inclusive growth in selected markets by: a) selecting and working in sectors in which poor men and women are actively engaged; b) motivating market actors to change their behaviour in a sustainable and catalytic way; and c) facilitating access to new knowledge, information, services and/or technologies to small/medium-scale farmers and entrepreneurs.

The design phase of the programme (September 2013 to February 2014) focussed on establishing the project in the Niger Delta as well as conducting thematic and technical sector ground research and analysis. This enabled MADE to select and design sectors of interventions aligned to the programme’s objectives. The selected sectors are palm oil, aquaculture, smoked fish/fisheries, and poultry, along with the service sector of agricultural inputs<sup>3</sup>.

The Pilot phase started in March 2014 and will run up to 31 August 2014. The focus of this phase is on prototyping, testing and refining interventions through demonstration activities across three selected value chain sectors – Agricultural inputs, fisheries and oil palm. Other activities include to test the assumptions laid out in the sectorial analyses, set up the baseline for the M&E performance measurement, and develop a network of private sector partnerships for collaboration. The Implementation phase will have a life span of 3-5 years, starting in September 2014 and ending on 28 February 2018.

#### **AQUACULTURE SECTOR– FOCUS OF THIS ASSIGNMENT**

The fisheries sector—comprised of both cultured and wild capture fish—is one of the most important sectors in Nigeria, both from an economic and social standpoint. In 2009, the Federal Department of Fisheries contributed approximately US\$ 1 billion to the country’s GDP. Further, in the Niger Delta, the sector is an important contributor to employment, livelihoods, and food security. Particularly for the sector’s participants including pond farmers and fishermen, as well as input suppliers, distributors, marketers, transporters, credit service providers, and boat and net repairers.

In the fisheries sector, fish reaches the end consumer—households, informal eateries, formal institutions— in either a smoked or fresh state. In the domestic fresh fish channel supply is dominated by cultured fish which represents approximately 85% of total supply. The importance of cultured fish to the fisheries sector is further reflected in its size, value, and number of employed. The aquaculture sector is valued at N70 billion and contributes some N22billion to the regional GDP. Importantly the

<sup>3</sup>More details on these sectors can be found in the business case issued to DFID in April 2014 – this and other project documents will be made available to the consultant.

aquaculture sector has seen strong growth trends, with production jumping from 16,619 tonnes in 1995 to 200,535 tonnes in 2010 representing an 1106% increase in growth. In terms of employment, the aquaculture sector directly supports an estimated 12,066<sup>4</sup> pond fish farmers of which 3,016 (30%) are female.

Thus, MADE selected the aquaculture sector for intervention because it fulfilled our key selection criteria—growth potential, impact on the poor and women, and feasibility. The sector's growth potential is driven off the back of strong market demand. The sector's poverty reduction potential is rooted in the number of fish farmers in the Niger Delta and the sector's strong multiplier effect with additional labour and economic activity revolving around each pond (e.g. feed, fingerlings). Finally the sector's feasibility stems from technological advances which have increased the efficiency and profitability of actors in the sector and the supporting enabling environment at the national (through the ATA) and state level (in particular Rivers State).

#### **MADE'S INTERVENTIONS IN THE AQUACULTURE SECTOR**

MADE's work in this sector is driven by a strategy to improve the productivity and competitiveness of fish farmers by addressing the sector's key constraints a. poor fish-farmer production knowledge b. poor business management knowledge c. low market penetration by some feed companies and hatcheries and d. limited access to new markets.

To address these constraints, MADE is facilitating the establishment of Demonstrations Ponds. Demonstrations pond or demo ponds are model fish ponds which are utilised to train fish farmers on the technical and managerial aspects of a successful fish farming business. They are also the physical focal points of the intervention, bringing together key supporting actors in the value chain (feed companies, hatcheries, extension services, farmer associations etc.) to improve communication and coordination between these actors.

At the demo ponds fish farmers learn new and improved skills, practices, and technologies of fish cultivation in addition to access to the Nigerian Agricultural Enterprise Curriculum (NAEC) aquaculture business management and record keeping training. Through their interaction with feed and hatchery companies they will have improved knowledge of these companies' offer and in turn companies will have improved understanding of their market. Producer associations will be able to use the demonstration ponds as a site to coordinate existing members to access new markets and market outlets and identify new members. In this way the demonstration pond will improve productivity and competitiveness of fish farmers.

MADE is collaborating with local feed companies and technical trainers in Rivers State to run the demonstration ponds. The demonstration ponds in Woji (Obio-Akpor Local Government Area) and Bori (Khana Local Government Area), Rivers State were launched in August 28, 2014 and September 25, 2014 respectively and are estimated to reach approximately 80 fish-farmers during the pilot phase. The Aquaculture intervention will gradually expand to other parts of Rivers, Akwa Ibom, Balyelsa, Delta, and to other Niger Delta states. The total targeted outreach for MADE's interventions in this sector is estimated at 5000 fish-farmers over the life of the project.

#### **B. OBJECTIVE**

<sup>4</sup>Figures from MANR Delta state and from field survey. Figure is inclusive of homestead farmers, which number approximately 10,000.

The purpose of this assignment is to establish a baseline for key results indicators<sup>5</sup> for the aquaculture interventions in Rivers State, specifically Omoku, Ekpeye, Tai, Khana, Gokana, Obio-Akpor, Ikwerre, Bonny, Port-Harcourt, Okrika and in Bayelsa State specifically Yenagoa and Sagbama LGAs. The study is expected to collect the baseline data on the targeted value chain actors – fish farmers, fish farmers’ associations, input suppliers (hatcheries & feed companies) – so that MADE can measure the impact of the interventions. Findings from this baseline study will also be a source of information for decision making and strategic planning. The baseline survey will also promote the involvement and/or participation of key stakeholders and indirect beneficiaries<sup>6</sup> from the get-go to enhance buy-in, eventual ownership of the change process that is key to program success and sustainability, and a solid basis<sup>7</sup> for eventual attribution of change.

### C. SCOPE OF WORK

The implementation of the baseline survey will comprise two main phases - a first phase that will involve development of tools and methodology for the baseline survey, and the implementation (data collection) phase.

1. **Development of methodology and tools for the baseline survey.** This will include drafting a methodology with explicit rationale for gathering the required information from identified targeted groups, a sample plan and the process for drawing the sample for gathering representative data for the identified target beneficiaries from stated locations; a work plan showing a precise timeline for each activity including training of enumerators on questionnaire protocol, administration and execution (pre-testing, mock interviews, etc.).
2. **Implementation of the Baseline Survey.** This phase will consist of:
  - a. **A literature review** of existing documentation, including sector analysis carried out by the project team, other program documents (including results chains and indicators) and other context specific published and unpublished documentation that would provide a good understanding of the value chain and context of the demo activities.
  - b. **Field data collection** on the current level of key results indicators and complementary information that will help guide project implementation and enhance the measurement of project results.

### D. ILLUSTRATIVE INDICATORS

These activities should establish baseline data on the socio-economic profile of surveyed fish farmers; economic activity including production, yields, sales, income; access/use of improved production and processing technologies and services; and information on business linkages between market actors in the value chain (see list of results indicators on page 8 of this TORs) – as well as their demographic profiles - household size and age/gender composition.

The quality of data with respect to accuracy, reliability and validity is crucial. It is expected that the consultant conducts at minimum, an acceptable level of rigor in sampling. We would suggest a sample of about 400 key beneficiaries across Rivers State, purposively selected to assure representativeness with respect to gender, age, the key value chain segments and targeted communities. The consultant should strive to attain a good gender mix (ideally 50/50) in the survey sample as much as possible.

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<sup>5</sup> The list of results indicators is included at the end of this TORs.

<sup>6</sup> Indirect beneficiaries here include but are not limited to firms, farmers, and other actors within the interconnected market systems not directly targeted by MADE.



The design and execution of the study should be participatory and the consultant will be required to maintain close collaboration with MADE's project oversight team described in section I below.

#### **E. KEY DELIVERABLES**

The key deliverables for the assignment are:

- a.** An inception report (includes work plan, survey questionnaire) to be submitted to MADE for review and approval before the start of the fieldwork.
- b.** Completed questionnaires used for the survey
- c.** A draft report to be submitted to MADE for review within two weeks of the completion of field data collection.
- d.** The database with the survey data will be the property of MADE and needs to be delivered at the time of the report in excel or SPSS
- e.** A final report detailing the survey findings. This report should include, but not be limited to the following:
  - i.** An executive summary
  - ii.** Context: Brief description of the baseline survey location and/or activity clusters
  - iii.** Baseline survey design and methodology
  - iv.** Detailed findings of the baseline survey in qualitative and quantitative (descriptive statistics, tables, charts, etc.) format, further recapped by targeted results indicators.
  - v.** Project zone opportunities, constraints and risks
  - vi.** Recommendations
  - vii.** Annexes
    - Survey questionnaire
    - Bibliography
    - List and contact of persons interviewed
    - List of tables, graphs, etc.

#### **F. TIMEFRAME AND WORKPLAN**

We estimate that this assignment will take about 7 weeks as detailed in the table below, being 1 week for the design (development of tools and methodology) and literature review; 2 weeks for field data collection and 4 weeks for data entry, cleaning, analysis and report writing. This work should take place during November 2014/January 2015.



Activities	Timelines									
	Week1	Week2	Week3	Week4	Week5	Week6	Week7	Week8	Week9	
	Oct 30 -Nov 7	Nov 10-21	Nov 24-28	Dec 1-5	Dec 8-9	Dec 15-19	Dec 22- 24,29- 30	Jan 5-9	Jan 12-14	
Call for proposal for MADE Aquaculture Oil Baseline Survey										
Receipt and Evaluation of received Proposal										
MADE's Negotiation meeting with successful bidder										
Review relevant Literature and development of tools for the survey										
Mobilization for Focus group discussions (FGDs)										
Conduct of Key Informant Interviews and Focus group discussions (FGDs)										
Training of enumerators /Pretest questionnaires/										
Training of coders /Pretest with pilot questionnaires/										
Amendment of Questionnaires										
Data collection										
Data entry										
Data analysis and Reporting										

Report Writing and Submission of Draft Report										
Presentation of report to MADE										

#### G. PROFILE OF THE CONSULTANT

We envisage that the study would be carried out by a small team made up for example, of a team lead, field supervisor and a team of enumerators reflective of the sample size for the study. The lead consultant will possess a good knowledge of the Niger Delta region and demonstrated experience in conducting baseline and/or related field studies. In addition s/he should have experience in developing data collection tools and in basic data analysis software such as excel and SPSS. S/he may recruit a co-consultant to complement/fill any skills/experience gaps.

The lead consultant should provide evidence that his/her team is qualified to perform this assignment (brochures, description of similar assignments, availability of appropriate skills within the team, etc.). Having a strong background and experience in qualitative/quantitative research and analysis methods is required. Having past successful experience carrying out similar assignments in the Niger Delta Region is an asset. Working knowledge of the Pidgin language and other local languages of the Niger Delta Region would also be an asset.

Other highly desirable skills include:

- Skills in participatory research techniques
- Gender sensitivity and cross-ethnic/cultural exposure and sensitivity
- Excellent writing and analytical skills and experience and capability in producing survey reports
- Flexibility and timeliness

#### H. APPLICATION DETAILS.

The aim of this RFP is for shortlisted organizations to submit comprehensive proposals including a detailed plan with timelines to execute these activities. Thus care should be taken to clearly state the following:

- An indication of availability to undertake this task within the timeframe listed above
- An explanation of how you fulfil the consultant profile and relevant skills and experience, including team composition;
- A description of how you would approach this assignment, how much it would cost and how much time it would take – in short, a draft technical and financial proposal and work plan; a draft excel template for the financial proposal has been attached with this proposal. Please refrain from copying sections of the Terms of Reference in the technical proposal. However, interpretations or comments to the Terms of Reference are welcome.
- The CVs of key personnel
- Two references.

Received proposals will be evaluated using the following criteria and corresponding weight:

Evaluation criteria	Scale
Conceptualization & Research design	30
Time & resource planning	10
Financial proposal	30
Experience in conducting such research	15

Organizational capacity	15
Total	100

Proposal Submission - please submit your proposal by e mail to [elo\\_ovuezirie@dai.com](mailto:elo_ovuezirie@dai.com) and [Terry\\_Lacey@dai.com](mailto:Terry_Lacey@dai.com) not later than 6.00pm on November 19, 2014. Late submissions will not be considered.

#### I. INSTITUTIONAL ARRANGEMENTS

MADE's M&E Team, the Team Leader (TL) and the Aquaculture Intervention Manager (IM) will oversee the Consultant's contract and work. For the duration of the project, the Consultant will provide key communications and documents to the M&E Lead or other staff designated by the TL. The TL Terry Lacey ([Terry\\_Lacey@dai.com](mailto:Terry_Lacey@dai.com)) and IM, Elo Ovuezirie ([elo\\_ovuezirie@dai.com](mailto:elo_ovuezirie@dai.com)) should be copied on all communications.

The consultant will be briefed by the above oversight team and provided with key project documents. The Consultant should complete/finalize the survey methodology that includes, sampling strategy, survey questionnaire, data collection plan and list of enumerators and present to oversight team within 3 days from signing the contract. All enumerators must be hired from the local communities of the survey. The Consultant will conduct all the work using own facilities and means of transportation. MADE will make provisions for temporary office and meeting space for all meetings with MADE. All expenses, including lodging and feeding are at the Consultant's charge.

#### J. CONFIDENTIALITY STATEMENT

All data and information received from MADE for the purpose of this assignment are to be treated confidentially and are only to be used in connection with the execution of these Terms of Reference. All intellectual property rights arising from the execution of these Terms of Reference are assigned to DAI/MADE. The contents of written materials obtained and used in this assignment may not be disclosed to any third parties without the expressed advance written authorization of DAI/MADE.

#### Indicators

- i. Number of small/medium scale farmers, entrepreneurs, labourers and workers
- ii. Number and type of trainings
- iii. Number of farmer association members trained
- iv. Number of training participants disaggregated into participating lead farmers, association farmer participants, non-association farmer participants
- v. Number of small/medium scale trained farmers, using feeding by biomass methodology and volume and type of feed usage
- vi. Number of small/medium scale trained farmers, adopting appropriate sorting and grading methods
- vii. Number of small/medium scale farmers, adopting standardized pond management practices
- viii. Number of small/medium scale farmers, adopting record keeping practices.
- ix. Number of indirect small/medium scale farmers, copying new practices
- x. Number of direct beneficiary and indirect beneficiary small/medium scale farmers reporting increased yield (kg) due to applied better production techniques
- xi. Number of direct beneficiary and indirect beneficiary small/medium scale farmers reporting increase in other volumetric measures of harvested fish derived from records due to reduced fish loss
- xii. Number of direct beneficiary and indirect beneficiary small/medium scale farmers reporting increased income
- xiii. Number of indirect small/medium scale beneficiary farmers reporting increased additional income from other income streams
- xiv. Number of feed company staff trained

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- xv. Proportion of sales volumes to small/medium scale farmers
  - xvi. Value of sales to the small/medium scale farmers
  - xvii. Number of support providers crowding in
  - xviii. Number of new entrant farmers and previous socio-economic engagements prior to entry.
  - xix. Number of small/medium scale farmers and entrepreneurs assisted to access credit
  - xx. Number of small/medium scale farmers and entrepreneurs assisted to access new markets
  - xxi. Number and names of partners and partner organisations
  - xxii. Number of partners organisations changing their approach to engaging with the poor as a result of engagement with MADE
  - xxiii. Number of market actors investing in MADE piloted innovations

