LIVELIHOOD DIVERSIFICATION OF FISHERFOLKS IN COMMUNITIES AROUND OYAN AND IKERE GORGE DAMS, SOUTH WESTERN NIGERIA

BY

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ABSTRACT

Fishing as the main source of livelihood by artisanal fisherfolks is declining due to climatic changes and over exploitation. Fishing income can no longer meet fisherfolks's needs. Alternative sources of livelihood in addition to fishing are now being explored by fisherfolks. However, information on livelihood diversification in Oyan and Ikere Gorge has not been adequately documented. Therefore, livelihood diversification of fisherfolks around Oyan and Ikere Gorge reservoirs in Ogun and Oyo states, respectively was investigated.

A two-stage sampling procedure was used to select respondents. Two reservoirs: Oyan and Ikere Gorge within the Ogun-Oshun River Basin were purposively selected. A total of 264 and 129 fisherfolks [Fishermen (35, 51), net makers (18, 21), fish processors (81, 42), fish dealers (77, 10), and boat builders (2, 3)] were randomly selected proportionate to size in Oyan and Ikere Gorge, respectively. An interview schedule was used to obtain data on fisherfolks's socio-economic characteristics, livelihood activities, extent of diversification, seasonal income, social capital, natural capital and diversification constraints in wet and dry seasons. Herfindahl Diversification Index (HDI) was determined and data were analysed using descriptive statistic, t-test and the probit regression model at $\alpha_{0.05}$.

Many fisherfolks (63.0%) were male, 78.7% were below 51 years of age and 93.3% were married. Primary occupation was fishing (32.3%, 40.2%), while secondary occupation was crop farming (51.2%; 38.3%) with house hold size of 7.2±5.6 and 7.8±3.9 around Oyan and Ikere Gorge reservoirs, respectively. In wet and dry seasons, fishermen around Oyan reservoir diversified into crop farming (58.7%; 50.0%), while net makers diversified into sales of patent medicines (63.6%) and commercial motorbike riding (58.8%), respectively. Fishermen around Ikere Gorge reservoir diversified into crop farming (76.7%; 75.9%); fish dealers into petty trading (66.7%; 33.3%) in wet and dry seasons, respectively. Poor transportation (98.9%) and restriction on the use of motorised boats (94.4%) in Oyan; inadequate extension services (96.8%) and distance to market (100%) in Ikere were major constraints to livelihood diversification. Net makers were the most diversified in Oyan (0.90; 0.63) and in Ikere (0.91; 0.56) both in wet and dry seasons, respectively. Fishermen had the least diversified activities in Oyan with HDI of 0.16 (wet), and HDI of 0.12 (dry) seasons, respectively. Boat builders had the least diversified activities in Ikere gorge reservoir in wet season with HDI of 0.25. Fish processors had the least with HDI of 0.28. Social capital (2.18) and age (0.06) significantly influence the probability of diversifying into different livelihood activities, while natural capital (-5.12) and gender (-0.66) negatively influenced livelihood diversification among fisherfolks in both reservoirs. Diversified income proportion was highest among fishermen (23.7%) and boat makers (31.4%) in wet season, while net makers (30.0%) and fish dealers (27.2%) had the highest in dry season. The mean income of net makers (₦10,909±3.1; ₦33,125±1.7) in Oyan was significantly different from those in Ikere Gorge (₦21,727±2.1; ₦17,777±2.8) in wet and dry seasons, respectively.

Fisherfolks in Oyan and Ikere Gorge reservoirs diversified mostly into crop farming and petty trading. Age was an important determinant of diversification.

Keywords: Fisherfolks, Livelihood diversification, Crop farming, Seasonal fishing.
Word Count: 500

DEDICATION

This work is dedicated to God the Father, the Son and the Holy Spirit from whom all inspiration, grace, wisdom and power flows.

CERTIFICATION

We certify that this work was carried out by Funmilayo Mojisola TALABI under our supervision in the Department of Aquaculture and Fisheries Management, Faculty of Agriculture and Forestry, University of Ibadan, Ibadan, Nigeria.

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LIST OF ABBREVIATIONS

ADP	:	Agricultural Development Programme
DCRD	:	Dragged Catch Reduction Devices
DFID	:	Department for International Development
FAO	:	Food and Agricultural Organization
FDF	:	Federal Department of Fisheries
FSP	:	Family Support Programme
GDP	:	Gross Domestic Products
NDE	:	National Directorate of Employment
NPC	:	National Population Commission
ODI	:	Overseas Development Institute
O-ORBDA	:	Ogun-Osun River Basin Development Authority
PBN	:	People's Bank of Nigeria
SDF	:	State Department Fisheries
SFLD	:	Sustainable Fisheries Livelihood Programmes Development
SLA	:	Sustainable Livelihood Approach
UNCED	:	United Nations Conference on Environment and Development
WCD	:	World Commission of Dams

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

One of the main problems confronting Nigeria today is how to significantly reduce the rising poverty among the populace. Oyekale *et al* (2006), Oni and Yusuf (2006), and Babatunde, (2008) among others show clearly that the incidence of poverty in Nigeria is higher among the rural people, that is, households that rely mainly on agricultural income and those with low paid work in the rural non-farm sector. This may not be unconnected with the rather low productivity growths that have characterized Nigeria's agriculture over the past four decades (Fulginiti *et al*, 2004). Amidst high levels of material uncertainty and risks, rural populations have become more occupationally flexible, spatially mobile and increasingly dependent on non-agricultural income-generating activities (ODI, 2001).

There has been an increased recognition among researchers in the past that Africans diversify their livelihood activities to include on-farm such as food crop production, livestock rearing, fisheries and off-farm activities like paid employment and artisan for a sustainable livelihood (Ellis, 1998; 2000; Bryceson, 2002). Barrett *et al.* (2001) notes that exploiting these off-farm opportunities could offer a pathway out of poverty for the rural poor.

The rural economy is not based mainly on agriculture but rather on a diversified array of livelihood activities and enterprises. In sub-Saharan African, reliance on agriculture tends to diminish continuously as income level rises; that is, the more diverse the income portfolios, the better off are the rural households (Adediran 2008, FAO, 2009) Elsewhere, a common pattern is for the very poor and comparatively well off to have the most diversified livelihood, while the middle ranges of income display less diversity (Ellis, 1999).

The concept of livelihood diversification has rapidly gained ground as an approach to rural poverty reduction in poor countries. The notion of diversity and diversification has

become part and parcel of livelihood theory. Rural livelihood diversification is defined as the process by which rural farm households construct an increasingly diverse portfolio of activities and assets in order to survive and improve their standard of living (Ellis, 2000a).

Diversification in rural livelihoods is the subject of conceptual and policy-based research because income from farming has come under pressure owing to population explosion (Barrett *et al*., 2001). A study by Food and Agriculture Organization (FAO) on farming systems and poverty suggested that diversification is the most important source of poverty reduction for small farmers in South and South-East Asia (FAO/ World Bank, 2001). Rural people no longer remain confined to crop production, fishing, forest management or livestock-rearing; but they combine a range of occupations to construct a diverse portfolio of activities (Dercon and Krishanan, 1996; Unni, 1996; Ellis, 2000a). In developing countries, the majority of the rural people engage in agricultural and non – agricultural activities to meet their livelihood needs. There have been trends in these countries for people to move from rural to urban areas and within rural areas and to move out of agriculture-based occupations, often owing to growing pressure on natural resources, declining terms of agricultural trade and other broad-ranging trends in society (ODI, 2001).

Marine and inland fisheries resources are the main sources of livelihood for over five million people in West and Central African countries, representing up to two-thirds of animal protein content of the average diet throughout the whole region and playing a very crucial role in national and local food security. Global trends in fresh water fish fauna indicate that many faunas are seriously declining as a result of climatic change and over-exploitation. It has been projected that, within 30 years, an average extinction rate of fresh water fish would be 50%. However, there is widespread recognition and broad evidence that fishing communities are among the poorest in most of these countries (SFLD, 2004).

Nigeria, with a population of over 140 million, is Africa's most populous country and the continent's fourth largest economy (NPC, 2006). The economy is still basically agrarian, despite the advent of petroleum in the mid-1970s, the relative share of agriculture, livestock, forestry and fishing, which was 65.6 per cent, in 1960/61 (with the agriculture subsector accounting for 56.6 per cent) has declined, with the agricultural sub-sector accounting for only 32 per cent per annum in the 1990s. But the sector still constitutes the source of employment and livelihood for about three-quarters of the population (Oluwatayo, 2009). The country, which has an area of 913, 07264 square kilometres, is well watered by the Rivers Niger and Benue and their tributaries. Nigeria possesses a vast inland fresh water ecosystem spread all over the country. This includes rivers, floodplains, wetlands and lakes (natural and manmade). The fish production from the inland water sector is of great significance, as it contributes to the major share in the rich protein food for domestic consumption. Fisheries constitute an important sector in Nigerian agriculture, providing valuable food and employment to millions of people and also serving as a source of livelihoods mainly for women in coastal and inland fishing communities. In Nigeria, the artisanal fishery occupies a significant position in the economy, contributing 4% to the total GDP, providing employment for about 5.8% of the Nigerian population and supplying 81.9% of the total domestic fish production (FDF, 2007). Nigeria has benefited from artisanal fisherfolks through the generation of income from licensing fees collected from the fishermen (Satia, 1995) in addition to the provision of valuable supply of animal protein to the increasing population.

The contribution of Dams to human development cannot be ignored. There are more than 45,000 Dams around the world; they have helped the economies of many communities and countries in utilizing and harnessing water resources primarily for food production,

energy generation, flood control and other domestic use. Dams support 30-40% of the entire irrigated area of the world and thus support 12-16% global food production (WCD, 2000).

A livelihood comprises the capabilities, assets and activities required for a means of living (Ellis, 2000a). These include the activities that are carried out in the household that provide a means of living or income for the household. In this definition, the conventional meaning of assets is explained to include material resources of household members, skills and experiences (human capital), their relations within wider communities (social capital) and their natural environment (natural capital). People are involved in livelihood activities in order to provide for household and other needs of life. The means by which these capital assets embed themselves in life economy and reproduce themselves is vital in the investigation of livelihood (DFID, 2000). Rural livelihood diversification is defined as the process by which rural farm households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living (Ellis, 2000a).

In this study, livelihood diversification refers to the attempts by individuals and households to find new ways to raise incomes and reduce vulnerability to different livelihood shocks. Livelihood diversification can take place through both agricultural diversification, that is, production of multiple crops or high-value crops; and non-agricultural livelihood diversification, that is, undertaking small enterprises, or choosing non-agricultural sources of livelihood, like casual labour or migration. Overseas Development Institute ,(2000) notes that rural households in most rural communities engage in various activities to make a living. These activities require the use of individual capabilities and household's asset.

Most definitions of diversification in developing countries work on the assumption that diversification primarily involves a substitution of one crop or other agricultural product for another, or an increase in the number of enterprises, or activities, carried out by a

particular farm, the definition used in developed countries sometimes relate more to the development of activities on the farm that do not involve agricultural production**.**

Livelihood diversification is not synonymous with income diversification but not all economic studies of diversification focus on different income sources and their relationship to income levels and assets. A livelihood is diversified when individuals or households engage in different activities or undertake different forms of employment both farm as well as non-farm in order to improve their standard of living. Accordingly, in this study, livelihood diversification refers to the attempt by fisherfolks to find ways of reducing vulnerability to different shocks by engaging in different activities both agricultural that is, production of multiple crops or high value crops and non agricultural livelihood diversification such as undertaking small enterprises like casual labour or migration.

Rural income diversification is the process by which farm households and individuals obtain their income from many different sources and put this income to other use (Davis *et al.,* 2010). Income diversification can also be defined as the composition of household incomes at a given instant in time. Variety of factors may explain income diversification such as risk reduction strategies, asset accumulation strategies and responses to household shocks. Most of these factors have been broadly classified into two fundamental causes of household income diversification- one takes household income diversification to be a consequence of push factor while the other views it as driven by pull factor (Ralitza and Knal, 2010). Rural household income diversification is seen as a matter of necessity and survival whereas household diversification is born out of desperation and driven primarily by the household poverty status (Ellis, 1998). Against the above background, this study was undertaken to examine the livelihood diversification of fisherfolks in communities around Oyan and Ikere Gorge Dams Southwest Nigeria.

1.2 Statement of the Research Problem

The presence of high incidence of poverty and low livelihood status among rural populace is disturbing and of great concern in many developing countries such as Nigeria (FAO, 2010). Among the extreme poor in rural household are fisherfolkss, considered to be the poorest of the poor. In Nigeria, most artisanal fisherfolks engage in low income and poor activities that have negative implications on their livelihood status and well being. In Southwestern Nigeria, on- farm activities such as food crop production, off-farm activities such as crop processing, fish processing and non -farm activities such as trading and artisan were the major livelihood pursuit of fisherfolks where majority are low income earners, poor and have limited funds to meet their livelihood needs resulting in low level of social and economic well being of fisherfolks (Williams, 2007). Declining agricultural productivity and persistent poverty in rural areas is threatening the standard of living of rural populace in Nigeria. Furthermore, the income level, food production level and the contribution of fisherfolks to the economic development of Nigeria is threatened due to low accessibility to livelihood assets and livelihood abilities by fisherfolks (Williams, 2007). Moreover, if the livelihood needs of fisherfolks are not adequately addressed, meeting the Millennium Development Goals of eradicating extreme poverty and hunger may only be a mirage.

In the past few decades, intervention programmes under governmental organizations were formed to address the problem of poverty among rural populace. Such programs include Better Live for Rural Dwellers, Family Support Programme FSP, Agricultural Development Programme ADP, and National Directorate of Employment NDE among others with the intension of providing inputs such as fertilizers, training in capacity building on improved technologies and forming farmers into established farm groups. Despite the intervention programmes, fisherfolks operates at low levels of skill acquisition in their livelihood pursuit thus not translating into an increase in economic and social status of fisherfolks (FAO, 2002).

This could have resulted from top-down approaches in handling down technologies, incompatible training methods of skill acquisition and inability to utilize these skills due to low literacy level of fisherfolkss (Clay et al, 2009).

The ecological zones that fisherfolks are situated in also have a role to play in their access to asset in their various communities. Variations in seasonal changes at different periods of the year could pose some serious and growing problems in improving rural fisherfolks's livelihood activities in their ecological zones (Ewebiyi, 2012). Some environmental factors could determine the type of access to asset. Access to water, for instance dam water which is the main source of drinking water for fisherfolks is usually polluted during the wet season. At the unset of wet season, fisherfolks face challenges that prevent them from diversifying their livelihood activities as a result of flooding of dam embankment. Also, lacks of access to asset necessitate the need for fisherfolks to diversify into poorer and lower income generating activities which has implications on their livelihood status.

According to Ellis (1998), livelihood diversification varies across countries and regions. Schwarze and Zeller (2005) reported that livelihood diversification occurs more among the poor, while Fabusoro et al (2010) reported on the contrary that livelihood diversification is more prominent among the rich who have access to asset, high level of abilities and activities. The artisanal fisheries sector is characterized with constraints such as low technology, lack of modern equipment, lack of fund to expand (Okeke and Shittu,2013).

The current decline in fish production also poses a problem to the sector and the animal protein demand of the country. A lot of studies abound on the composition and abundance of freshwater fish species of Nigeria. Several researches reported the decline of fish resources; (Odum 1995; Fregene 2002; Oso and Fagbuaro 2004; Fapohunda and Godstate 2007; Tawari-Fufeyin and Ekaye 2007; Meye and Ikomi 2008; and Offem et al.

2009). Jamu and Ayinla, (2003) asserted that fish resources available to artisanal fisherfolks have declined over the years owing to over-exploitation, seasonality in fishing, inadequate management of fisheries resources and climatic variation. For instance, Kainji lake basin data revealed a sharp decline in fish yield from 32,474 tonnes in 1995 to 13,361 tonnes in 2001 and 9,248 tonnes in 2004 (Abiodun, 2003; Abiodun and Niworu, 2004). National artisanal inland fish production has declined from 38.7% to 37.7% between 2006 and 2010 (Fagade, 2010). Hence, it is not surprising for artisanal fisherfolks to seek information on rich fishing ground (Njoku, 2007; Okwu *et al.*, 2011; Ifejika, 2002).

Income made from fishing is no longer sufficient to meet the livelihood needs of fisherfolks. The rural fisherfolks in Oyan and Ikere Gorge Dams are also faced with the problem of decline in fish catch, low unit production, intensive labour, limited gear usage, high post-harvest losses and relatively low income from fishing (Ikwenweiwe, 2000). Both Oyan and Ikere Gorge Dams were designed to provide additional source of livelihood to fisherfolkss and provide area of irrigation farming but this function is yet to be exploited till date.

FAO (2002) claims that poor understanding of the manifold nature of the livelihood of rural fisherfolks often leads to information and implementation of policies and projects at variance to their needs. As a result, rural fisherfolks who produce the majority of the internal fish supply in the country are often left out of most empirical analysis of poverty (Barrett et al, 2001). This necessitates the study of livelihood diversification of artisanal fisherfolks in Oyan and Ikere Gorge Dams. It is against this background that this study provided answers to the following research questions:

1. What are the socio-economic characteristics of fisherfolks in the study area?
2. What are the livelihood assets profiles of fisherfolks?
3. To what extent do fisherfolks diversify?

4. What are the factors that determine the extent of diversification?
5. What are the constraints encountered by fisherfolks in the study areas?

1.3 Objectives of the study

The general objective of this study was to assess the livelihood diversification of rural fisherfolks in communities around Oyan and Ikere Gorge Dams in southwestern Nigeria.

The specific objectives of the study were to;

1. identify the socio- economic characteristics of fisherfolks in communities around Oyan and Ikere Gorge dams;
2. profile the livelihood asset and diversification activities among fisherfolks in the study area;
3. determine the extent of diversification among fisherfolks groups in the study area;
4. identify the factors that determine extent of diversification among fisherfolks; and
5. identify the constraints encountered by fisherfolks in the study area.

1.4 Hypotheses

The following hypothesis were tested in the study

1. There is no significant difference in personal characteristics and livelihood diversification of fisherfolks in the study areas.
2. There is no significant difference in the livelihood diversification of fisherfolks in Oyan and Ikere gorge dams.
3. There is no significant relationship between asset and livelihood diversification of fisherfolks in the study areas.
4. There is no significant relationship between sources of information on diversification and extent of diversification.

1.5 Justification of the study

The results of this research will help to build the body of knowledge and data base on livelihood diversification activities and strategies that fisherfolks adopt in meeting the challenges of production and survival. The results of this study will also help to high-light issues on the importance of land and property ownership as this is capable of increasing rural fisherfolks's livelihood asset, their bargaining power within the household and their social status as members of the society. The outcome of this study will also help to identify issues on constraints to the livelihood of fisherfolks thereby improving their standard of living. Results from this study will help fisherfolks to have a better understanding and knowledge of combination of livelihood activities with high potentials.

The results from this study will also show the prevalent sources of information on livelihood diversification of fisherfolks in their communities. This study will also bring to limelight the importance of participating in social groups that will facilitate the dissemination of information and access to livelihood asset thus promoting the livelihood status of fisherfolks in their communities.

Many of the rural fisherfolks are unable to secure adequate livelihood from fishing and fish-related activities whether on their own account or by working for others. They engage in a variety of livelihood pursuit often requiring considerable mobility over shorter or longer periods. Olawoye, (2000) states that one of the common ways for Nigerians to meet their needs is by combining the income and products of several different activities. Times of hardship, such as seasonal changes, do not affect everyone equally. Some people survive long period of deprivation, while others in the same village do not. Challenges are locality-specific. Therefore, the challenges, assets and livelihood activities of fisherfolks in Oyan and Ikere Gorge Dams will differ. If what fisherfolks in Oyan and Ikere Gorge Dams diversify into is known, interventions can be provided. Similarly, if the constraints faced by them are

known, relief measures can be provided in that direction. The outcome of this study will highlight some of the problems fisherfolks face in their livelihood activities, capabilities, livelihood assets and livelihood strategies within their various communities.

Results from this study will help policy makers in developing interventions that will enable fisherfolks develop livelihood strategies that will build opportunities created by globalization. The outcome of this study will be useful to developmental agencies as it will keep them aware of the need to improve production and processing equipments that are essential for sustaining livelihoods and improving livelihood status of fisherfolks in Oyan and Ikere Gorge dams. The result of this study will highlight measures to increase livelihood abilities of fisherfolks for productive activities which will contribute to long term process of socio-economic development of fisherfolks.

Results from this study also identify measures to be adopted towards improving the livelihood status of rural fisherfolks. This study, also aims at providing useful baseline survey information to policy makers on matters pertaining to the livelihoods and livelihood status of rural fisherfolks. This study hopes to bring to limelight the strength, weakness, opportunities and threats to livelihoods among rural fisherfolks in other to come up with a way of developing intervention programmes specifically for the rural fisherfolks in Southwestern Nigeria.

1.6 Operational definition of terms

- **Fisherfolks group:** These are the fishermen and women, fish dealers, fish processors, net makers and boat makers.
- **Livelihood:** These are the abilities, assets and activities required for a means of living by fisherfolkss in the study areas.

- **Livelihood abilities:** These are the potentials possessed by fisherfolks in terms of skills, knowledge and training that enables them to perform activities in their pursuit for a living.
- **Livelihood assets:** These consist of basic resources upon which fisherfolks's means of living may be built. These resources could be natural, physical, human, social and financial in nature.
- **Livelihood activities:** These are specific pursuits which are undertaken by fisherfolks in order to derive a means of living.
- **Sustainable livelihood:** This involves a means of living where needs are met in a way, without necessarily compromising the ability of future generations to meet their own needs.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents the review of literature relevant to key concept to this study.

2.1 What is livelihood?

Livelihood can be referred to as "a means of securing basic necessities of life such as food, water, clothing and shelter". According to Scoones (2009), livelihood comprises of a set of activities and also the ability to acquire the basic necessities of life as an individual or as a group through endowments and resources such as human, financial and material resources. It involves a combination of resources (livelihood assets) and also the activities undertaken in order to live.

A livelihood comprises the capabilities, assets and activities required for a means of living. Livelihoods are shaped by a multitude of different forces and factors that are themselves constantly shifting.

People-centered analysis is most likely to begin with simultaneous investigation of people's assets, their objectives, that is, the livelihoods outcome which they are seeking, and the livelihood strategies which they adopt to achieve these objectives (DFID, 2001). A livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide livelihood opportunities for the next generation, and can contribute net benefits to other livelihoods at the local and global levels in the short and long terms (Chambers and Conway, 1992). Social and human developments are essential parts of a sustainable family or community existence in addition to food security. Capital assets, such as equitable access to community institutions, education and a stable family life, access to medical facilities, comfortable housing and a supply of clean water, are needed to make for a sustainable livelihood. Livelihood analysis helps to improve

the understanding of what is really happening in people's lives, what enables some but not others to escape from poverty.

2.2 Causes of livelihood change

Change rarely affects all households equally. One household may become impoverished following a draught, while another is able to cope (ODI, 2003). One way to look at change is to think about shocks, trends and cycles (Table 1). Shocks have a rapid onset and result in an immediate impact. Examples are contagious diseases, collapse in prices for export commodities, and pollution of water bodies. Other causes of change manifest themselves as trends with longer gestation, such as low fish yield owing to over exploitation of a fishery. Those that occur with warning sign (such as over-exploitation of fish resources) or according to cycles (such as seasonality) are more predictable. This may make coping with them more manageable (for some). The rapid onset shocks often strike rural households with no warning at all, thus constraining their ability to prepare and respond.

A second view of change is according to the level at which they occur. Some causes of change are internal to households. The natural lifecycle of the family and episodes of ill health are the two major factors that affect virtually all households. The ratio of dependents to producers changes from low to high to lower again as a newly married couple forms, have children and then the children mature. However, this dependency ratio (and hence the ratio of income to expenditure) can be dramatically affected by ill health, accidents or death of a household worker (ODI 2003). Other internal factors can be changes in preferences, priorities and management abilities of the family. These can reflect personal choices over, for example, risk-aversion, or problems, such as alcoholism, or changing gender roles in household decision-making.

Table1: Dynamics of change: shocks, trends and cycles

Household level		**Structural/policy level**	
A	Unexpected death of economically active household member	Shocks	Change in regulations governing land ownership
B	Rising education level over generation	Trends	Rising prices of fishing inputs
C	Changing dependency level in household	Cycles	Seasonal variation of rainfall or fishing labour required.

Source: Adapted from ODI (2003).

2.3 Livelihood assets

Livelihood assets refer to people's strength in terms of capital endowments and how they endeavour to convert these into positive livelihood outcome (Gaillard *et al*., 2009). However, no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek. This is particularly true for fisherfolks whose access to any given category of asset tend to be very limited. As a result, they have to seek ways of nurturing and combining what assets they do have in innovative ways to ensure survival.

The livelihood framework identifies five core asset categories or types upon which livelihoods are built. These include human capital, social capital, natural capital, physical capital and financial capita (DFID, 2000).

2.3.1 Human capital

Human capital represents the skills, knowledge, ability and good health that together enable people to pursue different livelihood strategies and achieve their livelihood outcomes (Scoones, 1998). At the household/fisherfolks level, human capital is a factor of the amount and quality of labour available. This varies according to household size, skill level, leadership potential, health status etc. Human capital is regarded as a means of achieving livelihood outcomes (ODI 2003). However, its accumulation can also be an end in itself. Many people regard ill health or lack of education as core dimensions of poverty; thus, overcoming these conditions may be one of their primary livelihood objectives. Human capital is required in order to make use of any of the four other types of assets. It is, therefore, necessary, although not sufficient on its own, for the achievement of positive livelihood outcomes (Ellis, 2000b; ODI, 2003).

2.3.2 Social capital

In the context of the sustainable livelihood framework, social capital is referred to as social resources upon which people draw in pursuit of their livelihood objectives (ODI, 2003). Social capitals are developed through various ways, which includes:

- Networks and connectedness, either vertical (patron/client) or horizontal (between individuals with shared interests), that increases people's trust and ability to work together and expand their access to wider institutions, such as political or civic bodies.
- Membership of more formalized groups, which often entails adherence to mutually-agreed on or commonly accepted rules, norms and sanction.
- Relationship of trust, reciprocity, and exchange that facilitates co-operations, reduce transaction cost and may provide the basis for informal safety nests amongst the poor. (for example *ajo and* esusu).

The above are all inter-related. For instance, membership of groups and associations can extend people's access to other institutions as well as influence the institution. Likewise, trust is likely to develop between people who are connected through kinship relations (Ellis 2000b).

The importance of social capital cannot be undermined in order to achieve livelihood outcomes. Mutual trust and reciprocity lowers the cost of working together. This means that social capital has a direct impact upon other types of capital. By improving the efficiency of economic relations, social capital can help increase people's income and rates of saving. Social capital can be effective in improving the management of common resources (natural capital) and the maintenance of shared infrastructure (physical capital) (DFID, 2004). In addition to this, social networks facilitate innovation, the development of knowledge and sharing of that knowledge. There is, therefore, a close relationship between social and human capital. Social capital, like other types of capital, can be valued as good itself. It can make a

particular important contribution to people's sense of well-being through identity, honour and belonging (Carney, 2002).

To the poor and vulnerable fisherfolks, social capital may be seen as a resource of last resort as it can provide a buffer that helps them cope with shocks, such as death in the family. It also acts as an informal safety net to ensure survival during periods of intense insecurity as well as compensate for a lack of other types of capital, for example, shared labour groups compensating for limited human capital among the fishermen (ODI, 2003).

2.3.3 Natural capital

This refers to the natural resource stocks from which resources that make up natural capital, from intangible public goods, such as the atmosphere and biodiversity to divisible assets used directly for production (DFID 2004). Many of the shocks that devastate the livelihoods of the poor are natural processes that destroy agricultural land (Ellis, 2000b). However seasonality is largely due to changes in the value or productivity of natural capital over the years.

Access to natural resources has been a constant theme in debates on poverty alleviation strategies among rural households (FAO, 2002). In the last decade, with the renewed international commitment to poverty reduction, there have been significant theoretical and practical advances in the way poverty-environment linkages are considered in mainstream development policy. The Sustainable Livelihoods Approach (SLA) emerged partly as a result of this rethinking of poverty-environment linkages and has since become a driving force in its evolution. The SLA has become a shared point of reference and organizing framework for many development agencies (DFID, 2004). It is, therefore, important to evaluate what the SLA has contributed to an understanding of livelihood diversification issues related to access to natural resources because natural capital is very

important to fisherfolks, as they derive all or part of their livelihood from resource-based activities.

The following three types of natural capital are considered.

1. Land:

Land is a principal livelihood asset and principal form of natural capital through which rural dwellers derive their livelihood especially in Nigeria (DFID,2O10). In rural area, this is particularly true for the rural poor such as the marginalized, indigenous or rural fisherfolks who usually have limited access and control over this form of natural asset. Land is also a means of investing, accumulating wealth and also transferring it between generations as a form of livelihood sustenance. Most times rural fisherfolks are among the landless dependent people, whose livelihoods are mostly threatened by land tenure insecurity and skewed land ownership.

2. Water

Water is a vital natural resources for human consumption, animals and plant survival, improvement of soil fertility among many other (Carswell,1997).Water availability is essential for attaining higher crop yields and good agricultural harvest. In Nigeria, it is also used in the processing of food crops such as garri, oil palm processing and also other activities such as black soap making, local gin making, local cream making and campala production. Accessibility to water resources also contribute to more diversified and sustainable livelihoods by giving rural dwellers more time for other activities. For instsnce, water availability will reduce energy and time spent by fisherfolks in their search for water to be used in their household and livelihood needs. In sufficient water is a key constraints to production and livelihood sustenance in natural resource based activity (World Bank, 2008 IFAD, 2011).

3 Forest

In Nigeria, pertaining to forest activities, the rural poor such fisherfolkss have the least access to forest products and forest- related activities due to long standing cultural traits in most rural communities (FAO,2009). Even though, some of these fisherfolks derive a greater portion of their livelihood from forest related activities, yet most of them often lack adequate access and legitimate use of forest areas and forest resources. This has lead to exploitative activities by fisherfolkss However to combat this, legal rights may be given by local authorities to fisherfolkss at seasonal periods. This will assist in providing secure livelihood at off season period of the year (World Bank, 2012).

2.3.4 Physical capital

Physical capital consists of basic infrastructure and producer goods needed to support livelihood (De Haan, 2000). Infrastructure consists of changes to the physical environment that help people to meet their basic needs and to be more productive, while producer goods are the tools and equipment that people use to function more productively (fishing nets, fishing boats and vessels).

Infrastructure in the form of the following is usually essential for sustainable livelihood: affordable transport, secure shelter and buildings, adequate water supply and sanitation, affordable energy and access to information (Ellis, 2000b).

Infrastructure is commonly a public good that is used without direct payment with the exception of shelter, toll roads and energy supplies, which are accessed for a fee related to usage. Producer goods, on the other hand, may be owned on an individual or group basis or accused through rental or fee-for-service markets (ODI, 2003).

Infrastructure, such as roads, rails and telecommunication, is essential to the integration of remote areas where many of fisherfolks live. People are able to move between

rural and urban areas more easily if the transport infrastructure is good. They are also more likely to be better informed about opportunities in areas to which they are thinking of migrating either temporarily or permanently.

The development of physical capital must be led by demand from the intended users. Without a perceived need for the service, it is unlikely that the required infrastructure maintenance will be carried out, meaning that the service is likely to become unsustainable, for example, the provision of fish outlet markets for a fishing community that requires fishing nets (Ellis, 2000b). Livelihood approach, therefore, must focus on helping to provide access to appropriate infrastructure that enables fisherfolks to achieve their livelihood objectives. Participatory approaches is, however, essential to establish users priorities and needs.

2.3.5 Financial capital

These denote the financial resources that people use to achieve their livelihood objectives (Ellis, 2000b). These include available stocks saving, that is cash, bank deposits, liquid assets, such as livestock and, jewellery and regular inflow of money, that is pension or remittances.

Financial resources can also be obtained through credit-providing institutions. Financial capital is the most versatile of the five categories of assets, in that it can be converted into other types of capital, it can be used for direct achievement of livelihood outcomes, and it can also be transformed into political influence. However, this asset tends to be the least available to the poor, which makes other types of capital very important to them (Ellis, 2000b). The financial capital of the poor can be built by development agencies through indirect means of access to financial capital. These include organizational, that is increasing the productivity of existing savings and financial flows by helping to develop effective, tailored financial service organizations for the poor (ODI, 2003). So long as they are well-trusted, accessible and

widely known, they may encourage people to save. Another option might be to help develop organization that transit remittance income more efficiently to financial recipients (ODI, 2003).

- Institutional, that is, increase access to financial services, including overcoming barriers associated with poor people's lack of collateral either by providing some sort of umbrella guarantee or by identifying mechanisms that enables people's existing assets to act as collateral.
- Legislative/ regulatory, that is working to reform the environment in which financial services operate to help government provide better safety nets for the poor, including pensions.

2.4 Livelihood strategies

This refers to the various combinations of activities and choices that people make or undertake in order to achieve their livelihood goals (ODI, 2003). These include productive activities, investment strategies, and reproductive choices. People's access to different levels and combinations of assets is probably the major influence to their choice of livelihood strategies (Ellis, 2000a). For instance, some activities require particular skills or may be labour-intensive, which denotes the choice of high levels of human capital; while some others may require start-up (financial) capital or good physical infrastructure for the transport of goods (physical capital). Others may require a certain type/level of natural capital as a basis for production (land, fishing ground, good quality water, and so on) or access to a given group of people, achievable only through existing social connection, which is social capital.

Different livelihood activities have different requirements but the general principle is that those who are endowed with assets are more likely to be able to make positive livelihood choices (Ellis, 2000a). That is, they will be choosing from a range of options in order to

maximize their achievement of positive livelihood outcomes, rather than being forced into any given strategy because it is their only option. Livelihood strategies are intimately connected with people's objectives, that is, the beneficial livelihood outcomes that they seek.

2.5 Livelihood outcomes

Ellis (2000a) outlines the major livelihood outcomes as the outputs of livelihood strategies which can be established through participatory enquiry. They include the following:

- **More income**

People continue to seek a simple increase in net returns to the activities they undertake and overall increase in the amount of money coming into the household. Increased income also relates to the ideal of economic sustainability of livelihoods.

- **Increased well-being**

In addition to income and things that money can buy, people value non-material goods. Their sense of well-being is affected by numerous factors including their self-esteem, sense of control and inclusion, physical security of household members, their health status and access to services, political enfranchisement, and maintenance of their cultural heritage.

- **Reduced vulnerability**

Fisherfolks are often forced to live very precariously with no cushion against the adverse effect of the vulnerability context (Ellis, 2000a). Their livelihoods are unsustainable. For such people, reducing their vulnerability to the downside and increasing the overall social sustainability of their livelihoods may well take precedence over seeking to maximize the upside.

- **Improved food security**

Food insecurity is a core dimension of vulnerability. Participatory poverty assessments have shown that hunger and dietary inadequacies are distinct dimension of deprivation (Ellis, 2000a).

- **More sustainable use of the natural resource base**

Environmental sustainability or sustainability of the natural resource base is a major concern that is not adequately captured in the other livelihood outcome categories. Although often viewed as a donor objective, it is shared by many who recognize the long-term benefit of prudent resource use.

- **The right to a standard of living**

This includes food and housing, as enshrined in international agreements. This is not achieved for many of fisherfolks whose primary day-to-day objectives continue to be to secure enough food to eat.

2.6 Rural livelihood activities

A large proportion of the people in rural areas are engaged in agriculture, making agriculture the largest employer of labour and the main source of food and raw material for the growing population. Ellis (1998) states that, although agriculture is of central importance, on its own, it is unable to provide a sufficient means of survival in rural areas. ODI (2000) observes that the tendency for rural fisherfolks to engage in multiple occupations is a remarkable trait, but few attempts have been made to link this behavior, in a systematic way, to rural poverty-reduction policies. In the past, it has often been assumed that farm output growth would create plentiful non-farm income-earning opportunities in the rural economy via linkage effects. However, in the opinion of DFID (2000), this is no longer tenable for

many rural poor families; farming, on its own, is unable to provide a sufficient means of survival. They also yield gains of new technology, display sign of levelling off, particularly in those regions where they were most dramatic in the past.

Empirical evidence from different locations suggests that rural fisherfolks do engage in multiple activities and rely on diversified income portfolio (ODI, 2000). UNCED (2000) affirms that the economic, social and environmental functions of securing access to capital assets provides not only the means for the rural poor to improve their livelihoods, but can also increase aggregate food supplies, raise rural employment, foster the uptake of more sustainable agriculture and non-agricultural practices. FAO (1993) estimated that each fisherman's job creates two other jobs in processing or distribution line. There has been an increased recognition among researchers in the past that Africans diversify their livelihood activities, including on-farm (crop, livestock, fisheries) and off-farm activities for a sustainable livelihood (Ellis, 1998; 2000a; Bryceson, 2002). Barrett, *et al.* (2001a) reported that exploiting these off-farm opportunities could offer a pathway out of poverty for the rural poor.

2.7 Reasons for livelihood diversification

According to ODI (2003), households adopt diversified portfolios of activities for one or more of the following reasons:

a) **Spreading of risks**

Working in different activities helps to spread risk and manage uncertainty, provided that these do not rely on the same resources, markets, and so on. The benefits of specialization and economies of scale in one activity may be lost, but diversification makes total income more predictable. Even better-off households may like to reduce the degree of risk they encounter by complementing high return but high-risk activities with those that are low risk

and low return (ODI, 2003). The risky nature of agriculture helps explain the high levels of diversification in rural areas.

b) **Coping with insufficiency**

Diverse activities may be undertaken as an ex-post coping response to shortcomings in other activities. A failed harvest owing to drought or pests, loss of job or the need to pay emergency medical or funeral bills can drive households into pursuing other activities.

c) **Seasonality**

Some primary activities, such as crop farming or gathering of fruit nuts, and mushrooms depend on the weather and the seasons. Some manufacturing may also be seasonal, for example, when crafts are produced for particular festivals (ODI, 2003). Undertaking different activities in the off-season, no matter if they produce lower returns than the main activities, is preferable to outright unemployment.

d) **Compensating for failures in credit markets**

When a favoured activity requires working capital but people have no access to ready credit or have it only on exorbitant terms. They may undertake some other activities to generate cash to pay for the inputs (ODI, 2003). For example, net and trap makers may work on farm just before the main fishing season to finance the purchase of material in order to make nets of the main fishing season.

e) **Gradual transition to new activities**

Change to new activities with higher returns may be incremental, particularly if the new occupation is untested. The new activity is adopted as an addition to the household portfolio rather than a substitute for existing activities (ODI, 2003). Sudden and dramatic changes in livelihood (for example from farming to migration) are only likely when driven by necessity (for example to pay off a debt). Over time, if high returns prove stable, it may become an area of specialization.

f) **Building on complementary activities**

Some diversified activities may build on existing skills, experience and information (ODI, 2003). Urban contracts made during urban work may facilitate trade. Blacksmiths may move to repair work, barbers set up hairdressing salons and tailors enter the cloth trade. In such cases, change is path-dependent, in that it depends on previous conditions and experience.

2.8 Concept of diversification

2.8.1 Definition and associated dimensions

Diversification is the process by which a household increases the diversity of its income-generating activities (Ellis, 2000a). Recent studies have drawn attention to the enormous diversification of livelihood strategies at every level – within geographic regions, across sectors, within households and over time. Although farming is still an important activity, it is unable to provide a sufficient means of survival in rural areas. The diversification of livelihood strategies is a rapid process and shows no signs of abating (FAO, 2004). In the late 1980s and the early 1990s, research in Southern Africa estimated that 40% of rural household income was derived from non-farm sources (Ellis, 1998; Reardon, 1998). Research in the late 1990s has estimated that this figure is now 55-80% and is proceeding apace. In South Asia, roughly 60% of rural household income is from non-farm sources (Ellis, 1999).

Livelihood diversification results in complex interactions of poverty, income distribution, farm productivity, environmental conservation and gender relations that are not straightforward and sometimes counter-intuitive and can be contradictory between alternative pieces of case study evidence (Ellis, 1999). The declining productivity of natural resources has also been isolated as a key factor pushing people out of agriculture and into non-farm based activities (Bryceson, 2000). Further trends that can be isolated for a thumb-nail sketch

are that it is often the very poor and the relatively rich who, for different reasons, are most prone to diversify their livelihood strategies. The purpose of diversification is thus to develop portfolios of income-generating activities with low covariate risk among their components (Hazell and Norton, 1985; Ellis 2000a, 2000b). Most studies recognize the benefits of diversification as a means to achieve increased income and livelihood security. In particular, Reardon et al (1992), Carter and May (1999) and Ellis (2000b) emphasize the role of flexible government schemes and policies in promoting diversification, such as the removal of financial, legal and fiscal boundaries (such as market access, transportation and commodity taxes) to uptake of new activities, while taking into account regional/local specificities and households' motives for diversifying their income sources.

A distinction of relevance in the literature on diversification is that between coping and adapting. Coping is a short-term response (or *ex-post*) to decreasing income or food supply. Adapting, on the other hand, is a gradual and long-term response used to buffer the household against future potential shocks and changes, usually classified as a permanent *ex-ante* strategy (Davies, 1993). Risk being the decision-maker's "subjective perception of uncertainty" (Kostov and Lingard 2001) and uncertainty being a large contributor to household vulnerability imply that diversification may be adopted as an *ex-ante* strategy, by choice (Reardon et al, 1992, Valdivia *et al*. 1996; Ellis, 2000b), allowing households to better cope with unforeseen shocks, adverse events, trends, and seasonality (Chambers, 1983, Dercon 2001, Alwang et al., 2002).

The outcome of a diversification process is a larger number of income-generating activities for an individual, household, local or national economy. As such, non-farm rural employment, when added to an existing portfolio of activities, is considered a vector of economic growth through the creation of linkages for inputs, outputs and consumption goods (Start 2001), raising incomes and efficiency. The pattern of diversification and changing

income levels indicates that agriculture is not a path out of poverty in many areas. In a case study of a cocoa production area in Nigeria, for example, household rural non-farm income rose on average from 33% in the mid-1980s to 57% in 1997, with the poorest households showing the strongest move over the period (Mustapha, 1999). Livelihood diversification is not synonymous with income diversification but not all economic studies of diversification focus on different income sources and their relationship to income levels and assets. Income diversification can be defined as the composition of household incomes at a given instant in time (Start, 2001).

Livelihood strategies are, therefore, likely to be influenced by relative income levels, particularly the number of options that become available to different income classes (Ellis, 1999).

2.8.2 Nuances of diversification- diversification versus diversity

The outcome of a diversification process is a larger number of income-generating activities for an individual, household, local or national economy. At local and national economy levels, increase of income-generating activities in the rural non-farm economy raises the question of whether rural non-farm employment is an accumulation strategy providing opportunities for those choosing to positively adapt, or a means by which the labour displaced from traditional activities is absorbed (Reardon *et al*. 1992; Ellis 1998). Despite the importance of agriculture or fisheries in rural areas, the former involves higher capitalization, productivity and stronger demand than the latter. As such, non-farm rural employment, when added to an existing portfolio of activities, is considered a vector of economic growth through the creation of linkages for inputs, outputs and consumption goods (Start 2001), raising incomes and efficiency. At the household level, by relating outcomes to the "diversity versus (or) diversification" question, one may ask whether households with

more than one activity outside the agricultural/fisheries sector could be considered as less poor, less vulnerable, or whether it is the fact that households are able to continuously change and adapt their portfolio of activities that makes them less poor and less vulnerable.

2.8.3 Specialization within diversification

Specialization is not necessarily antagonistic to diversification in a livelihood context. A household may indeed hold a portfolio of specialized activities carried out by individual family members (Ellis 2000a), as a result of a diversification strategy. Results of a diversification strategy can be evident at the farm level through "on-farm diversity" (when a number of more or less specialized crop and livestock production activities are carried out on the household farm land) or when farming activities are complemented by specialized non-farm activities in the rural economy. Similarly, in the case of marine fishing, "within fishing" specialization occurs (fishing with different gears, adapted to target species). Diversification in specialized activities "outside fishing", such as agriculture or rural service-type enterprises alongside traditional fishing pursuits, is also encountered (Coulthard, 2005). In the case of inland fishing, Smith *et al*., (2005) contend that specialization was relatively rare because of limits of scale, such as fishing space, effective demand and labour needs, and under-investment, although it was noted that large water bodies provide scope for specialization and that some wealthier households are more likely to invest in specialized assets (for the market). The case of small-scale fisheries, is supported by Salas and Gaertner (2004), who found that being "generalists" allowed small-scale fishers to switch among target species with changes in their circumstances.

2.8.4 Diversification does not mean substitution

In the same way intensification does not need to follow specialization, diversification does not always mean substitution. In Asia and Africa, it was observed that rural people do not specialize in one activity to the exclusion of all others, but rather increase their portfolio of economic pursuits to encompass a wider range of productive areas (Hussein and Nelson 1998). Consequently, the term "alternative" livelihood activity should be used cautiously, depending on whether a new household enterprise replaces an existing one, or complements it, either through integration (for example, the backyard processing of a home-grown product) or through simple addition to the existing household activity portfolio. Given the range of nuances and associated dimensions to "diversification", how should it be understood in application to fishing communities, and what form of diversification is prevalent among them? For example, should fishing-associated activities, ranging from boat-building to fish-frying or ice-making, be understood as part of diversification processes, or should diversification be understood as doing something completely unrelated to the original activity engaged in (for example, bicycle maintenance for a fisherman)? As explored in the next section, many factors, often context-specific, influence the process of diversification, both within and outside fishing.

2.9 Determinants of diversification

The determinants of diversification have been reported in the literature, although frequently focusing on farmers, and have shown consistency across time and space (Barrett *et al.* 2001). In a general context, many factors, of a "pull" (positive) or "push" (negative) nature, influence diversification and its outcomes.

It is important to note that these factors are usually combined. For example, linking wealth and risk management strategies, Valdivia *et al.* (1996) showed that households with more liquid assets (cattle and small livestock) were, in principle, better endowed to survive shocks, and, therefore, less likely to diversify their income sources. In practice, however, they were not less diversified than those with no or small livestock holdings, but had the financial capacity for self-investment allowing them to engage in higher-income-higher-risk activities (Dercon 1998).

In the case of poor households, willingness to avoid risk stemmed from the "non-separability between current consumption and future productive capacity in the form of subsistence requirements" (Zimmerman and Carter, 1999). As a result, poor households adopted low-risk-low-return activities (Dercon, 1998).

Migration and mobility are the geographical component of diversification. In the context of fishing, variations in catches and fish stocks may result in two different adaptation strategies. For migrant fishers, the response strategy to mitigate declines in catches will be to migrate to richer fishing grounds on a seasonal basis. This pattern is found amongst Ghanaian fishermen who travel much of the West African coast in search of fish (Fregene, 2007). However, in a similar study in Nigeria, this form of migration is also conditional to the financial resources of the fishermen and their facilities (for example canoes, speed boats and bicycles) (Fatunla, 1996). For settled fishers' population, migration can also be a solution, though, instead of chasing fish, they will engage in alternative non-fishing activities on nearby land, move to urban centres, or temporarily travel to nearby villages for a few days to market fish and engage in other businesses before returning home (Fatunla, 1996). Increased population pressure result in migration to coastal areas for fishing. This has also become a livelihood alternative, driven mainly by family connections (Kramer *et al.* 2002). In contrast,

income opportunities can drive migrants to find jobs in urban coastal centres as crew members on industrial fishing fleets.

Inadequate knowledge and skills obstruct access to alternative employment niches, especially in the non-farm sector (Dercon 1998; Barrett *et al.*, 2001). In the case of Nigerian fishing communities, children's school attendance is particularly challenged by the migrating patterns of fishing families, as well as high cost of education, lack of transport facilities and high but seasonal profitability of the fishing activity (Fatunla, 1996). Undoubtedly, unless addressed through more flexible literacy and education schemes for fishing households, this will impact on the building of human capital, with negative consequences on individuals' capacity, not only to uptake future employment opportunities within or outside of the fisheries sector, but also to engage more fully in community life as citizens (SFLP 2005; FAO 2006a).

Gender is another variable influencing the type of income-generating activities engaged in. Studies in fishing communities of Tanzania and Kenya confirmed that, whilst fishing was not an important activity for women's groups, fish and trading was an important activity for them and is second to farming (MRAG, 2003). In Benin and Congo, according to Choo *et al.* (2006), there is a higher degree of diversification in income-generating activities for women. Choo *et al.* (2006) confirmed that men's activities are halted when fish catch is low. Women continue fish trade using imported frozen fish or are involved in often low value-adding agro-processing activities, increase gathering and selling of wild fruits and vegetables, and intensify their agricultural activities. In Burkina Faso on Lake Bagré, women sustain income at the household level through activities like petty trading, which gives low but stable returns unaffected by seasonality (Kabore 2006).

However, in Nigeria, Fatunla (1996) found that women engaged in occupation similar to their husband's occupation. The common occupation in the study areas are fishing, trading

and mat weaving. This shows that wives and female relatives of fishermen are not necessarily always involved in post-harvest activities, as has traditionally been assumed to be the case (Choo *et al.,* 2006; FAO/SFLP 2006). This also provides supplementary evidence of the range of income streams available to fishing households to which both men and women contribute. It reinforces the relevance of considering the household as the smallest unit when investigating diversification to capture it adequately and go beyond generalizations and stereotypes.

Paris, (2002) poor households with low assets do not have access to credit facility. This has been identified as an important constraint to livelihood diversification in fishing communities. An example of corrective measure was promoted by the SFLP, in collaboration with a national credit union that developed pro-poor products, such as credit for procurement of smoking ovens and drying facilities.

Dis-functioning financial markets also hamper diversification opportunities within the sector or into non-farm activities (Barrett *et al.,* 2001). Fishing households, who lack collateral in the form of land could not obtain loan from the bank for fishing gear upgrades or improvements in a context of over-exploitation of fisheries resources. Conditions for loan procurement are not always suited to fishers' conditions in their terms of lending. As a consequence, most loans are obtained through informal channels (Ministry of Fisheries and The World Bank, 2005). This is also the case for West and Central Africa (Verstralen, 2005).

The allocation of labour between farming and a non-farm activity is also a function of prices, wages, household wealth, working capacity and other characteristics such as varying returns to productive assets (for example labour or land) and market dysfunctions (for example credit or land) (Reardon *et al*. 1992; Barrett *et al*. 2001). Opportunity cost of labour, associated with access to the fishery and factors indirectly 'trapping' people into fishing (for

example specialized investment, as in the example of Coulthard's (2005) can also confine households to dependence on fishing (Smith *et al*., 2005).

2.10 Role of fisheries in the Nigerian economy

The fisheries subsector is important in the Nigerian economy. It has maintained a steady contribution to total GDP between the year 2000 and 2004 at the rate of 1.2%, 1.6%, 1.7% 1.5% and 1.55% respectively (Omolayo *et al.*, 2008). This translates to about 5% of agricultural GDP, which itself contributed between 30 and 35 percent in the same period.

The contribution of fisheries is significant, in the context of other social, economic and cultural effects. Official figures put fisheries GDP (current basic prices) at N 106.47 billion in 2003 and N 128.29 billion in 2004. (Omolayo *et al.*, 2008). The contribution of the fisheries sub-sector to the growth of the Nigerian economy cannot be ignored. It helps to supply fishmeal, protein and macronutrients required for the general welfare and healthy life of people; other areas of contribution include income and employment generation, rural development, poverty alleviation, food security, manpower development and foreign exchange earnings (FAO, 2000).

(a) Food security

Fish is said to contribute about 40% of the total dietary protein consumption in Nigeria but would be as high as 80% in coastal and riverine communities (FAO, 2000). Fish is the preferred source of animal protein, with balanced amino acid and essential minerals for healthy human growth. It has been found helpful in the management of hypertension, with positive effects on the developments of the brain and the entire nervous system, thereby enhancing learning functions (Areola, 2007). Fish oil is also good for bone development, good skin and eyesight. Fish also helps to resist the early occurrence and spread of cancers and helps to combat the dreaded HIV/AIDS and diabetes (FAO, 2007).

According to Adebayo and Anyanwu 2013, the trend of aquaculture production in Nigeria and its implication for food security revealed that capture fish will continue to provide the bulk of fish food supply in Nigeria as the bulk of fish being consumed still comes from the artisanal sector. Presently in Nigeria, fish production from capture cannot supply the demand of fish by the large population. Adeoye, *et al,* 2012 estimated that Nigeria will need 4.84 million tons of fish consumption by the year 2025.

Fish is available in the market in various forms, as fresh, smoked, dried, canned, chilled or frozen. It is relatively cheap compared with other products, like meat and egg. This accounts for its preference and high demand in the market (Areola, 2007).

(b) **Income and employment generation**

The fisheries industry is a major employer of labour accounting for 80% of those living within the riverine/coastal areas of the country (FAO, 2000; Areola, 2007). Employment opportunities in the fisheries subsector can be considered from the direct and indirect employment, which it generates. These include those engaged in fish production, fisheries education, consultancy services, processing of fish and fishery products, fish transport, net repair and fabrication, outboard engine repair and maintenance, vessel repair, cold storage operations, and manufacturer of feeds (FAO, 2000).

(c) **Foreign exchange earnings**

About 90% of fish produced in Nigeria is sold in the local market as cheap sources of animal protein, while the rest goes to the international market to generate foreign exchange. Exportation of shrimps and other fishery products, such as cuttlefish, crab-claw, shark fin, fish bladders and ornamental fish, generates foreign exchange for the nation (Areola, 2007). Fisheries occupy a unique position in the agricultural sector of the Nigerian economy. In terms of Gross Domestic Products (GDP), the fisheries sub –sector has recorded the fastest growth rate in agriculture to the GDP. The contribution of fisheries sub-sector to GDP at

2001 current factor cost rose from N76.76 billion to N162.61 billion in 2005(CBN report, 2005)

2.11 Nigerian fisheries and state of fish product in Nigeria

In Nigeria, the demand and supply of fish are at disparity, with demand exceeding supply. This is not unconnected with the ever-increasing population and poor management of the fisheries resources (Ajana, 2002). The sources of domestic fish production are captured fisheries (from rivers, lake and seas) and aquaculture. However, for obvious biological and technical reasons like infertile coastal waters, narrow continental shelf, poorly managed lake and river fisheries among others, Nigeria's capture fisheries cannot supply the present and future fish demand, hence, the need to intensify aquaculture to bridge the gap by augmenting fish capture from the wild (FAO, 2000).

Daw *et al.* (2009) note that fish are major sources of livelihood, providing direct and indirect employment to over 200 million people of the world, the majority of whom live in the developing world. Historically, living aquatic resources have provided livelihoods and revenue for Nigerians, particularly, those living along the riverine and coastal areas (Moses, 1990; Ipinmoroti, 2012). Federal Department of Fisheries (2009) asserts that, in the agricultural sector of the Nigerian economy, which employs about 70% of the active labour force, fish occupies a unique position, in that it is the cheapest source of animal protein consumed by the average Nigerian, accounting for up to 50% of the total animal protein intake. Fisheries involve many activities and processes, such as catching (or harvesting), processing, preservation, distribution and marketing of the landings (Moses, 2002; Omorinkoba *et al.*, 2011). It involves all the processes of taking the fish from the water and to the final consumer. Hence, fishing can be defined as the hunting for and or catching of fish or other aquatic resources with the aid of some implements. The fishing activity in the Nigerian

marine subsector is categorized into offshore, inshore industrial, coastal and brackish water artisanal fisheries (Etim, 2010).

The total fish demand for Nigeria based on the 2014 population estimate of 180 million people is 3.32 metric tons. The domestic fish production from aquaculture, artisanal and industrial fisheries for 2014 is 1.123million metric tons (Nigerian fisheries statistics, 2016). In 2014, fisheries contributed 0.48% to the agricultural GDP and contribution of agriculture to GDP (2014) was 20.24% (Nigerian fisheries statistics, 2016.)

FAO (2008) estimated the projected population and fish demand/ supply from year 2000 to year 2020 with the domestic fish production for the year 2016 put at 1.12 million tons with a shortfall of 0.20 million tons (Table 2).

2.12 Lakes and reservoirs fisheries

Nigeria is blessed with numerous water bodies, ranging from the marine (Atlantic Ocean), to the brackish waters (deltaic rivers and estuaries) to inland freshwaters (rivers, streams and lakes). Omorinkoba *et al*. (2011) avers that the inland water bodies in Nigeria are estimated at over 14 million hectares that are being fished predominantly by artisanal fishermen. The creation of man-made lakes in Nigeria using modern technology to exploit river basin resources is relatively new. The construction of Kanji Lake, done between 1964 and 1968, was the first. It was followed by the construction of Asejire reservoir in 1969; while other lakes, such as Tiga (1974), Goronyo (1984), Jebbba(1985) and Shiroro(1995), followed in that same order (Greboval *et al*, 1994). Recently, considerable interest had been shown in the relevance of information to the productivity, development and management of aquatic environment (Mustapha, 2002). Lakes and reservoirs support very important fisheries that provide a livelihood to millions of people and contribute a significant source of animal protein.

Greboval *et al* (1994) avers that the fisheries resources of East African lakes have been developed, which has significantly increased the rate of exploitation. However, it was observed that, while some stocks of East African lakes remain largely under-exploited, many are now showing definite signs of over-exploitation. According to Raynolds and Greboval (1998), the fisheries of Lake Victoria have undergone very substantial changes, increased fishing intensity and stress that have arisen from the introduction of exotic species. Table 3 shows the major lakes and reservoirs in Nigeria.

Table 2. Projected Human Population, Fish Demand and Supply in Nigeria (2000–2020)

Year	Population (Million)	Fish Demand (Million Tons)	Fish Supply (Million Tons)	Short fall (Million Tons)
2000	114.4	1,430.00	467.098	962.902
2001	117.6	1,470.00	480.163	984.836
2002	121	1,412.50	507.928	1,004.57
2003	124.4	1,555.00	522.627	1,063.08
2004	128	1,600.00	536.917	1,063.07
2005	131.5	1,643.75	552.433	1,091.32
2006	135.3	1,691.25	567.948	1,23.301
2007	139.1	1,732.75	583.872	1,154.87
2008	143	1,782.30	600.612	1,186.89
2009	147.1	1,838.75	617.353	1,221.40
2010	151.2	1,810.00	634.5	1,255.44
2011	155.5	1,943.75	652.606	1,291.14
2012	160	2,000.00	689.958	1,328.51
2013	164	2,113.75	709.683	1,365.04
2014	169.1	2,175.00	730.248	1,404.07
2015	174	2,055.00	671.492	1,444.75
2016	178.8	2,195.5	703.532	1,491.97
2017	183.3	2,298.4	763.381	1,535.02
2018	189	2,421.25	771.982	1,649.27
2019	194.4	2,596.7	792.546	1,804.15
2020	199.9	2,624.5	799.276	1,824.72

Source: (FDF, 2008)

Table 3: Major lakes and reservoirs in Nigeria

S/N	Name	Types of water body	Surface Area (ha)	Year of construction/commissioning
i.	Kanji Lake	Man-made	127,000	1968
ii.	Jebba Lake	Man-made	35,000	1985
iii.	Shiroro Lake	Man-made	31,200	1990
iv.	Goronyo Lake	Man-made	20,000	1984
v.	Tiga Lake	Man-made	17,000	1974
Vi	Chalawa Gorge	Man-made	10,000	1992
vii.	Dadin Kowa	Man-made	29,000	1984
viii.	Kiri Lake	Man-made	11,500	1982
ix.	Bakolori	Man-made	18,000	1978
x.	Zobe	Man-made	5,000	1983
xi.	Oyan	Man-made	4,000	1983
xii.	Ikere Gorge	Man-made		1983

Source: "Niger Dams Project", Encyclopedia Britannica online.

https://en.wikipedia.org/wiki/listofdamsinnigeria

2.13 Importance of artisanal fishery

Artisanal fishery is a small scale fishery whose gear is generally simple and hand-operated (hooks, gillnets, traps and baskets) and its craft is simple and traditional (dug-out wooden canoes, bamboo rafts and small open fibre-glass boats).

Omorinkoba *et al.* (2011) define artisanal fisheries as small-scale fisheries where the fishers operate in small units. Moses (2002) and Onuoha, (2009) characterized artisanal fisheries as being;

(1) Labour intensive.

(2) Involves very low capital investment.

(3) Poorly developed infrastructural facilities, such as cold storage and processing plants

(4) Scattered fishing units in remote hardly accessible settlements, which makes evacuation, distribution and marketing of their products rather difficult.

Despite the aforementioned characteristics, artisanal fishery is one of the contributors to the national economy through the generation of foreign exchange for the nation (Ibrahim *et al*, 2009). It also provides relaxation as a hobby for some people in addition to the provision of valuable supply of animal protein to the increasing population.

Between 12 and 13 million registered fishermen are directly involved in the business of catching fish and this creates jobs for these people (Le Sann, 1998). Apart from catching fish, other jobs associated with artisanal fishery, including boat building, engine maintenance, production of fishing gears, fish processing, packaging, transportation and distribution of fish and fish products. FAO (1993) estimated that each fisherman's job creates two other jobs in processing or distribution.

In Nigeria, there are more than 6 million coastal and artisanal fisherfolks fishing the 46, 300km² of maritime area and 125,470.82km² of inland water bodies (Fregene, 2007). Faturoti, 2010 reported that artisanal fisheries in Nigeria provide more than 82%of the

domestic fish supply, giving livelihoods to one million fishermen and up to 5.8 million fisherfolks in the secondary sector.

2.14 Fresh water capture fishery

The riverine fish catch in the south western states of Nigeria is greatly diverse and comprises marine intrusive elements (Edward 2013). Fishery of economic importance includes *Malaperuru selectricus*, *Bagrus bayad*, and *Clarias* garienpinus. According to the list from the Statistics Unit of State Department Fisheries (SDF), landings by the artisanal fishers in the different fishing settlements also include crayfish, sole, tilapia and snakehead. Statistical data on catches landed at the different landing sites were lacking and even in the Statistics Unit of the SDF, very relevant information were still lacking.

Fresh water capture fishery is fishing in rivers, streams, lakes, and reservoirs, natural and artificial ponds. It is mainly artisanal fishing which involves the use of canoes that may be mechanized (using outboard engines) or non-mechanized (simply using paddles and poles to drive canoes). Other types of fishing gears include cast net, gill net, long line with baited hooks and traps (Omorinkoba *et al.*, 2011). Fishes caught in this system are mainly fresh water fishes. Table 4 presents some fresh water fish species and their indigenous names.

2.15 Preservation of fish

In the tropics, the quality of the flesh of a fish begins to deteriorate as soon as the fish dies. This is mainly due to bacteria action and biochemical changes in the fish and is catalyzed by the high temperature of the tropics (Moses, 2002). If fish is not quickly and properly preserved, quality product and heavy fish loss as well as widened the gap between supply and demand ensue (Ellis, 2000a). Fish can be preserved in the following ways:

Suppressing the activities of spoilage micro-organisms through application of heat at low temperature and/or chemical compound through smoke-drying and salting. Other methods include removal of water by solar, wood or wind energy.

Table 4: Example of fresh water fishes

Scientific Name	Yoruba Name
Malaperuru selectricus	*Ojiji*
Bagrus bayad	*Abori*
Oreochromis niloticus	*Epiya*
Chrysichtys nigrodigitatus	*Obokun*
Claria sanguillaris	*Aro*
Clarias garienpinus	*Aro*

Source: Falaye (2001)

Killing of the spoilage micro-organisms and enzymes by heat or irradiation and prevention of contamination. Fish deteriorates very rapidly, it is necessary to prevent the various stages of deterioration so as to make it safe for human consumption. Preservation techniques that are designed to prevent deteriorative process include canning, freezing, drying, smoking and solute treatment, particularly salting (Ellis, 2000a).

2.16 Potential contributions of improved fishing technology to livelihood

Numerous threats to coastal and marine environment affect the lives and working conditions of fishermen in fishing communities (Moses, 1983). These include natural calamities, destruction of mangroves, water pollution, irresponsible tourism, destructive fishing techniques, privatization of fisheries resources and deforestation. All of these, in one way or the other, may displace fishing communities, affect fish workers' access to resources and or Damage the resources themselves. They also eliminate jobs security, income and livelihood. (ICSF, 1994).

According to DFID (2001), technology is the physical infrastructure, machinery and equipment and the associated knowledge and skills, and the capacity to organize and use all of these. It is a vital contribution to people's livelihood. Technology is also crucial to avoiding environmental damage and waste caused by certain fishing practices. Global discarded by-catch of fish and other marine organisms is currently estimated at more than 20 million tons a year (Christopher *et al.,* 2003). Fishing gear can be modified with the use of by-catch reduction devices (BCRDs) to lower the amount of unintended catch. The use of dragged gear/bottom trawling can never really be selective. It catches unwanted species along with immature fishes and also inflicts considerable damage to the seabed and associated fish habitat. Some fish worker's organizations have called for a total ban on trawling (at least in certain seas) because of the evidence of negative social and economic impacts of this

technique on millions of small-scale fish-workers worldwide, particularly in tropical multi-species fisheries of developing countries (ICSF, 1994).

The development of fishing methods would not have been possible without a parallel development of more specialized fishing vessels from rafts and rowing boats to motor vessels with increasing power. In the modernized artisanal sector, petrol- kerosene-diesel-powered outboard motors are preferred because of their high productivity.

New and improved technologies which women and men use in ways which are appropriate to their context and needs can:

- expand and improve their livelihood option increase their productivity and incomes;
- improves the quality of the goods and services that they use; and
- enhance the quality of their lives.

2.17 Fishing gear

The fishing gears being used by fishermen in Nigeria inland waters, as documented by Omorinkoba *et al.* (2011) and Moses (1983), vary from the transitional type, such as non-return value trap in the streams and rivers to modern type, like synthetic gill nets on the reservoirs and lakes. However, the international standard statistical classification of fishing gear based on fishing methods and operation recognises as static/passive gears and mobile/active gears (Brandt, 1984).

Passive gears are sometimes referred to as slow gears. They are set and left under water for a certain time after which they should be retrieved as the level of efficiency reduces. Passive gears must be more or less visible except there is an entangling thing like food. Fish has to come in voluntarily. They include traps, set net, gill nets, pots and some types of fishing hooks. Much experience is needed to construct a passive gear in such a manner that the prey will accept the gear and not be frightened by its construction, colour,

visibility or smell. Passive gears have little or no fish selectivity in terms of species, size or sex. Limited energy is required in setting this gear (Andrew, 1984).

Active gears depend on fish response to how gears work in relation to fish behaviour. It does not have to be invisible, rarely reaches saturation time and catch is proportional to fishing time. Active gear can be designed in relation to size, age, sex and position of fish in water body (Conover and Munch, 2002). Active gear requires more energy when setting them. Active gears include trawl nets and cast nets. The success of this gear depends more or less upon man's skill or perseverance. The fisherman can influence the success of an active gear by leading the gear into the path of the fish or by driving the fish into it.

Fishing equipment and methods improved through the centuries. Mechanization came to fishing in the 19th century (Clark, 2006). The steamer replaced sailing boats in sea fisheries during the final quarter of that century and was replaced in turn by motor vessels. Small fishing boats became motorized at the beginning of the 20th century. In the 1940s, instrumentations such as the echo sounder (for vertical searching) and, later, sonar (for horizontal searching) were introduced to fisheries (Masatsume, 1998).

CHAPTER THREE

THEORETICAL AND CONCEPTUAL FRAMEWORK

3.1 Theoretical framework

The theoretical background for this study is based upon a review of the following theories and models:

- The household production model
- Sustainable livelihood theory
- Positive attributes of livelihood model
- Perspective theories of livelihood

3.1.1 Household production model

This model claims that the production capabilities of rural agricultural households are derived from production resources at both level of production and the levels of exchange. At the level of production, the production assets are resources like land, family labour, water bodies, fishing equipment and so on. These are internal resources which the household commands; they determine the production potential of the household. On the other hand, production services are not intrinsic to the households but are available at the level of exchange from sources outside the village. Fishing household production is increased with these production services which are sourced externally, like the use of technology, credit, extension information, markets, and transport, which are channelled by both private and public organizations and require the household to claim or obtain access to them, usually with money, in the wider social and institutional settings. Chamber and Conway (1992) argue in support of this same model but give a different nomenclature for these production resources as tangible assets (production resources) and intangible assets (production services).

The implication of this theory is that production potential will still remain idle or underutilized until relevant production services are injected into them, which will definitely increase production and improve farmers' income through the availability of appropriate marketing infrastructure for the produce. All of these will directly improve the livelihood of fisherfolks.

3.1.2 Sustainable livelihood theory

This approach attempts to link the micro-and macro-level contents in which households seek their livelihood (Carney, 1998; DFID, 2000). The approach aims to be people-centered, holistic and dynamic. Households are seen to possess five sets of livelihood assets essential to their livelihood strategies, human capital, natural capital, financial capital, social capital and political environment through a set of livelihood strategies designed to strengthen their well-being. The contents in which households operate involve a number of threats that render them vulnerable to negative livelihood outcomes. The threats can include periodic droughts, floods, diseases, seasonal change shocks, economic shocks, conflict and civil unrest, as well as the illness and death of household members. Households are viewed as being sustainable if they can adjust to threats without compromising their future ability to survive shocks to their livelihoods. The sustainable livelihood framework is summarized in Figure 1.

The sustainable livelihood (SL) theory and framework was developed within research institutes, such as the Institute of Development Studies; NGOs (for example Care and Oxfam); and donors, such as the Department for International Development and the United Nations Development Program. Whilst the sustainable livelihood framework is constantly evolving, experimental in nature and the product of institutional collaboration, it is already widely used in a number of influential international development agencies, informing

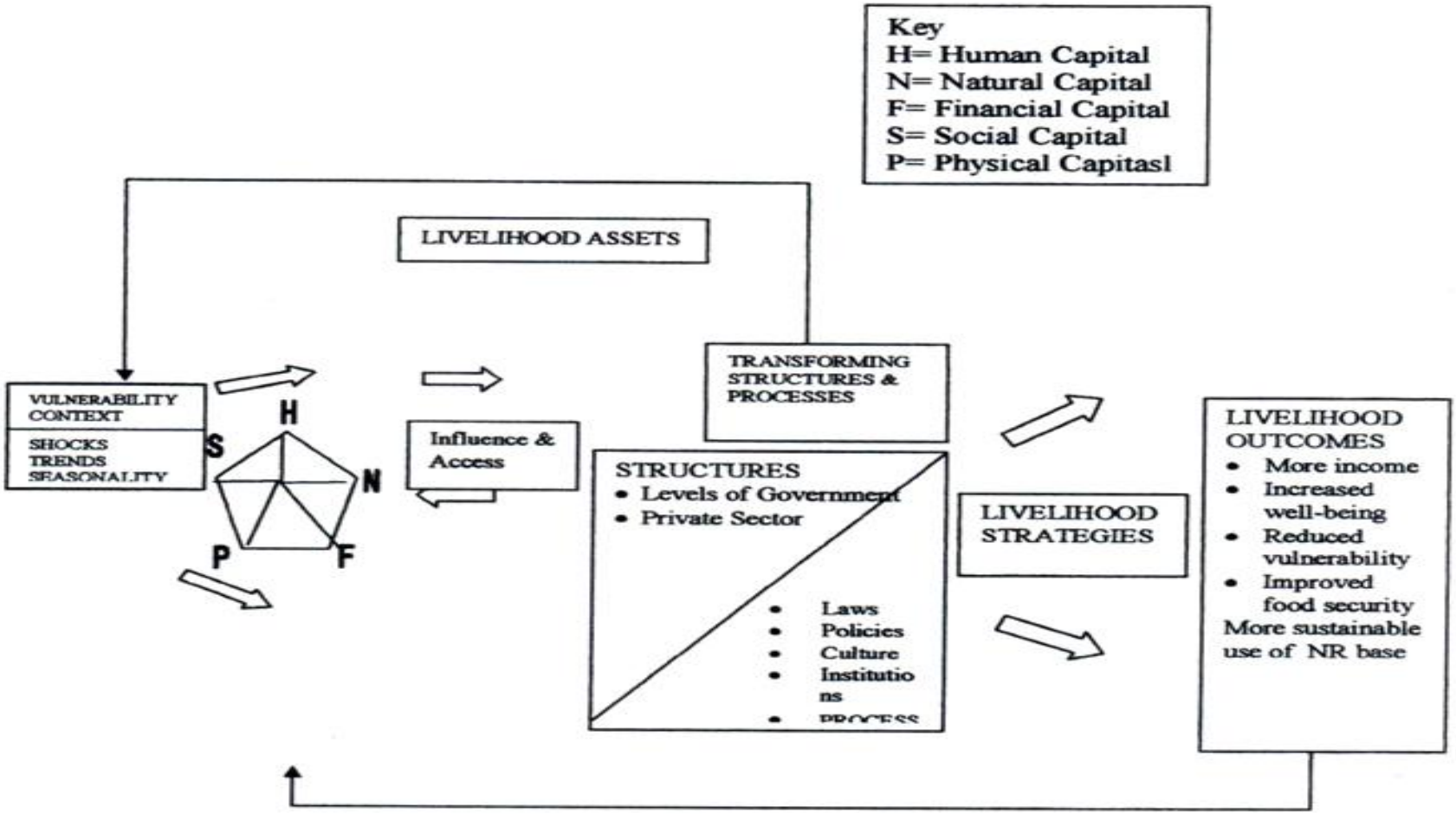

Figure 1: Sustainable livelihood framework

Source: DFID (2000).

programme content, assessment parameters and goal formation (Carney et al., 1999). It has been used by the United Nations' Food and Agriculture Organization (FAO), in its strategic framework (Altarelli and Carloni, 2000); by CARE, in its 'household livelihood security' programme (Drinkwater and Rusinow, 1999); by the UNDP and Oxfam (Neefjes, 1999). In the UK, the Department for International Development (DFID) uses SL approaches in the context of the commitment made in the Government White Papers on International Development (DFID 2000) to work towards the International Development Target of eliminating poverty by 2015.

3.1.3 Positive attributes of livelihood model

The positive poverty and vulnerability reduction attributes of livelihood diversification are summarized in Figure 2. Livelihood diversification is both partly predicated on and itself increases human capital in terms of experience, education, skills and willingness to innovate (Ellis, 2000).

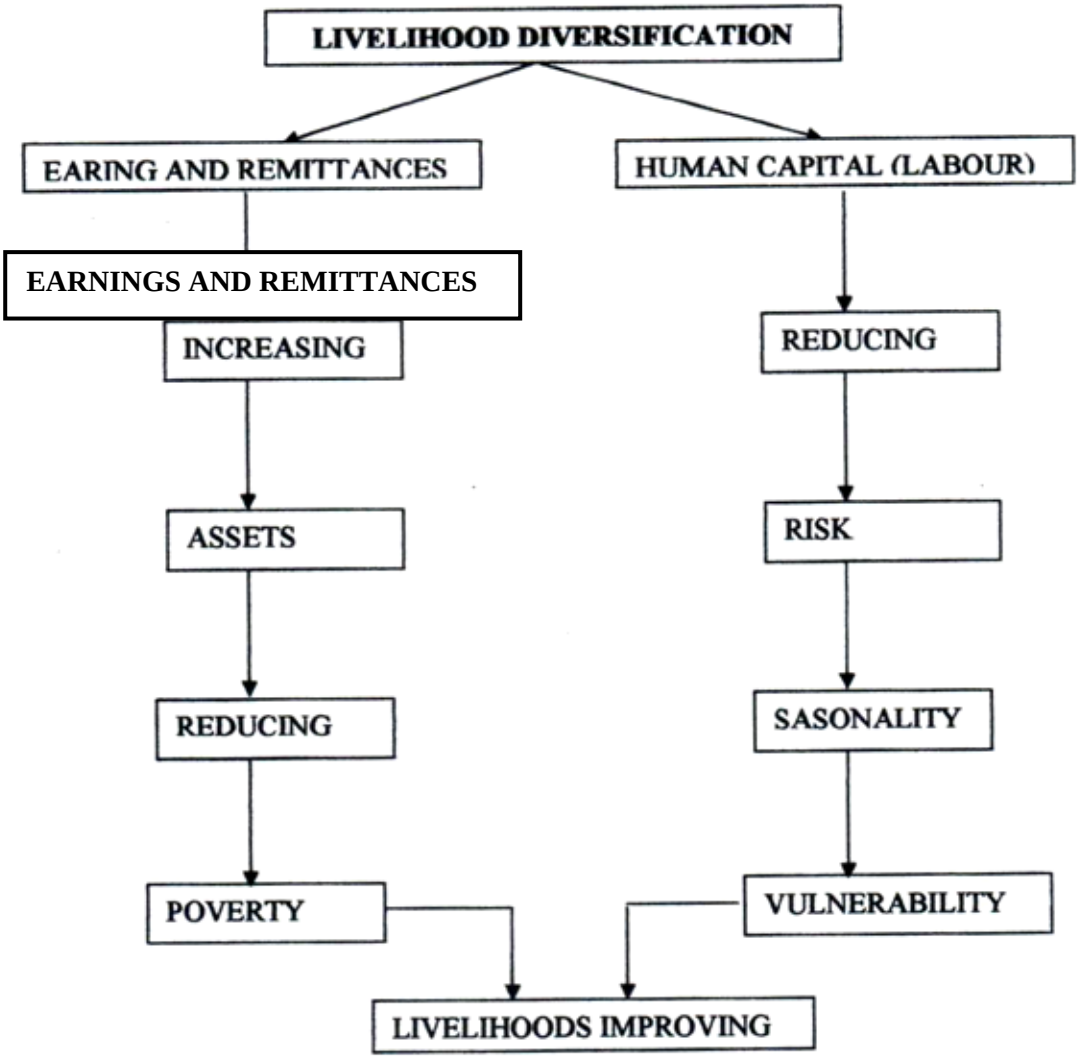

Figure 2: Positive Attributes of Livelihood Diversification

Source: Ellis (2000b), adapted from DFID (1998)

Livelihood diversification generates earnings and remittances that tend to alter significantly the options open to the household by providing it with cash resources that can be flexibly deployed. These factors contribute to lessening vulnerability by ameliorating risk and reducing the adverse consumption effect of seasonality. They also result in increasing assets beyond human capital, thereby permitting poverty to be reduced. In general, livelihood diversification improves livelihoods. Its failure to do so can often be traced to the adverse institutional environment that penalizes people on the move.

3.1.4 Perspective theory of livelihoods

Livelihood approaches are conceptual frameworks that promote people-centred development. They are responsive and participatory, and they favour multidisciplinary and multi-level development interactions (Carney 2002). Livelihood approaches generate a deeper understanding of the wide range of livelihood strategies pursued by the people that poverty reduction measures address (DFID, 2000).

Livelihood approaches acknowledge the connections and interactions of the livelihood of individuals, households and or communities with the larger socio-economic, cultural and political context at the micro and macro levels (Geiser *et al.*, 2011a). Livelihood approaches help to reconcile a holistic perception of sustainable livelihood with the operational need for focused development interventions. In other words, they give access to the complexity of poverty and livelihood while acknowledging the need to reduce complexity in a responsible way for drafting policies and designing programmes and projects (DFID, 2004).

3.1.4.1 Features of the perspective theory

Ashley and Carney (1999) and Carney (2002) outline the core principles underlying the perspective theory. These are five basic focal features that give a holistic approach to sustainable livelihood. These are discussed below:

People-centred

Sustainable poverty reduction will be achieved only if external support focuses on what matters to people and works with them in a way that is congruent with current livelihood strategies, social environment and ability to adapt, that is, focusing on what matters to people.

Responsive and participatory

Poor people themselves must be key actors in identifying and addressing livelihood priorities. Development agents need processes that enable them to listen and respond to the poor, that is, poor people themselves must be key actors.

Multi-level

Poverty reduction is an enormous challenge that will only be achieved at multiple levels, ensuring that micro-level activity informs development of policy and an effective enabling environment, and that macro-level structures and process support people to build upon their own strength.

Conducted in partnership

This simply involves both public and private sectors. There are four key dimensions to sustainability – economic, institutional, social and environmental sustainability. All are important and balance must be found between them; that is, 'identify constraints and opportunities regardless of the sector, geographical space or level at which they occur.

Dynamic

External support must recognize the dynamic nature of livelihood strategies, respond flexibly to changes in people's situation, and develop longer-term commitments.

3.1.5 Concept of livelihood

Gainful employment is a necessary and an important indicator of a viable income generation to secure household needs. It must be sufficient to meet the needs of all the households. If the household is food-insecure as a result of engaging solely in agricultural and related activities, then the household needs to diversify into high-paying, non-farm jobs to improve household income (Sewanyana, 2002). The concept of a "livelihood" seeks to bring together the critical factors that affect the vulnerability or strength of individual or family's survival strategies. These are thought to comprise the assets possessed by people, activities in which they engage in order to generate an adequate standard of living and to satisfy other goals, such as risk-reduction, and factors that facilitate or inhibit different people from gaining access to any activities. These considerations result in the following definitions of a livelihood (Ellis, 2000). "A Livelihood comprises the assets (natural, physical, human, financial and social capital), the activities and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household".

The term livelihood attempts to capture not just what people do in order to make a living, but also the resources that provide them with the capability to build a satisfactory living, the risk factors that they must consider in managing their resources and the institutional and policy context that either helps or hinders them in their pursuit of a viable or improved living. Livelihood can be made up of a range of non-farm and on farm activities that together provide a variety of procurement strategies for food and cash (Frankenberg *et*

al., 2003). Livelihood activities may vary from one rural area to another, depending on the available resources, infrastructure and climatic conditions of the environment.

3.1.6 Conceptual framework

The conceptual framework for this study, as presented in Figure 3 is made up of the independent, intervening and dependent variables. The independent variables considered in this study were selected personal characteristics, livelihood assets, livelihood activities, source of information and constraints to the livelihood diversification of rural fisherfolks, while the dependent variables for the study was livelihood diversification of rural fisherfolks. The intervening variables were those which influenced other variables of the study. They were government policies, environmental factors, social conditions and development/ intervention programmes.

The conceptual orientation is based on the premise that selected personal characteristics of rural fisherfolks (such as age, educational attainment, marital status, family background) will influence livelihood assets of the rural fisherfolks (such as physical, natural, financial, social and human assets). The larger the family/household size, the higher the human capital. Also, the type of livelihood activities (fish-related and non-fish-related activities) engaged in by the rural fisherfolks will be influenced by the type of livelihood assets (natural financial, physical social and human assets) possessed by fisherfolks. The type of livelihood activities (fish-related and non-fish-related activities) of fisherfolks and their livelihood diversification will influence each other, making each high, medium or low. Conversely, their livelihood diversification in turn will determine the level of livelihood activities as well as the extent of livelihood diversification of fisherfolks (either high, medium or low). The sources of information and constraints will influence each other. The sources of information will influence the livelihood activities engaged in by fisherfolks as well as the

livelihood assets possessed by fisherfolks. The constraints faced by the rural fisherfolks will influence the type of information that they seek and the good information got will help them in solving their problems. The type of livelihood activities engaged in by the rural fisherfolks will determine their livelihood diversification (high, medium or low). The constraints faced by the rural fisherfolks will influence the extent of their livelihood diversification as high, medium or low. Consequently, the intervening variables, like government policies, environmental factors, socio-cultural factors, though outside the control of the researcher has an indirect relationship with the livelihood asset and livelihood diversification of the rural fisherfolks. The foregoing explanation is presented in Figure 3.

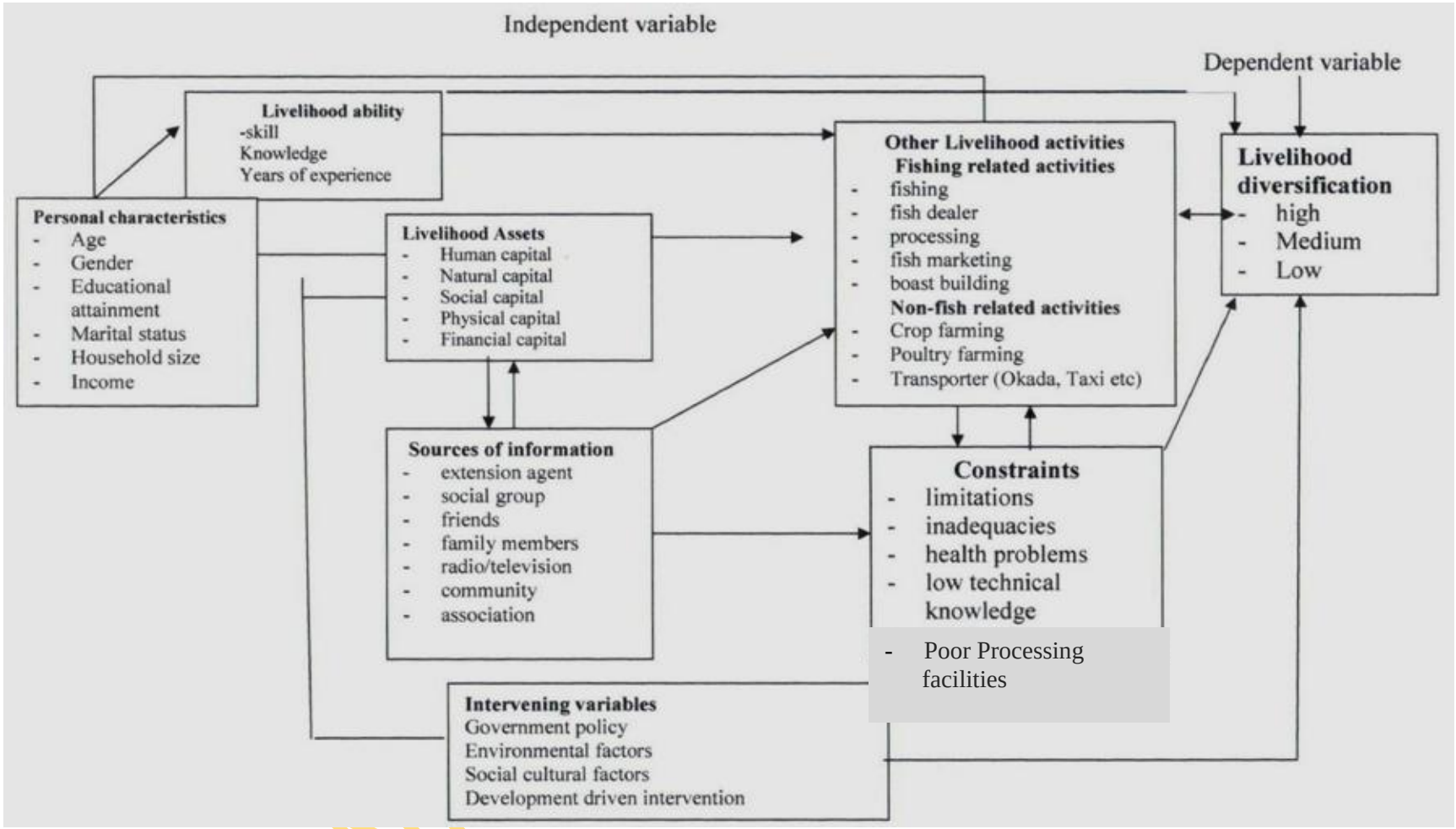

Figure 3: Conceptual framework on livelihood diversification of fisherfolks in communities around Oyan and Ikere Gorge Dams, Southwestern Nigeria.

CHAPTER FOUR

METHODOLOGY

4.1 The study areas

4.1.2 Oyan Dam

Oyan Dam is owned and operated by the Ogun-Oshun River Basin Development Authority (O-ORDA). It was commissioned on 29th March, 1983. Oyan Dam is located on latitude $7^0 15'$N and longitude $3^0 16'$E at an elevation of 43.3m above sea level (Figure 5). It is on the confluence of Oyan and Ofiki Rivers, both tributaries of Ogun River. It is located 20 kilometres North-West of Abeokuta, close to Badagry-Sokoto Highway (O-ORBDA, 1988; Ofoezie *et al.*, 1991). It has a catchment area of approximately 9,000km^2 southern climatic belt of Nigeria. The lake covers an area of 4,000 hectares. It was designed to supply 825 million litres and 175 million litres of raw water per day to the Water Corporations at Lagos and Ogun States, respectively. It was also designed to provide water for the irrigation of about 3,000 ha lower Ogun Irrigation Project under construction. In addition, it has the capacity to generate 9 mega watts of hydroelectric power for distribution to Abeokuta and its environs. The Authority also controls fishing activities on the Dam. Over 2,180 metric tons of fish, made up of 395 metric tons of *Clariasheterotis*, 686 metric tons of *Chrysithys*, 18.0 metric tons of *Ophicephalus*, 16.0 metric tons of lates and 1,065 metric tons of Tilapia, all valued at over 34.51 million naira, have been caught and sold by the Authority's registered fishermen and fish dealers to members of the public in the Abeokuta and Lagos metropolis between 1984 and 1998 (O-ORBDA, 1998). Table 5 captures the technical data of Oyan Dam.

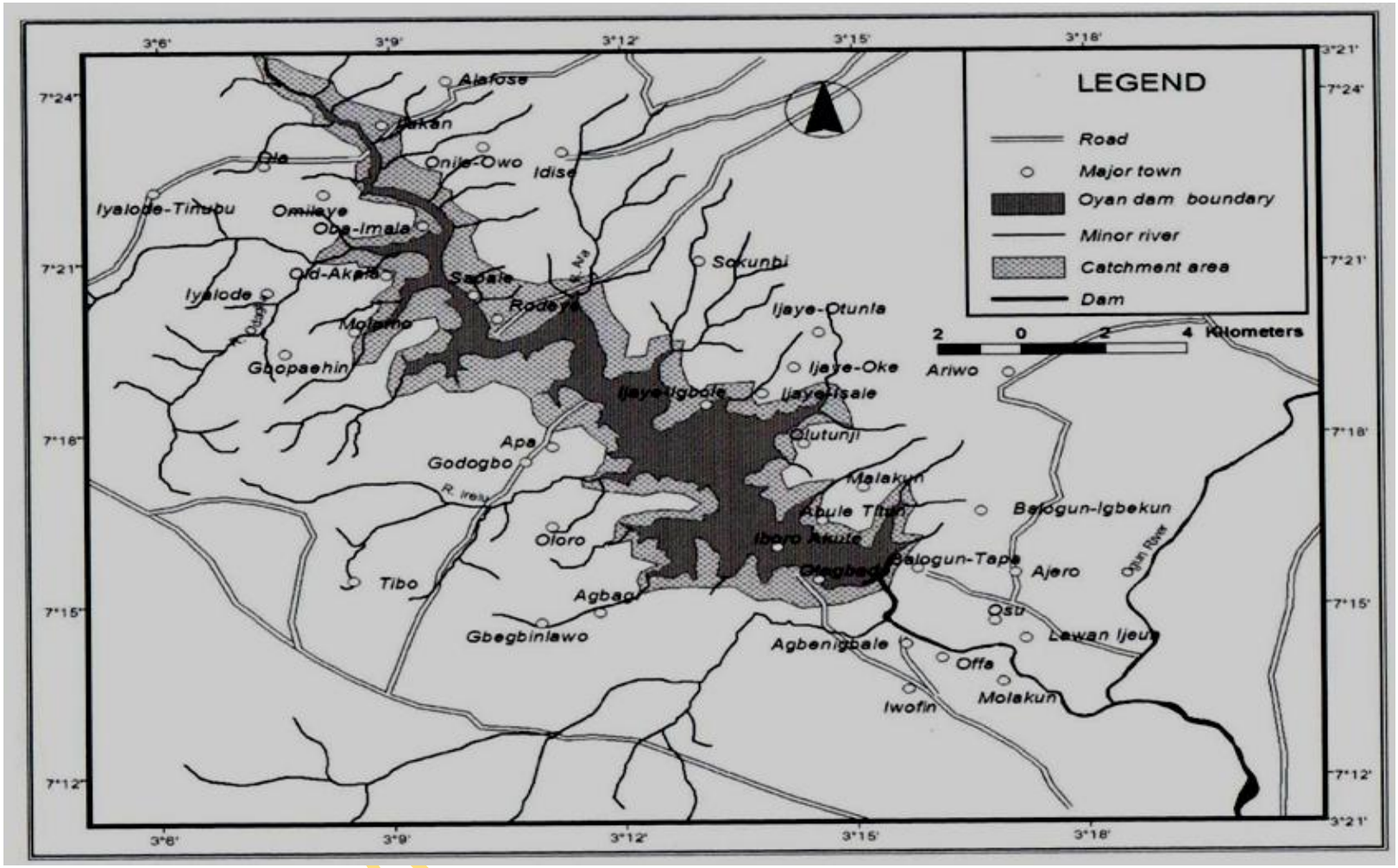

Figure 4: Oyan Dam's catchment area, Ogun State

Source: Ogun-Osun, River Basin Development Authority, (1998).

Before impoundment, there were thirteen villages on the eastern side of the proposed Dam and nine on the western sides, making a total of twenty-two villages that were relocated. The authority thereafter established three settlement camps for the displaced communities: one on each bank of the Dam in Ogun State and the third on the far end of the lake in Oyo State, which were named Ibaro, Abuletuntun and Igbo-Ora, respectively (O-ORBDA, 1998). At present, there are other villages, for example Apojola, Imala-odo and Akiro, where some migratory fisherfolks have been able to settle their families, erecting palm fronds and thatched roofed houses.

As a result of the generally coarse to medium grained-size soil, which is more drained with low fertility, the vegetation of the lake area falls within derived savannah of the low forest type region of Nigeria with sparse shrubs and predominant grasses except along the river bank where the vegetation is thick having some other plant species. As a result of timber lumbering, bush burning and cultivation of an original rainforest, it has a few shrubs trees and more grasses.

Table 5: Technical data of Oyan Dam

Catchment Area	9,000km^2
Surface Area	4,000 hectares
Gross Storage	270 million m^3
Normal water level	63.0 metres
Maximum water level	65.5 metres
Minimum water level	47.5 metres
Embankment-height	10.44 metres
Embankment-length	30 metres
Spillway-length	75 metres
Capacity	3,440 cumecs (3,440m^3/sec)
Auxiliary spillway-length	400 metres
Crest	63.25 metres
Earth volume	1.14 million cubic metres
Concrete volume	65m^3
Length of the Dam	11km
Length of the lake	27km
Lake maximum width at normal water level	6km

Source: Ogun-Oshun River Basin Development Authority (1998)

Generally, the topography is almost flat to gently undulating in the areas near the Dam (O-ORBDA, 1989) from the top of the rock surfaces, hence exposing the rock underneath. The location of the Dam upstream is the thickly populated city of Abeokuta heightens the awareness for the safety requirement of the Dam. The Agbe quarry is located about 1.8kilometres downstream of Oyan Dam hence the Dam is threatened by the blasting operations in the vicinity (O-ORBDA 1991). Landing sites in Oyan Dam include Ibaro, Abuletuntun, Apojola, Akala, Igbo-buje and Imala- Odo. Fish mongers come from all over the city of Abeokuta and beyond to buy both fresh and smoked fish from these landing sites daily. Presented in Table 6 is the list of the communities before and after Oyan Dam. Oyan dam is located in Ogun State.

Table 6: List of communities before and after Oyan Dam

S/N	Communities	Location	Distance	Description
1	Ibaro	After	2km	Settlement
2	Abuletuntun	Before	4km	Settlement
3	Abule Sikiru	Before	1km	Fishing village
4	Launi	Before	500m	Fishing village
5	Soderu	Before	700m	Fishing village

Source: Field survey, (2012)

4.1.3 Ogun State

Ogun state is located in the southwestern vegetation zone of Nigeria with a population of 4, 610,378 people (NPC, 2006). It is bordered by Lagos state in the south, in the north by Oyo and Osun state, Ondo state in the east and Republic of Benin in the west. The state is administratively divided into 20 LGAs. Abeokuta is the capital of the state as well as being the largest city in the state. The ethnic composition of Ogun state is largely from the Yoruba sub-groups of Awori, Egba, Ijebu, Yewa and Remo.

The state was created on 3rd February, 1976 from old western region. It covers an area of 16,980.55km². It has a population density of 220km². Ogun state is located between 7˚ 00′ N and 3˚ 35′ East of the Meridian.

Ogun state is located in the moderately hot, humid climatic zone of southwestern Nigeria. This favours the planting of arable crops such as maize, cassava and yam. Livestock rearing, rearing of goat, sheep, cattle and fish production is carried out in the state.

4.1.4 Ikere Gorge Dam

Ikere Gorge Dam is situated on the Ogun River, 8 kilometres east of Ikere village and 30 kilometres north east of Iseyin in Oyo State (figure 6). The Dam was designed for the following purposes:

- Supply of water to Iseyin, Okeho, Iganna and their environs.
- Supply of 82 million cubic metres of water to Lagos.
- Provide irrigation water for the 3,000ha middle Ogun irrigation project.
- Generate 6 megawatts of hydro-electricity.
- For fishing activities.

Ikere Gorge Dam supplies 82 million cubic metres of water to Iju Water Works in Lagos and serves as means of transportation to people living behind the Dam.

There are 7 landing ports, namely: Shaka, Asatu, Dobe, Alagbon, Aba Samu, Bendal and Alagbede. Each landing site has a chairman, secretary and treasurer. They all reside at the location/ site with their families. The Dam was named Gorge because it was constructed in the valley, surrounded by hills. It covers about 47km. Table 7 presents the list of communities surrounding Ikere Gorge Dam. Ikere Gorge dam is located in Oyo state.

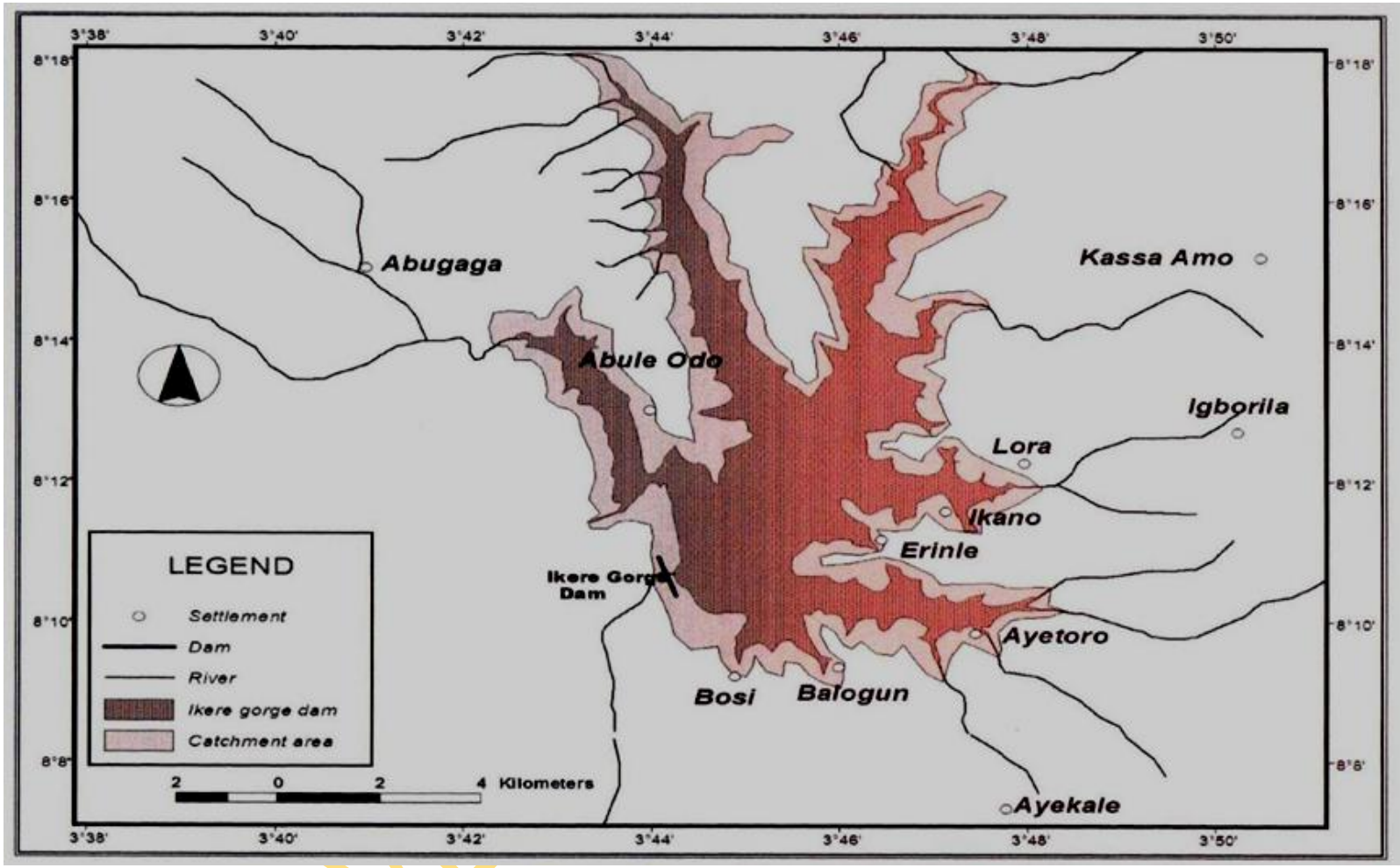

Figure 5: Ikere Gorge dam's catchment area, Oyo state.

Source: Ogun-Osun River Basin Development Authority, (1998).

Table 7: List of communities around Ikere Gorge Dam

S/N	Communities	Location	Distance from Dam	Description
1	Spill Way	After	500m	Settlement
2	Gate	After	600m	Settlement
3	Saka	Before	5km	Fishing village
4	Dobe	Before	7km	Fishing village
5	Alagbon	Ater	20km	Fishing and farming
6	Alagbede	After	25km	Fishing and farming
7	Asamu	After	35km	Fishing and farming
8	Irawote	Before	15m	Fishing village

Source: Field survey (2012)

4.1.5 Oyo State

Oyo State is an inland state located in the southwestern vegetation zone of Nigeria with a population of 5,591,589 people (NPC, 2006). The state covers a total of 28,454 km² of landmass and is ranked 14th by size. It is bordered in the south by Ogun State and in the north by Kwara State. It is also bordered in the west by the Republic of Benin, while in the east by Osun state. The landscape consists of old hard rocks and dome shaped hills, which rise gently for about 500metres in the southern part to a height of about 1,219 meters above sea level in the northern part. Principal rivers that originates from this highland include rivers such as Oba, Oyan, Ogun, Otin, Ofiki, Sasa, Oni, Erinle and Osun river.

It is made up of 33 local government areas in four vegetation zones of Ibadan/Ibarapa, Oyo, Ogbomosho and Sharki and three other senatorial districts namely: Oyo central, Oyo south and Oyo north senatorial district. Oyo state is located between 7˚40′ N and 5˚ 15′ east of the Meridian. This location confers to the state's equatorial and climatic conditions.

The climate of the state has notable dry and wet seasons with a relatively high humidity. Mean annual temperatures range between 25˚C- 35˚C. The raining season lasts for 8 months which states in April and ends in October. The dry season also lasts from November to March. Agriculture is the principal occupation of the people of Oyo state. The climate favours the growth of arable crops such as yam, cassava, millet, rice, fruits and plantain. Cash crops such as cocoa, tobacco and timber also abound in the state.

Agriculture is the major source of income for the greater number of people in Oyo State. Eighty percent of the people are farmers, who are either involved in commercial or subsistence farming. (Oyo State Government, 2010). Oyo state was formed in 1976 from the old western region. The state included Osun state, before the split of 1991. Oyo state is an ethnically homogeneous state, mainly inhabited by the Yoruba group who are predominantly agrarian, but have preference for living in urban centers. The ethnic composition of Oyo state

is largely from the Yoruba subgroups which comprises of the Oyos, the Oke-oguns, the Ibadans and the Ibarapas.

The study was carried out in Ogun and Oyo States, within the Southwestern part of Nigeria (Figure 4). The southwestern agricultural zone lies between latitudes 5^0N and 9^0N, with an area of 114,271 square kilometers, representing 12% of the country's total land mass. The zone has four distinct sub-ecological vegetations namely swamp mangrove forest, moist and dry lowland forest, woodland derived savannah and southern guinea savannah.

This zone comprises of Lagos, Ogun, Oyo, Osun, Ondo and Ekiti states. Ogun state is situated in the tropical rain forest while Oyo falls within the derived savannah. The climate of the zone is typically equatorial, with distinct wet and dry seasons. The rainy season lasts up to 9 months, with two peaks, in July and September. The zone is bordered by Republic of Benin in its west, Edo and Delta in the east, the Atlantic to the south and Kwara and Kogi states in the Northern border.

The Southwestern part of Nigeria has a population of 27, 581, 982 people (National Population Commission, NPC, 2006). It is ethnically dominated by the Yorubas and in many rural communities, the official language is Yoruba. Inspite of this, numerous dialectal variations exist among the rural dwellers in this vegetation zone.

The climate in southwestern Nigeria is predominantly humid with distinct wet and dry seasons. The mean annual rainfall ranges from 1,5000mm to 3,000mm per annum. Annual mean temperature ranges from 18˚C- 24˚C during the raining season and during the dry season 30˚C and 35˚C. This favours the planting of arable crops and tree crops.

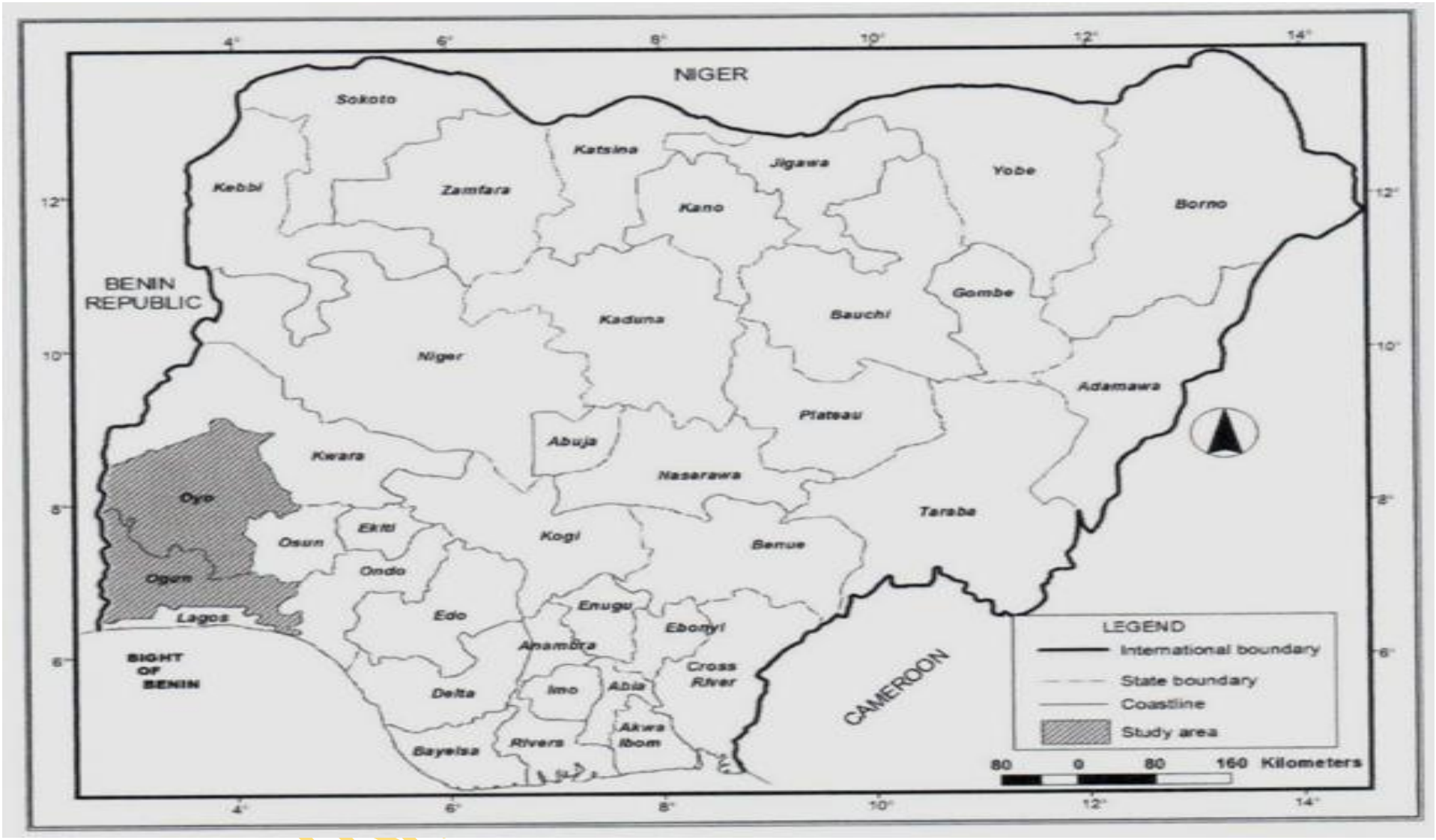

Figure 6: Selected States in Nigeria

4.2 Population of the study

The target population for this study comprises all fisherfolks in communities around Oyan and Ikere Gorge Dams and is registered with the Ogun-Osun River Basin Development Authority (O-ORBDA). These include fishermen, fish dealers, fish processors, net makers and boat builders.

4.3 Sampling procedure and sample size

A four stage sampling procedure was used in selecting respondents from the population of registered fisherfolks with the Ogun-Osun River Basin Development Authority (O-ORBDA) in the communities around Oyan and Ikere Gorge dams in Oyo and Ogun States, southwestern Nigeria.

Firstly, stratification of southwestern Nigeria into vegetation zones and the purposive selection of two states, having a dam each located in the Derived Savannah Zone (DSZ) areas of the states. Oyan dam in Ogun State and Ikere Gorge dam in Oyo State were selected at this stage.. These dams were also selected because they are managed by the same body that is the Ogun-Osun River Basin Development Authority.

The second stage involved the selection of rural communities found around Oyan and Ikere Gorge dams. These communities were either fishing villages or farm settlements where fisherfolks resides. A total of five communities were found around Oyan dam and eight communities found around Ikere Gorge dam.

The third stage involved the selection of fifty per cent of the rural communities found around Oyan and Ikere Gorge dams using random sampling technique. Seven communities were selected at this stage. Three around Oyan dam and four around Ikere Gorge dam.

The fourth stage was the random selection of sixty-five per cent of fisherfolks within the selected communities that paid their license fees for the year 2012 and are registered with the O-ORBDA. A total of three hundred and ninety respondents were sampled for the study. Interview schedule were administered to the respondents and used for the analysis. The selection of fisherfolks is presented in Table 8. Registered fisherfolks were sorted into various groups as presented in Table 9. Sampled fisherfolks for this study were also categorized according to their groups and presented in Table 10.

Table 8: Selection of fisherfolks in communities around Oyan and Ikere Gorge dams

Dam	State	Number of community around dams	50% of community selected	Registered fisherfolks in selected community	Sample fisherfolks (65%)
Oyan	Ogun	5	3	403	262
Ikere	Oyo	8	4	197	128
Total		13	7	600	390

Source: Field survey, 2012.

Table 9: Registered fisherfolks groups in Oyan and Ikere Gorge Dams for year 2012

Dams	Fishermen	Net makers	Fish processors	Fish dealers	Boat builders	Total
Oyan	130	27	124	119	3	403
Ikere	78	33	65	16	5	197
Total	208	60	189	135	8	600

Source: Field survey (2012)

Table 10: Number of sampled fisherfolks in Oyan and Ikere Gorge dams

Dams	Fishermen	Net makers	Fish processors	Fish dealers	Boat builders	Total
Oyan	84	18	81	77	2	262
Ikere	52	21	42	10	3	128
Total	136	39	123	87	5	390

65% of the registered fisherfolks.

Source: Field survey (2012)

4.4 Method of data collection

1. Qualitative method: Two focus Group Discussions were conducted on gender basis among fisherfolks groups in the selected communities with the exception of boat makers who were all males. This allowed for different focus group discussions to be carried out among the different fisherfolks groups. In-depth interviews with key informants were used to solicit information from chairmen and secretaries of each association, community leaders, and O-ORBDA key staffs.

2. Quantitative method: The administration of validated interview schedule was conducted after qualitative study on the selected fisherfolks and was used to collect quantitative data for the study. Both interview and focus group discussion were conducted in the evening on arrival from fishing or their daily chores in order not to interfere with the various tasks of each household member who were actively involved in sourcing for their means of livelihoods.

4.5 Validation of instrument

Content and face validity of the instrument was conducted with the help of my supervisors and other lecturers in the Department of Aquaculture and Fisheries Management as well as the Department of Agricultural Extension and Rural Development. This involved the deletion of irrelevant questions and inclusion of relevant ones.

4.6 Reliability of the instrument

The developed instruments were pre-tested in communities outside the study areas that had similar characteristics with the study areas. The reliability of the instruments was determined through split-half method and reliability value of above 0.70 was obtained, hence the instrument was adjudged adequate for the research.

4.7 Length and period of data collection

The data was collected for seasonal trend for 18 months that is wet and dry season.

4.8 Measurement of variables

4.8.1 Independent variables

Independent variables of the study include personal characteristics, livelihood activities, livelihood assets of fisherfolks in communities around Oyan and Ikere Gorge dam in Ogun and Oyo State Southwestern, Nigeria. Other variables include sources of information on livelihood and constraints to the livelihoods of the fisherfolks in the study area. Descriptive statistics such as frequencies, percentages and means was used to describe the data collected as shown below.

4.8.2 Socio-economic characteristics

1. Age: Respondents' age was measured at interval level and their actual number of years was taken.
2. Gender: Fisherfolks gender was indicated appropriately as either male or female
3. Educational attainment: Respondents' educational attainment was measured at ordinal level. Educational status was indicated appropriately from the following options (a) No formal education (b) primary education (c) secondary education (d) Tertiary education (e) Others (Islamic education).
4. Marital Status: Respondents' marital status was measured at nominal level as single, married, divorced, widowed and separated.
5. Household size: This was measured at interval level and actual number of people residing in the household was recorded.

6. Number of children: This was measured at interval level by respondents stating the actual number of children residing in the household.

7. Religion: Religious inclination was measured at nominal level, appropriately indicated from the following options (a) Christianity (b) Islam and (c) Traditional worshiper.

8. Income: This was measured at interval level and respondents' estimated monthly income in naira from their primary occupation was recorded.

4.8.3 Livelihood Assets:

Livelihood assets score was measured based on the five livelihood assets namely: natural, physical, social, financial and human assets.

(a) Natural capital: this was measured using categories such as access to land, forest, and dam. Based on a yes/no response. A score of 1 was assigned of 'yes' response and O to 'no' response.

(i) Season of accessibility to natural capital: This was measured using categories where respondents indicated the season(s) in which they had access to land, forest, dam and river in wet or dry seasons .

(b) Physical capital

Respondents were categorized using a list of eleven options of physical assets and indicated appropriately using a Yes or No response to indicate their ownership of these listed items. A list of physical assets was presented to the respondents. Some of the items presented include farm implements, building, well, fish processing drums, livestock, fishing boats, vehicles, motorcycle and bicycle. These physical items were selected based on relevant items obtained from the pre-tested instrument.

(c) Social capital

Respondents were measured based on categorizes from a list of five social groups that they belonged to. These social groups include community based association, religious groups, occupational group, cooperative group, and cultural group.

(d) Financial capital

Respondents were measured with categories based on a Yes/No response from the following listed financial sources: bank account, informal credit and thrift '*Esusu',* saving and credit '*Ajo',* regular remittances, cooperatives and personal savings, community assistance.

4.8.4 Sources of information on respondents livelihood

Sources of information on respondents' livelihood were measured based on a yes/No response using categories from eight possible information sources which included; extension services, social support-services, radio, television, G.S.M, friends, Neighbours and group participation.

4.8.5 Constraints to fisherfolks livelihood diversification

Constraints to fisherfolks livelihood were measured based on a Yes/No response using categories from a list of possible constraints to their livelihood. The list was generated from constraints listed by fisherfolks during the pre testing of instrument.

4.9 Data Analysis

4.9.1 Descriptive statistics

Descriptive statistics were used to describe the socio-economic characteristics of the respondents, in the form of frequencies, percentages and mean. Other variable include profile of livelihood asset and diversification activities among fisherfolks.

4.9.2 Measures of diversification

Diversification was measured using the number of livelihood activities, income share and Herfindal Diversification Index.

1. **Number of livelihood activities**: The more the livelihood activities of fisherfolks, the more diversified fisherfolks.
2. **Share of income of minor livelihood activity**: This is the measure of the ratio of the sum of income from all livelihood activities. The higher the ratio, the more diversified the fisherfolk is. The measure is from the range of 0 – 1.

   $$\text{Income share} = \frac{\text{sum of income from minor livelihood activities}}{\text{Total income from all livelihood activities}}$$

3. **Herfindahl Diversification Index (HDI) Model specification:** The level of livelihood diversification was determined by computation of Herfindahl Index. The income diversification index used in the study was defined as the inverse of the Herfindahl Index as adopted by Idowu *et al.* (2011) thus:

$D = I/ \Sigma Si2$

D = level of income diversification

Si = Share of income source i in households total income

$Si = Yi/Y$, $Y= \Sigma Y$

Yi = Total income from source i

Y = total household income from all sources

Herfindahl Index measures the level of income diversification which is the degree of concentration (scatteredness) of households' income into various sources. Households with most diversified income will have the largest values of D. Households with less diversified income will have the smallest values of D. Least diversified household (those depending on a single income source) D takes on its minimum value of 1. The higher the number of income source (s) and or the more evenly distributed the income share, the higher the value of D.

4.9.3 Probit Regression Model

The probit model assumes that, while we observe the values of 0 and 1 for the variable Y_i there is a latent unobserved continuous variable Y* that determines the value of Y, we assume that Y* can be specified as follows:

$$Y^* = B_0 + B_1X_{i1} + B_2X_{i2} + B_3X_{i3} + \cdots .. + B_kX_{ik} + U_i \quad \ldots\ldots (2)$$

and that :

$$Y_i = 1 \; if \; Y* > 0$$

$$Y_i = 0 \; otherwise$$

where Y^*= Herfindahl Diversification index

Following Okere and Shittu (2013), the diversification index Y_i was categorized as:

Y_i = Diversification index (0 = if not diversified, 1 = if diversified)

$X_{i1} \ldots. X_{ik}$ = vector of independent variables

B_0 = constant

B_i = coefficient estimates

U_i = random disturbance term

X_1 = Gender of fisherfolks;

X_2 = Age of fisherfolks in years;

X_3 = Years of education

X_4 = Marital Status

X_5 = Number of wives

X_6 = Number of children

X_7 = Household size

X_8 = Financial capital

X_9 = Human capital

X_{10} = Natural capital

X_{11} = Physical capital

X_{12}= Social Capital aggregateX_{13}= Location (Oyan or Ikere gorge) .

CHAPTER FIVE

RESULT AND DISCUSSION

5.1 Introduction

This chapter presents the results of analysis, interpretation and discussion of data that were collected. These results are presented and discussed in six major sub sections which include socio-economic characteristics, livelihood asset, livelihood activities, sources of information on livelihoods, extent of diversification among fisherfolks groups, factors determining extent of diversification and constraints to livelihood diversification of fisherfolks in the study areas.

5.2 Socio-economic characteristics of fisherfolks.

An understanding of the socio-economic characteristics of fisherfolks is important as it directly or indirectly influences livelihood diversification and extent of diversification of fisherfolks groups in the study areas. These include gender, age, marital status, and primary occupation amongst others.

5.2.1 Gender

Gender is an integral and inseparable part of rural livelihoods. Many developmental projects have assumed that male-headed households provide the majority of agricultural labour and that the man is the sole decision-maker concerning agricultural activities

The result for gender distribution of fisherfolks is presented in Table 11. It shows that most (63.08%) of fisherfolks were male, while 36.92% were female. Traditionally, fisheries have been associated with men with focus primarily on capture fisheries while women dominated pre and post-harvest activities such as processing and marketing the catch, Choo *et,al,* 2008. Women also perform direct unpaid tasks such as mending nets, collecting baits, preparing

Table 11: Gender distribution of fisherfolks.

Gender	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
Male	151	57.63	95	74.22	246	63.08
Female	111	42.37	33	25.78	144	36.92
Total	262	100.00	128	100.00	390	100.00

Source: Field survey (2012).

5.2.2 Age

Table 12 reveals that the mean age of fisherfolks was 27.75 years with a modal age of 31-40 years. Result of analysis also shows that 14.61% of them were between 51and 60 years. More than half of the fisherfolks (55.13%) falls within 31-50 years of age.

These age groups are within the active and productive years which have a great implication for active involvement in livelihood diversification activities. This finding corroborates the findings of Olaoye (2010) which states that most fisherfolks in their economically active age can undertake strenuous task associated to fishing enterprise. It is also in line with the findings of Bello (2000) who ascertain that age has positive correlation with acceptance of innovation and ability to diversify livelihood.

These also proves the fact that fisherfolks take fishing as a way of life and many communities that are located near river, lakes and seas depend on fishing for food and their livelihood. A total of 6.67% of fisherfolks above the age of 60 years were found in the study areas. This result might have been due to the fact that retired old people had permanently settled in the communities with their families and were still fishing.

5.2.3 Ethnic group of fisherfolks

Fisherfolks were grouped broadly into four: Yoruba, Hausa, Ijaw and Igbo. Table 13 shows that more than half (58.0%) of fisherfolks were Ijaw, who were made up of natives of Benue, Kogi or Delta States.

Table 12: Distribution of fisherfolks by age.

Age	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
< 30	58	22.14	31	24.22	89	22.82
31- 40	74	28.24	35	27.34	109	27.95
41- 50	76	29.01	30	23.44	106	27.18
51- 60	37	14.12	23	17.97	57	14.61
>60	17	6.49	9	7.03	26	6.67
Total	262	100.00	128	100.00	390	100.00
Means	14.47		41.03		27.75	
Standard deviation	11.88		12.89		12.39	

Source: Field Survey (2012)

Table 13: Distribution of fisherfolks by ethnic groups

Ethnic group	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
Yoruba	41	15.65	13	10.16	54	13.84
Hausa	42	16.03	53	41.41	95	24.36
Ijaw	165	62.98	61	47.66	226	57.95
Igbo	3	1.15	0	0	3	0.78
Juku	11	4.20	1	0.78	12	3.08
Total	262	100.00	128	100.00	390	100.00

Source: Field survey (2012)

The Ijaw take the act of fishing as a cultural way of life. They pass on the act of fishing and fishing activities from one generation to another. The least represented ethnic group in the study areas was the Igbo (0.78%).

Despite the geopolitical location of the study areas (Oyan and Ikere Gorge Dams) in the Yoruba-speaking towns of Abeokuta and Iseyin, only 15.65% of fisherfolks in Oyan Dam and 10.16% of fisherfolks in Ikere Gorge Dam were Yoruba. This could be because the Yorubas were displaced and resettled in another location during dam construction. Majority might have migrated to city centers and still engage in fishing enterprise.

5.2.4 Religion

Result of analysis on Table 14 reveals that 41.79%, 55.64% and 2.56% of the fisherfolks were Christians, Muslims and Traditional worshipers respectively. This finding is in consistent with that of Oyesola and Ademola (2011) who reported that 41.5%, 54.0% and 4.5% of the respondents were Christians, Muslims and Traditional worshipers.

Ademola (2010) and Akinola (2008) in a similar studies in southwestern, Nigeria reported that most respondents were actively involved in religious organization or groups. This suggests that religious groups could have some significant feature in influencing livelihood diversification of fisherfolks in the study areas.

5.2.5 Marital status

The marital status of fisherfolks in the study areas is presented in Table 15. The table revealed that 86.92% of fisherfolks in the study areas were married, 6.41% were single, while 6.67% of the fisherfolks were ether separated, divorced, widowed. The result implies that most of the fisherfolks in the study areas were married. This shows the importance of marriage institution in the rural communities in the study areas. This could necessitate the

need for them to be involved into several livelihood activities in order to ensure food security at household level and also earn more income for a living. Ademola (2010) and Ogunbameru et al, (2006) corroborated this assertion that rural dwellers specifically are mostly married. Marital status also serves as a measure of social status in rural communities in southwestern, Nigeria. Marital status is an important factor determining the extent of livelihood diversification. Fisherfolks that are married are more likely to have diversified income

Table 14: Distribution of fisherfolks by religion

Religion	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
Christian	115	43.89	48	37.5	163	41.79
Muslim	141	53.82	76	59.37	217	55.64
Traditional worshipers	6	2.29	4	3.13	10	2.56
Total	262	100.00	128	100.00	390	100.00

Source: Field survey (2012

Table 15: Distribution of fisherfolks by marital status

Marital status	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
Single	17	6.49	8	6.25	25	6.41
Married	229	87.40	110	85.94	339	86.92
Divorced	0	0	1	0.78	1	0.26
Widowed	4	1.53	2	1.56	6	1.54
Separated	12	4.58	7	5.47	19	4.87
Total	262	100.00	128	100.00	390	100.00

Source: Field survey (2012)

portfolios than unmarried fisherfolks. This is due to the fact that married fisherfolks have more family responsibilities than the unmarried ones.

5.2.6 Number of Wives

Table 16 revealed the modal number of wives of the fisherfolks in the study areas to be 3 and the mean number of wives to be 0.9. The table also shows that 0.77% of fisherfolks in the study areas had above five wives while 4.10% of them had four wives. Women comprise a large percentage of the labour force in small scale capture fisheries-related activities including pre- and post- harvest work. A fisherfolk woman would have given birth to an average of seven children by the end of her reproductive life. The children are used as part of the household work force. Women also compliment men's fishing effort by adding value to the catch through preservation, processing and marketing of the catch (FAO, 2005).

Table 16: Distribution of fisherfolks by number of wives

No of wives	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
1	49	18.70	21	16.40	70	17.95
2	87	33.21	53	41.41	140	35.90
3	117	44.66	44	34.38	161	41.28
4	7	2.67	9	7.03	16	4.10
>5	2	0.76	1	0.78	3	0.77
Total	262	100.00	128	100.00	390	100.00
Mean	0.82		0.98		0.9	
Standard deviation	0.98		0.93		1.44	

Source: Field survey (2012)

5.2.7 Number of children

Number of children of fisherfolks were grouped broadly into five. Result of the findings in Table 17 revealed that the modal class for the number of children was 4-6 children (35.39%) with a mean of 4.94. About 25.13% of the fisherfolks had between 7-12 children, while 2. 56% of them had more than12 children.

This corroborates the findings of a study carried out by FAO, 2005 that most men in fishing communities desire many children and expressed a very strong preference for sons as they make a strong labour force in fishing households. Artisanal fishing activities are organized around work groups consisting of fathers, sons and close male relatives. More so, sons are expected to provide financial support for parents in their old age.

Table 17: Distribution of fisherfolks by number of children

No of Children	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
None	24	9.16	16	12.50	40	10.26
1-3	71	27.10	33	25.78	104	26.67
4-6	94	35.88	44	34.38	138	35.39
7-9	56	21.37	24	18.75	80	20.51
10-12	10	3.82	8	6.25	18	4.62
>12	7	2.67	3	2.34	10	2.56
Total	262	100	128	100.00	390	100
Mean	4.95		4.92		4.94	
Standard deviation	3.67		3.72		7.39	

Source: Field survey (2012)

5.2.8 Household size of fisherfolks

The distribution of fisherfolks by household size reveals that 32.82% of the fisherfolks had a modal household class of between 4-6 persons with a mean household size of 6.72. A total of 23.59% of fisherfolks had household size of between 1-3 persons. This could be because they are mostly migrated people who might just be married with young families. The table also revealed that 13.85% of the fisherfolks had a household size of between 10-12 persons while 6.66% had above 12 persons as their household size. The result is presented in Table 18.

The implication of this is that fisherfolks with large members would have enough family hands to assist them in their fishing activities and hence they would pay less for hired labour. It also implies that members of the household can engage in one form of livelihood activity or the other to make ends meet and would assist in providing family labour.

Keeping of large families is common in Africa because it is believed that large household size could be an avenue for household heads to use the members for various economic purposes to augment family income. Artisanal fisheries contribute 85-90% of domestic production and this provides economic support and livelihood for 6 million coastal and riverside rural dwellers (Adeleke *et al.,* 2011). Household size has both positive and negative effects on diversification. For instance, a larger household may depend on more income-generating activities for sustainable livelihood than a smaller household. Hired labour will be minimized in a larger household. The fairly large household size in the study areas indicates high dependency ratio with severe implications for the provision household's basic needs. Therefore, with the large household size in the study area, members of poor households may be made poorer with no ability to muster enough resources to cope with poverty, Adejare, 2013.

Table 18: Distribution of fisherfolks household size.

Household size	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
1-3	68	25.95	24	18.75	92	23.59
4-6	86	32.82	42	32.81	128	32.82
7-9	62	23.66	28	21.88	90	23.08
10-12	29	11.07	25	19.53	54	13.85
≥12	17	6.49	9	7.03	26	6.66
Total	262	100.00	128	100.00	390	100
Mean	6.40		7.03		6.72	
Standard deviation	5.58		4.27		4.93	

Source: Field survey (2012)

5.2.9 Primary occupation of fisherfolks.

The distribution of fisherfolks by primary occupation showed that the majority (72.5%) of fisherfolks engaged in fishing as their primary occupation and means of livelihood. This is in proper conformity with the expected, since the study was directed to fisherfolks and due to the location of their communities near the dam. Fishing is a ready cash earner as opposed to farming, in which the farmer has to raise his crops and wait till the period of maturity for the crops to be harvested and sold.

Those that are engaged in fish processing were 63.9% and only 3.2% of fisherfolks were boat makers. Details of the result are presented in Table 19.

5.2.10 Secondary occupation of fisherfolks

The distribution of fisherfolks by secondary occupation was studied based on season. In the wet season in Oyan dam, fishermen 50.0%, fish processors 58.7% and fish dealers 63.3% were mainly involved in crop farming as their secondary occupation while net makers operated patent medicine store (63.3%) mainly as their secondary occupation. The result is presented in Table 20.

Secondary occupation of fisherfolks in Oyan dam during the dry season showed that fish dealers 66.7%, diversified mainly into petty trading, boat makers 80.0%, had carpentry works as their main secondary occupation while the fishermen 76.7%, fish processors 45.85% and net makers 41.7%, diversified mainly into food crop production. The result is presented in Table 21.

During the wet season in Ikere Gorge dam, fishermen 75.9%, fish processors 59.1%, fish dealers 33.3% and net makers 23.8% were mainly involved in crop farming as their secondary occupation while boat makers 66.7% had motorbike riding as their main secondary

Table 19: Distribution of fisherfolks in Oyan and Ikere Gorge Dams by Primary occupation

	Oyan **F (%)**	**Ikere** **F (%)**	**Total** **F (%)**
Fishermen	85 (32.3)	51 (40.2)	135(72.5)
Fish processors	80 (30.5)	43 (33.6)	123(63.9)
Fish dealers	77 (29.3)	10 (7.9)	87(37.2)
Boat makers	2 (0.8)	3 (2.4)	5(3.2)
Net makers	18 (6.8)	21 (16.5)	39(23.3)
Total	262 (100)	128(100)	390(100)

Source: Field survey (2012)

Table 20: Distribution of fisherfolks in Oyan Dam by secondary occupation in the wet season

	Fishermen F (%)	**Fish processors F (%)**	**Fish dealers F (%)**	**Boat makers F (%)**	**Net makers F (%)**
Crop farming	26 (50)	27 (58.7)	21 (63.6)	2 (100)	3 (27.3)
Hunting	4 (7.7)	0 (0)	0 (0)	0 (0)	1 (9.1)
Charcoal production	5 (9.6)	0 (0)	1 (3.0)	0 (0)	0 (0)
Petty trading	5 (9.6)	10 (21.7)	3 (9.1)	0 (0)	0 (0)
Driving	4 (7.7)	1 (2.2)	1 (3.0)	0 (0)	0 (0)
Patent store	2 (3.8)	7 (15.2)	1 (3.0)	0 (0)	7 (63.6)
Carpentry	1 (1.9)	0 (0)	0 (0)	0 (0)	0 (0)
Thatched roof making	5 (9.6)	1 (2.2)	6 (18.2)	0 (0)	0 (0)
Total	52 (100)	46 (100)	33 (100)	1 (100)	11 (100)

Source: Field survey (2012).

Table 21: Distribution of fisherfolks in Oyan Dam by secondary occupation in the dry season

	Fishermen F (%)	**Fish processors F (%)**	**Fish dealers F (%)**	**Boat makers F (%)**	**Net makers F (%)**
Crop farming	27 (58.7)	29 (61.7)	18 (56.3)	1 (50.0)	5 (29.4)
Hunting	3 (6.5)	0 (0)	2 (6.3)	0 (0)	1 (5.9)
Charcoal production	4 (8.7)	0 (0)	2 (6.3)	0 (0)	0 (0)
Petty trading	4 (8.7)	10 (21.3)	4 (12.5)	0 (0)	0 (0)
Driving	2 (4.3)	1 (2.1)	1 (3.1)	0 (0)	1 (5.9)
Motorbike riding	1 (2.2)	6 (12.8)	2 (6.3)	1 (50.0)	10 (58.8)
Carpentry	1 (2.2)	0 (0)	0 (0)	0 (0)	0 (0)
Collection of NTFP	4 (8.7)	1 (2.1)	3 (9.4)	0 (0)	0 (0)
Total	46 (100)	47 (100)	32 (100)	2 (100)	17 (100)

Source: Field survey (2012)

NTFP- Non Timber Forest Products

occupation. Fishermen added hair barbing 3.4%, cattle rearing 3.4% and patent medicine store 6.9% to their secondary occupation.

Fish dealers 66.7%, had petty trading as their main secondary occupation while net makers collected non timber forest products as their main secondary occupation. The result is presented in Table 22. Secondary occupation of fisherfolks in Ikere Gorge dam during the dry season is presented in Table 23. The result revealed that fishermen76.7%, fish processors 45.8% and net makers 41.7% diversify mainly into crop farming. Corroborating this result is the study of Babatunde and Qaim (2009) which found farming as the most important income generating source for poorest households. This might also be due to the fact that rural dwellers are mostly agrarian who views farming as a normal way of life. Crop farming also helps the fishermen cope with food insecurity. This implies that fisherfolks derives more benefits and values (food and income) from farming activities than non farming activities. Boat makers 80%, had carpentry works as their main secondary occupation.

Plate 1 – 8 shows some of the secondary occupation and other livelihood among fisherfolks in the study area. This implied a secondary source of income-generating occupation, mainly at the subsistence level. Some of fisherfolks had their secondary occupations in the category of "others" which could be charcoal production, weaving of elephant grass for roofs, artisan, works and paid employment, among others.

Table 22: Distribution of fisherfolks in Ikere Gorge Dam by secondary occupation in the wet season

	Fishermen F(%)	Fish processors F(%)	Fish dealers F(%)	Boat makers F(%)	Net makers F(%)
Crop farming	22 (75.9)	13 (59.1)	1 (33.3)	0 (0)	5 (23.8)
Hunting	1 (3.4)	1 (4.5)	0 (0)	0 (0)	1 (4.8)
Charcoal production	1 (3.4)	0 (0)	0 (0)	0 (0)	1 (4.8)
Petty trading	1 (3.4)	7 (31.8)	2 (66.7)	0 (0)	0 (0)
Patent store	2 (6.9)	0 (0)	0 (0)	0 (0)	0 (0)
Driving	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Motorbike riding	0 (0)	0 (0)	0 (0)	2 (66.7)	2 (9.5)
Carpentry	0 (0)	0 (0)	0 (0)	1 (33.3)	0 (0)
NTFP	0 (0)	0 (0)	0 (0)	0 (0)	10 (47.6)
Hair barbing	1 (3.4)	0 (0)	0 (0)	0 (0)	0 (0)
Paid employment	1 (3.4)	1 (4.5)	0 (0)	0 (0)	2 (9.5)
Total	29 (100)	22 (100)	3 (100)	3 (100)	21 (100)

Source: Field survey (2012)

Table 23: Distribution of fisherfolks in Ikere Gorge Dam by secondary occupation in the dry season

	Fishermen F(%)	**Fish processors F(%)**	**Fish dealers F(%)**	**Boat makers F(%)**	**Net makers F(%)**
Crop farming	23 (76.7)	11 (45.8)	1 (33.3)	0 (0)	5 (41.7)
Hunting	0 (0)	3 (12.5)	0 (0)	0 (0)	1 (8.3)
Charcoal production	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Petty trading	1 (3.3)	9 (37.5)	2 (66.7)	0 (0)	0 (0)
Patent store	2 (6.7)	0 (0)	0 (0)	0 (0)	0 (0)
Driving	1 (3.3)	0 (0)	0 (0)	0 (0)	0 (0)
Motorbike riding	0 (0)	0 (0)	0 (0)	1 (20)	2 (16.7)
Carpentry	0 (0)	0 (0)	0 (0)	2 (80)	1 (8.3)
Cattle rearing	1 (3.3)	0 (0)	0 (0)	0 (0)	0 (0)
Hair barbing	1 (3.3)	0 (0)	0 (0)	0 (0)	0 (0)
Paid employment	1 (3.3)	1 (4.2)	0 (0)	0 (0)	3 (25.0)
Total	30 (100)	24 (100)	3 (100)	1 (100)	12 (100)

Source: Field survey (2012)

5.2.11 Educational status

The distribution of the educational status of fisherfolks is presented in Table 24. The table shows that 46.92% of sampled fisherfolks had primary education, while 19.49% had no formal education. Those that had secondary education were also 19.49% and 11.79% of sampled fisherfolks in the study areas had Islamic education while 2.13% had tertiary education.

This corroborate the findings of Akinwumi et al, (2011) which states that at least 40% of fisherfolks in each community studied had primary education. Olaoye, et al, (2012), in their study reported that a total of 67.5% of the respondents were literates having primary, secondary or higher education. The relatively high level of education of fisherfolks household could give such household the capacity to successfully implement livelihood diversification strategies and cope with income fluctuation and failure.

Table 24: Distribution of fisherfolks by education

Educational Status	Oyan Dam		Ikere-Gorge		Total	
	F	(%)	F	(%)	F	(%)
No Formal	51	19.47	25	19.50	76	19.49
Primary	133	50.76	50	39.06	183	46.92
Secondary	50	19.08	26	20.31	76	19.49
Tertiary	6	2.29	3	2.30	9	2.31
Islamic	22	8.40	24	18.75	46	11.79
Total	262	100.00	128	100.00	390	100.00

Source: Field survey (2012)

5.2.12 Monthly income of fisherfolks in wet and dry seasons.

Result in table 25 shows that the monthly income of fisherfolks in the study areas from their primary occupation during the wet season was highest among the fishermen with a mean of ₦75,562.5. The table also revealed that 38.9% of the fishermen earn income in the range of ₦10,001-Nl20,000 while 5.9% of the fisherfolks earn income in the range of ₦40,001 and ₦50,000 monthly. Fish processors had the lowest monthly income among the sampled fisherfolks in the study areas with a mean income of ₦20,000.

In the dry season monthly income of sampled fisherfolks in the study areas was highest among the net makers with a mean of ₦26,937.5.Among the sampled net makers in the study areas, 3.44% had monthly income above fifty thousand naira. Boat makers had the least income in the dry season among the sampled fisherfolks in the study areas with a mean of ₦19,000. The result is presented in Table 26.

This is in corroboration with Oyesola and Ademola (2011) who reported that respondents had an average monthly income of between ₦5,000-N20,000 from their primary occupation. It could therefore be indicated that low income level of boat makers would likely reduce their accessibility to livelihood assets. This implies that lower income in the livelihood activities of sampled boat makers in the study areas cannot sustain and maintain their families and livelihoods. Hence, the need for livelihood diversification.

Table 25: Distribution of fisherfolks by monthly income from primary occupation in wet season (March-October)

	Fishermen		Fish process		Fish dealer		Boat Maker		Net maker		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
≤	44	(32.4)	25	(20.33)	20	(22.9)	1	(20.0)	6	(15.4)	96	(22.2)
₦10,000	53	(38.9)	42	(34.0)	35	(40.2)	1	(20.0)	9	(23.1)	140	(31.24)
₦10,001-	17	(12.5)	27	(22.0)	17	(19.5)	2	(40.0)	5	(12.8)	68	(21.36)
₦20,001-	12	(8.8)	28	(22.8)	10	(11.5)	0	(0.0)	13	(33.3)	63	(15.28)
₦30,000												
₦30,001-	8	(5.9)	1	(0.8)	3	(3.4)	1	(20.0)	4	(10.3)	17	(8.1)
₦ 40,000												
₦40,001-	2	(1.5)	0	(0)	2	(2.5)	0	(0.0)	2	(5.1)	6	(1.8)
₦50,000												
≥ ₦ 50,000	136	(100)	123	(100)	87	(100)	5	(100)	39	(100)	390	(100)
Total	75,562.5		20,000		44,400		34,33.33		21,33			
									3.33			
Mean	5.011	11313.7			55460.0		13650.40		1006			
standard					9				6.45			
deviation												

Source: Field survey (2012) Multiple responses possible

Table 26: Distribution of fisherfolks by monthly income from primary occupation in dry season (November – February)

	Fishermen		Fish process		Fish dealer		Boat Maker		Net maker		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
≤ ₦10,000	53	(39.0)	42	(34.1)	38	(43/.7)	1`	(20.0)	8	(20.5)	142	(31.46)
₦10,001-₦20,000	43	(31.6)	50	(40.7)	19	(21.8)	3	(60.00)	8	(20.5)	123	(34.92)
₦20,001-₦30,000	17	(12.5)	16	(13.0)	13	(14.9)	0	(0.0)	9	(23.9)	55	(12.86)
₦30,001-₦40,000	14	(10.3)	10	(8.1)	10	(11.5()	1	(20.0)	7	(17.9)	42	(13.56)
₦40,001-₦50,000	4	(2.9)	2	(1.6)	4	(4.6)	0	(0.0)	4	(10.3)	14	(3.88)
≥ ₦50,000	5	(3.7-	3	(2.4)	3	(3.4)	0	(0.0)	3	(7.7)	14	(3.44)
Total	136 100		123(100)		87 (100)		5 (100)		39 (100)		39 (100)	
Mean	22,827.16		19,089.74		24,173.91		19,000		26,937.5			
Standard deviation	42711.8		12576.19		30620.48		13674.94		16074.30			

Source: Field survey (2012): Multiple responses possible

5.3 Profile of livelihood asset and diversification activities

The livelihood framework identifies five core asset categories or types upon which livelihoods are built. Fisherfolks's livelihood assets are defined broadly to include natural, physical, social, financial, and human capital as well as household valuables (Ellis, 2000).Winter *et al.* (2009) argue that the value and use of an asset depend not only on the quantity owned, but also on the ownership status of the asset.

Livelihood assets refer to people's strength in terms of capital endowments and how they endeavour to convert these into positive livelihood outcome (DFID, 2000). The individuals' asset base helps both directly and indirectly in livelihood diversification.Asset offers a store of wealth as well as provides an opportunity to invest in alternative enterprises.

Several researchers (Reardon, 1997; FAO and World bank, 2001; Kumar and Mathur, 2006) have noted that the lack of asset base creates an entry level barrier for the resource-poor households in diversifying their livelihood options particularly towards high-end remunerative non-farm activities. The livelihood asserts of fisherfolks area are presented below.

5.3.1 Natural capital

5.3.1.1 Land ownership refers to the availability of land for cultivation and other usage

The distribution of fisherfolks by land ownership shows that 46.67% owned a piece of land. These could either be used for crop farming, building of house/ hut and other domestic usage, such as spreading out of farm produce for sun – drying and erecting fish – processing kilns for fish smoking. The results also revealed that the majority (53.33%) of fisherfolks did not own land, as shown in Table 27.

Table 27: Distribution of fisherfolks by land ownership

Land Ownership	Oyan	Ikere	Total
Yes	133(50.76)	49(38.28)	182(46.67)
No	129(49.24)	79(61.72)	208(53.33)

Source: Field survey, 2012

Note: Percentages in parentheses

5.3.1.2 Access to natural capital

The distribution of fisherfolks by access to natural capital showed that 36.09% of them in Oyan Dam and 48.98% of them in Ikere Gorge Dam had access to land in the wet season. In the dry season, only 2.26% and 2.04% of them had access to land in Oyan and Ikere Gorge, respectively. With respect to Dam in the wet season, fisherfolks in both locations had limited access.

This represented 8.13% and 21.05% in Oyan and Ikere Gorge, respectively. With respect to river in both locations, 57.69% and 81.25% had access to it in Oyan and Ikere Gorge, respectively. This implies that both locations depend mainly on river for domestic purposes. The result is presented in Table 28.

Table 28: Distribution of fisherfolks by access to natural capital

Natural capital	Oyan Dam		Ikere Gorge	
	Wet season	Dry season	Wet season	Dry season
Land	48(36.09)	3(2.26)	24(48.98)	1(2.04)
Forest	3(23.08)	8(61.54)	6(35.29)	5(29.41)
Dam	13(8.13)	2(1.25)	16(21.05)	0(0)
River	15(57.69)	10(38.46)	28(81.25)	11(30.67)

Source: Field survey (2012)

Note: Percentages in parentheses

5.3.2 Physical capital

5.3.2.1 Ownership

Fisherfolks physical capital assets examined were crop farming tools, fishing gears, fish processing drums, and fishing boats, among others. The dominant physical capital owned by the fishersfolk in Oyan Dam were fishing gear (59.16%) these included fishing nets of various mesh sizes, gura traps and hook and line.

Ownership of crop farming tools was 53.34% (such as hoe, cutlass, and spades). Ownership of fishing boats was 51.53%; this was also a dominant physical capital among fisherfolks in Oyan Dam made up of fishing boats of various sizes. The least owned physical capital among fisherfolks in Oyan Dam were bus and motor car (0.76%).

However, the dominant physical capital among fisherfolks in Ikere Gorge Dam included fishing gear (60.16%) and fishing boat (58.59%). Also, 51.56% of fisherfolks owned building in Ikere Gorge Dam, while the remaining 48.44% engaged in squatting or resided in family compounds. Most of the homes were made of thatch, wood and mats. Key informant interviews and focus group discussions revealed that there was no electric power distribution across the communities surrounding Ikere Gorge Dam.

Most fisherfolks used kerosene lanterns for lightening their houses. Very few could afford power generating sets as alternative means of power supply. The least owned physical capital among sampled fisherfolks in Ikere Gorge Dam was similar to those of the sampled fisherfolks in Oyan Dam. It was observed that only one person owned a car among the sampledfisherfolks in Ikere Gorge Dam and two people owned a car each among those sampled in Oyan Dam. The result is presented in Table 29.

Table 29: Distribution of fisherfolks by ownership of physical capital

Physical capital	Oyan	Ikere
Crop farming tools		
Yes	145(53.34)	53(41.41)
No	117(44.66)	75(58.59)
Fishing gear		
Yes	155(59.16)	77(60.16)
No	107(40.84)	51(39.84)
Building		
Yes	175(33.21)	66(51.56)
No	87(66.79)	62(48.44)
Livestock		
Yes	83(31.68)	38(29.69)
No	179(68.32)	19(70.31)
Fish processing drums		
Yes	77(29.39)	20(15.63)
No	185(70.61)	108(84.38)
Tricycle		
Yes	6(2.29)	1(0.78)
No	256(97.71)	127(99.22)
Fishing boat/Canoe		
Yes	135(51.53)	75(58.59)
No	127(48.47)	53(41.41)
Motorcycle		
Yes	33(12.60)	27(21.09)
No	229(87.40)	101(78.91)
Bicycle		
Yes	9(3.44)	5(3.97)
No	253(96.56)	132(96.09)
Bus		
Yes	2(0.76)	1(0.78)
No	260(99.24)	127(99.22)
Car		
Yes	2(0.76)	1(0.78)
No	260(99.24)	127 (99.22)

Source: Field survey (2012)

Note: Percentages in parentheses

5.3.2.2 Access to physical capital

Physical capital comprises of the basic production tools and equipment needed to support livelihood. For fisherfolks to function more productively using their physical assets in order to increase their livelihood activities, it is essential that the physical assets are structured around the following components such as accessible and affordable transport, secure shelter and building, accessible and adequate water supply. Clean affordable energy for sustainable livelihood activities.

Without adequate access to these physical asset types long periods are spent in non-productive activities like the collection of water and fuel wood, (FAO, 2008). This was buttressed during FGD's where issues as such were pointed out, for instance "*poor transportation system debars essential products from reaching considerable number of fisherfolks and also in turn makes the transportation of fish catch and other goods to the market very expensive, this gives room for the activities of the middlemen sabotage to extort the produce of these fisherfolks.*

Also there is a need to ensure adequate access to improved production and processing techniques for suitable livelihoods for the fisherfolks. The was also buttressed by a key informant at Oyan dam, who stated that *"access to improved processing kilns will assist them in increasing their production level. It would also help to improve the quality of fish being process and also conserve a lot of time and energy wasted using local process kilns".*

Insufficient or inappropriate physical assets can put constraints to the production capacity of fisherfolks as buttressed by discussants at the FDG. More time, energy and effort are spent on meeting basic needs. However, fisherfolkks could have denied access to improved physical assets due to initial capital investment which could be expensive to obtain. Also, the cost of maintaining these physical assets would require commitment of both financial and human resources, which could be tasking to the fisherfolks livelihood at the initial stage. This

therefore implies that adequate availability and access of physical assets to fisherfolks in the study areas will go a long way in improving the level of livelihood assets of these fisherfolks and increasing level of livelihood activities carried out per day

5.3.3 Social capital

Table 30 presents the distribution of fisherfolks by social capital. All (100%) fisherfolks in Oyan and Ikere Gorge Dams belong to religious groups. Also, 72.5% of them in Oyan Dam and 75.8% in Ikere gorge Dam belonged to cultural groups. As for social groups that fisherfolks belonged to in Oyan Dam, 46.9% were in cooperative groups. Also, 57.8% of them in Ikere Gorge Dam were in community-based association.

5.3.3.1 Benefits derived from social capital.

Table 31 reveals that 12.5% of fisherfolks in Ikere Gorge Dam said fish production equipment was available to them and in a timely manner, while 75.0% of them claimed that the fish production equipment available to them was not adequate. Also, 37.79% of fisherfolks in Oyan Dam had fish-processing equipment, though in a non timely (75.76%) and not adequate (65.66%) manner. This implies that there could be a reduction in the quality of fish that is processed from Oyan Dam.

5.4 Financial capital

Financial capital denotes the financial resources that people use to achieve their livelihood objectives (Ellis, 2000). Financial resources can also be obtained through credit-providing institutions and can be used for direct achievement of livelihood outcomes.

Table 30 Distribution of fisherfolks by social capital

Social capital	Oyan	Ikere
Community-based Association		
Yes	200(76.3)	74(57.8)
No	62(23.7)	53(42.2)
Occupational group		
Yes	150(57.3)	100 (78.1)
No	112(42.7.)	28(21.9)
Cooperative group		
Yes	123(46.9)	78(60.9)
No	139(50.1)	50(39.1)
Cultural group		
Yes	190(72.5)	97(75.8)
No	72(27.5)	31(24.2)
Religious group		
Yes	262(100)	128(100)
No	0(0)	0(0)

Source: Field survey (2012)

Note: Percentages in parentheses Multiple responses

Table 31: Percentage distribution of benefits from social capital

Benefit	Availability		Timeliness		Adequacy	
	Oyan	Ikere	Oyan	Ikere	Oyan	Ikere
Livelihood Opportunities						
Yes	7.25	1.56	10.53	-	89.47	100
No	92.75	98.44	89.47	100	10.53	-
Finances						
Yes	33.59	14.06	11.36	11.11	42.14	4.44
No	66.41	85.94	88.64	88.89	51.95	55.56
Labour						
Yes	27.48	15.62	23.61	30.0	45.8	50.0
No	72.52	84.38	75.0	70.0	54.17	50.0
Fish-processing equipment						
Yes	30.53	14.06	12.5	16.67	51.3	66.7
No	69.47	85.94	87.5	83.33	48.7	33.3
Remittance						
Yes	1.91	0.78	-	-	-	-
No	98.09	99.22	100	100.00	-	-
Land						
Yes	10.69	4.69	10.71	16.69	75.0	50.0
No	89.3	95.31	89.29	83.33	25.0	50.0

Source: Field survey, 2012 Multiple responses

As evident in Table 32 the highest source of financial capital of most sampled fisherfolks in Oyan and Ikere Gorge Dams was daily contribution.

This was about 87.40% among fisherfolks in Oyan Dam and 75.00% among fisherfolks in Ikere Gorge Dam. This implies that fisherfolks were using their involvement in daily contribution to achieve their livelihood objectives and outcomes.

Table 32: Sources of financial capital

Financial capital	Oyan	Ikere	Total
A. Formal sources			
Current account			
Yes	41(15.6)	8(6.25)	49(10.92)
No	221(84.35)	120(93.75)	341(89.05)
Bank loan			
Yes	1(0.38)	0 (0)	1(0.38)
No	261(99.62)	128(100)	389(99.81)
B. Informal sources			
Esusu			
Yes	128(48.85)	29(22.66)	157(35.75)
No	134(51.15)	99(77.34)	233(64.24)
Remittances			
Yes	15(5.73)	6(4.69)	21(5.21)
No	247(94.27)	122(95.31)	369(94.79)
Pension			
Yes	6(4.69)	6(4.69)	12(4.69)
No	122(95.31)	122(95.31)	244(95.31)
Assistance from religious bodies			
Yes	14(5.34)	3(2.34)	17(3.84)
No	248(94.66)	125(97.66)	373(96.16)
Community assistance			
Yes	4(1.53)	0(0)	4(1.53)
No	258(98.47)	128(100)	386(99.23)
Daily contribution(*Ajo*)			
Yes	232(88.54)	96(75.0)	328(81.77)
No	33(12.60)	32(25.0)	65(18.8)

Source: Field survey, (2012)

Note: Percentages in parentheses

5.5 Human capital

Human capital represents the skills, knowledge, ability and good health that together enable people to pursue different livelihood strategies and achieve their livelihood outcomes. At the household/fisherfolks level, human capital is a function of the amount and quality of labour available.

5.6 Hired Labour

The distribution of fisherfolks by usage of hired laborer showed that 21.88% of them engaged the services of hired labour in their livelihood activities. While (78.13%) did not use hired labour. This is presented in Table 33.

5.7 Sources of information on livelihood

Findings revealed that most (65.27%) of fisherfolks in Oyan Dam received information on livelihood activities from their family members followed by friends (60.69%) and neighbours (58.02%). This implies that fisherfolks in Oyan Dam had limited access to diverse information on livelihood activities, particularly as only 1.91% of it came from extension agents.

A similar pattern was seen among fisherfolks in Ikere Gorge Dam. However, the presence of extension agents was not felt in Ikere Gorge Dam as none of fisherfolks received information on livelihood activities from extension agents. The highest sources of livelihood information that fisherfolks in Ikere Gorge Dam received was from family members (33.59%), while the least (0.78%) source of information on livelihood activities came from religious groups. Table 34 presents this result.

Table 33: Distribution of fisherfolks by of hired labour usage.

Usage of hired labour	Oyan	Ikere
Yes	52(19.85)	28(21.88)
No	210(80.15)	100(78.13)

Source: Field survey (2012).

Note: Percentages in parentheses

Table 34: Sources of information on livelihood

Sources of information	Oyan	Ikere	Total
Extension agents			
Yes	5(1.91)	0(0.00)	5(1.91)
No	257(98.09)	128(100)	285(99.0)
Family members			
Yes	171(65.27)	43(33.59)	214(49.4)
No	91(34.73)	85(66.41)	176(50.6)
Mass media(radio/tv)			
Yes	80(30.53)	17(13.28)	97(21.9)
No	182(69.47)	111(86.72)	293(78.0)
Friends			
Yes	159(60.69)	33(25.78)	192(43.2)
No	103(39.31)	95(74.22)	198(56.8)
Neighbors			
Yes	152(58.02)	26(20.31)	178(39.2)
No	101(41.98)	102(79.69)	203(60.8)
Religious groups			
Yes	20(7.63)	1 (0.78)	21(4.2)
No	242(92.37)	127(99.22)	369(95.8)

Source: Field survey (2012). Multiple responses

Note: Percentages in parentheses

5.8 Profile of livelihood activities engaged in by fisherfolks

The livelihood activities engaged in by fisherfolks in communities around Oyan and Ikere Gorge Dams were limited to a fairly narrow range of activities but these activities might be combined in complex ways and were sometimes short-lived. This is in agreement with the opinion of Chambers and Conway (1992), that livelihood becomes sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

Table 35 revealed that fisherfolks in communities around Oyan Dam engaged more in fishing (60.69%) and smoking (22.52%) activities irrespective of the season, probably owing to the fact that they were exploiting the fisheries resources in the Dam and taking advantage of the seemingly free entry nature of the Dam. This is followed by fish marketing (17.18%) in the dry season and farming in the wet season. The major crops grown in communities around Oyan and Ikere Gorge Dams were similar. These included maize, cassava, yam, rice, cowpea, pepper, tomatoes and okra. The choice of crop grown in these communities conforms to the choice of food consumption pattern of the people in the study area.

The least livelihood activities engaged in by fisherfolks in communities around Oyan Dam included boat making (0.38%) in the dry season; paid employment and off farm activities (0.38%) in the wet season. Similarly, the highest livelihood activities engaged in by fisherfolks in communities around Ikere Gorge Dam is fishing both in dry and wet seasons (66.41%), fish marketing, fish smoking and non-agricultural activities in the dry season (11.72%) as well as crop farming in the wet season (35.16%).

Table 35: Profile of livelihood activities engaged in by fisherfolks.

Livelihood participation	Oyan Dam		Ikere-gorge	
	Dry	Wet	Dry	Wet
Crop farming	159(41.84)	159(36.81)	85(50.60)	85(46.70)
Petty trading	45(11.84)	34(7.87)	15(8.93)	14(7.69)
Commercial motor cycle	58(15.26)	59(13.66)	15(8.93)	16(8.79)
Hunting	22(5.79)	15(3.47)	13(7.74)	6(3.30)
Mat weaving	1(0.26)	2(0.46)	3(1.79)	3(1.65)
Charcoal production	36(9.47)	30(6.94)	15(8.93)	12(6.59)
Paid employment	30(7.89)	1(0.23)	13(7.74)	0(0.00)
NTFP	27(7.10)	131(30.32)	8(7.76)	45(19.79)
Hair plaiting\	2(5.26)	1(0.23)	1(0.60)	1(5.49)

Source: Field survey (2012)

Note: Percentages in parentheses Multiple responses possible

NTFP-Non Timber Forest Products

Data collected during the focus group discussions revealed that non-agricultural livelihood activities among fisherfolks in the study area included shop keeping; food vending; petty trading (bread, biscuit, sugar, kerosene, kola nut); skill acquisition in tailoring, weaving, bricklaying, carpentry, mechanical repair of bicycle and motorcycle.

The least livelihood activities engaged in by sampled fisherfolkss in communities around Ikere Gorge Dam were hair plaiting (0.60) in the dry and paid employment (0.0%) in the wet season probably as a result of the fact that the fishing activities by fisherfolks in Ikere Gorge Dam were rewarding and sufficient to meet their livelihood needs in the wet season. As such they saw no reason to diversify their income in the wet season. Fish catch and fish-related activities are at the peak in the wet season in Ikere Gorge Dam.

5.9 Extent of diversification among fisherfolks groups

As a natural response to the decreasing returns from the Dams in the study areas, fisherfolks will diversify their livelihood activities in an attempt to avoid or alleviate poverty and spread risks. The peculiar nature of the fisheries in the study areas will influence the diversification of fisherfolks in either the dry or the wet season. This is in line with empirical evidence (Olawoye, 2000; Barret et, al, 2001, Minot *et al*., 2006) from a variety of locations, which suggests that rural households engage in multiple activities and rely on diversified income portfolios.

Much of the household diversification is not just non-farm but non-rural in character. The extent of diversification among the sampled fisherfolks groups in the study areas is found presented below.

5.10 Extent of diversification among the fishermen

Table 36 indicates the extent of diversification among the fishermen in different seasons. The fishers diversified more into hunting (73.53%) in the dry season and crop farming (98.04%) in the wet season. Corroborating this result is the study of Babatunde and Qaim (2009) which found farming as the most important income generating source for poorest households. This might also be due to the fact that rural dwellers are mostly agrarian who views farming as a normal way of life. Crop farming also helps the fishermen cope with food insecurity. This implies that fisherfolks derives more benefits and values (food and income) from farming activities than non farming activities. As such, agricultural activities should be given priority in any intervention to boost diversification of fisherfolks in fishing communities. The least diversification activity in the study areas was petty trading, with 9.80% diversification in the dry season and 7.35% diversification in the wet season. This implies that fishermen utilizes the available land for crop farming and exploit the forest for game in order to provide food for the family and sell the excess if available.

5.10.1 Extent of diversification among fish processors

Fish smokers though involved in various activities, as indicated in Table 37 Majority of them diversified into the collection of Non Timber Forest Products (NTFPs) both in the dry (79.55%) and in the wet (85.23%) season to compensate for low sales and low income from fish smoking.

Table 36: Extent of diversification among the fishers in different seasons

Activities	Dry*	Wet*
Petty trading	20(9.80)	15(7.35)
Crop farming	135(66.81)	200(98.04)
NTFP	85(41.67)	20(9.80)
Hunting	150(73.53)	50(24.51)

Source: Field survey (2012) *Multiple responses

NTFP- Non Timber Forest Products.

Table 37: Extent of diversification among the fish processors in different seasons

Activities	Dry*	Wet*
Food processing	20 (22.73)	9 (10.23)
NTFP	70 (79.55)	75 (85.23)
Petty trading	10 (11.36)	6 (6.82)
Crop farming	0 (0.00)	20 (22.73)
Hair plaiting	12 (13.64)	8 (9.09)
Food milling	18 (20.45)	15 (17.05)

Source: Field survey (2012) *Multiple responses possible

Non-Timber Forest Products (NTFP)

Fish smokers who diversified into crop farming accounted for 22.73% in the wet season and 22.73% of the fish processors were involved in the processing of farm produce such as processing cassava tuber into dried cassava flour, yam tubers into yam flour and so on in the dry seasons. Only few of the fish processors were involved in petty trading both in the wet (6.82%) and the dry (11.36%) seasons.

5.10.2 Extent of diversification among the fish dealers

Very few fish dealers diversified into other activities. Most (51.85%) of the fish dealers in the study area diversified into the collection of Non Timber Forest Products especially the gathering of fruits and nuts in the dry season. The fish dealers moved from one community to the other in search of fresh fish. Most of them passed through the forest where they gathered fruits and nuts to sell as source of additional income. The least diversified activities among the fish dealers were charcoal production (9.25%) in the dry season. In the wet season, fish dealers diversified mostly into the collection of Non Timber Forest Products (49.02%) and crop farming (38.89%) as presented in Table 38.

Table 38: Extent of diversification among the fish dealers in different seasons

Activities	Dry*	Wet*
Petty trading	9 (16.67)	14 (25.39)
Crop farming	15 (27.78)	21 (38.89)
Charcoal production	5(9.26)	0(0.00)
Collection of NTFP	28 (51.85)	25 (49.02)

Source: Field survey (2012) *Multiple responses possible

Note: Percentages in parentheses

NTFP- Non Timber Forest Products

5.10.3 Extent of diversification among the boat-makers in different seasons

Table 39 shows that all (100%) the boat makers in the study areas diversified into carpentry work in the dry season and into crop farming in the wet season. This implies that the boat makers in the study areas were skilled in both crop farming and carpentry works. Their diversification into carpentry work complemented their existing livelihood activity. Diversification among the boat-makers clearly support one of the reasons for livelihood diversification according to ODI (2003), which states that some diversified activities may build on existing skills and experience.

5.10.4 Extent of diversification among the net-makers

Net-makers were the most diversified among fisherfolkss group in the study areas. In the dry season, the net-makers diversified mainly into the collection of Non Timber Forest Products (44.12%) and charcoal production (29.41%) to compensate for periods of low demand for nets. Also, 17.65% of the net makers were involved in mat-weaving made from dried elephant grass. In the wet season, more than half (61.76%) of the net-makers diversified into crop farming, followed by fishing (58.82%). The result is presented in Table 40.

Table 39: Extent of diversification among the boat makers

Activities	Dry	Wet
Carpentry work	9(100)	3(33.33)
Crop farming	2(22.22)	9(100)

Source: Field survey (2012)

Note: Percentages in parentheses

Table 40: Extent of diversification among the net-makers in different seasons

Activities	Dry*	Wet*
Fishing	12 (35.29)	20 (58.82)
Petty trading	3 (8.82)	6 (17.65)
Barbing	2(5.88)	2(5.88)
Motorcycle riding	4 (11.76)	3 (8.82)
Crop farming	6 (17.65)	21(61.76)
Carpentry work	5(14.71)	0 (0.00)
Animal production	7 (20.59)	4 (11.76)
Hunting	5(14.71)	0 (0.00)
Gathering of NTFP	15(44.12)	10(29.41)
Charcoal production	10 (29.41)	7 (20.59)
Mat-weaving	6(17.65)	2(5.88)

Source: Field survey (2012) *Multiple responses possible

Note: Percentages in parentheses.

NTFP – Non Timber Forest Products

5.11 Pattern of livelihood diversification of fisherfolks by share of income

The share of income of the fisherfolks in the study areas differed significantly with respect to seasonal changes. During the dry season, net-makers (0.2405) had the highest share of income which implied that net makers were the most diversified among the sampled fisherfolks in the study areas. Boat makers (0.1696) had the least income share during the dry season. In the wet season, fishermen (0.3863) had the highest share of income implying that the sampled fishermen in the study areas were the most diversified in the wet season. The income share of sampled fish dealers in the study areas was the second highest both in the dry (0.2158) and in the wet (0.2270) seasons. An implication of this is that fish dealers earn a relatively high income from sales irrespective of seasonality though a higher income is generated during the wet season. This finding is in line with Fatunla (1996) and Hill (2005), who note that income generated by fish dealers is a sustainable activity to improved the livelihood of the fisherfolks.

Share of income of minor livelihood activities is the measure of the ratio of the sum of income from all livelihood activities. The measure is from the range of 0-1. The higher the ratio, the more diversified the fisherfolk is. The shares of incomes from different activities in which fisherfolks engaged in is presented in Table 41.

Table 41: Distribution of fisherfolks by income share

Fisherfolks	Dry		Wet	
	Income (₦)	Income share	Income (₦)	Income share
Fishermen	22827.16	0.2038	75562.50	0.3863
Fish smokers	19089.74	0.1704	20000.00	0.1022
Fish dealer	24173.91	0.2158	44400.00	0.2270
Boat makers	19000.00	0.1696	34333.33	0.1755
Net makers	26937.50	0.2405	21333.33	0.1091
Total	112028.31	1.0	195629.16	1.0

Source: Field survey (2012)

5.12 Comparison of mean income of fisherfolks in wet and dry season

Table 42 revealed that there is a statistical difference between the mean income of fishermen in the study areas both in wet and dry seasons. For fish the study areas both in wet and dry seasons. For fish processors in the study areas, the table revealed that there is no statistical difference in their mean income there is no statistical difference in their mean income both in wet and dry seasons though it is significant at 1%.

The table also revealed that there is a statistical difference in the mean income of fish dealers in the study areas both in wet and dry seasons. There is also a statistical difference in the mean income of net makers in the study areas both in wet and dry seasons.

Mean income of fisherfolks in the study areas was compared based on seasons i.e wet (March-October) and dry (November – February) sea sons. This was done with t-test as a test of difference.

Table 42: Comparison of mean income of fisherfolks in wet and dry season

	Fisher	Mean	Standard deviation	t-test
Wet				
Fishermen	136	75,562.5	5.011	0.97
Processor	123	20,000	11313.7	-0.15*
Dealers	87	44,400	55460.09	1.32
Boat makers	5	34,333.33	13650.40	1.6
Net makers	39	21,333.33	100066.45	0.02
Dry				
Fishermen	136	22,827.16	42711.8	0.048
Processors	123	19,089.74	12576.19	-1.50*
Dealers	87	24,173.91	30620.48	0.65
Boat makers	5	19,000	13674.94	-0.36*
Net makers	39	26,937.5	16074.30	2.0

Source: Field survey (2012)

Note: Percentages in parentheses

5.13 Extent of diversification among fisherfolks

This section presents the extent of diversification among fisherfolks using the Herfindahl Diversification Index (HDI) in both the dry and the wet seasons.

The results of the extent of diversification among fisherfolks groups is presented in Table 43. In the dry season, net makers were the most diversified (0.625), followed by boat makers (0.176), fish dealers (0.147), fish processors (0.139), and fishermen (0.122) in Oyan Dam. The trend was slightly different in Ikere Gorge Dam, where fish processors (0.278) were the least diversified and net makers (0.556) were the most diversified in the dry season. In the wet season, net makers (0.909) were the most diversified both in Oyan and Ikere Gorge Dams.

The implication of net makers being the most diversified among fisherfolks could be attributed to low demand of nets during the dry season and this would necessitate diversification into other income-earning activities so as to sustain their livelihood. Another reason could be that the demand for nets was at the peak in the onset of the wet season. Also, the fishermen were less diversified in the dry season probably because the income made from fishing was enough for them not to engage in other livelihood activities. Boat makers were the least diversified during the dry season according to a key informant in Ikere Gorge damwho stated that '*the demand for boats are usually high in the dry season.* Probably, the income generated by boat makers in the dry season was enough for their sustenance.

The implication of fish processors being the most diversified among fisherfolks could probably be due to the fact that fish dealers competed with them for the harvested fish product, causing a drastic reduction in the quantity of fish available for processing and income made from fish processing was minimal, which could result in the need for diversification. The fishermen were the least diversified among fisherfolks in the wet season.

Table 43: Distribution of fisherfolks by extent of diversification

	Oyan		Ikere	
HDI	**Dry**	**Wet**	**Dry**	**Wet**
Fishermen	0.122 (0.105)	0.159 (0.135)	0.303 (0.193)	0.435 (0.203)
Fish processors	0.139 (0.088)	0.222 (0.135)	0.278 (0.219)	0.370 (0.270)
Fish dealers	0.147 (0.122)	0.256 (0.223)	0.419 (0.156)	0.347 (0.146)
Boat makers	0.176 (0.375)	0.500(0.674)	0.334(0.454)	0.248 (0.313)
Net maker	0.625 (0.275)	0.909 (0.087)	0.556 (0.434)	0.909 (0.369)

Source: Field survey (2012)

Note: Standard deviation in parentheses

This was due to large harvest realized during the wet season. They derived enough income to cater for their needs and did not see the need to diversify into other income-earning streams.

In conclusion, it is evident that the fishermen diversified less among fisherfolks groups in Oyan Dam irrespective of the season. Similarly, the net makers were highly diversified in both seasons, while fish dealers moderately diversified into other livelihood activities.

5.14 Factors determining the extent of diversification among fisherfolks

Probit Regression Model was used to determine the factors influencing the extent of livelihood diversification among fisherfolks. It is used to model dichotomous variables. It is a non-linear regression model that forces the output (predicted) values to be either 0 or 1. It is also used when the dependent variable is binary (has two possible values). In this study, the inverse of the Herfindahl Index was used as the dependent variable, and was regressed against a set of explanatory variables that were hypothesized to be important in determining the extent of diversification. The determinant of the extent of diversification was done for the different categories of fisherfolks as explained below.

5.14.1 Factors determining the extent of diversification among the fishermen

The diagnostics revealed that the model had a log likelihood ratio of -116.2 and a chi square statistics of 34.77 which were significant at 1 percent. The pseudo R-square was 0.1301. The diagnostics showed that the model was fit for the data.

Six variables in the model were statistically significant at various levels with respect to the dry season, while five variables were significant in the wet season. Out of the six variables

that were significant in the dry season, five variables were negatively signed, namely sex, years of education, number of wives, financial capital and physical capital. The positively signed variable was age. Out of the five variables that were significant in the wet season, one variables was negatively signed, namely Natural capital.

Age

The age of the fishers positively influenced the extent of diversification among the fishers in the dry and the wet seasons, at $p \leq 0.05$ and $p \leq 0.01$, respectively. This implies that, as the ages of fishers in the study areas increase the likelihood of them diversifying their livelihood increases in the dry and the wet season. In other words, multiplicity of activities increases with advancing age. This is also in line with Anna's (2002) claim that experienced persons have more prospects of getting jobs in the non-fishing sector.

Year of education

Year of education of the fishers was positive and significant at $p \leq 0.10$ in the dry season. This implies that as the years of education of fishermen in the study areas increase, the likelihood for them to diversify their livelihood decreases in the dry season. Education is an important factor influencing the extent of livelihood diversification. This result is consistent with the results from other studies on diversification behaviour in Africa (Awudu and CroleRees 2001; Winters et al., 2009; Oluwatayo, 2009; Idowu *et al.*, 2011), where education was found to be a key determinant of the diversification of income-generating activities. This is because education enhances the potential of respondents and makes them grab available opportunities with little or no stress.

Number of wives

The number of wives that the fishers had was positive and significantly influenced the extent of livelihood diversification among the fishers in the study area, at $p \leq 0.10$ in the dry season. This implies that, as the number of wives of fishers in the study area increases, the likelihood

for the fishers to diversify their livelihood activities will increases in the dry season. A possible implication of this is increase in the number of wives increases the household size. Thus, there is the need to cater for the members constituting the increase. A larger household size may depend on more income-generating activities for sustainable livelihood than a smaller household size.

Financial capital

Financial capital in the dry season was negative and significant at $p \leq 0.01$. This result is probably because accessing financial capital is an important investment which is necessary for increasing fish production. Therefore, those fishermen that could access financial capital were less diversified in their income sources and were probably more involved in fishing activities. This relates to Barrett et al. (2001) who found complete reliance on own fishing activities common among the wealthier rural African fishing households. Such households are those that are able to access better financial capital.

Physical capital

Physical capital comprises the basic producer equipment needed to support livelihood. These were fishing nets, smoking kilns, fishing boats and vessel, among others. Access to physical capital had a negative relationship with the extent of livelihood diversification and was significant at $p \leq 0.05$ level. This implies that increase in the physical capital of fishermen in the study area tends to reduce the extent of their livelihood diversification activities in the dry season.

Natural capital

Natural capital refers to the natural resource stocks from which intangible public goods, such as the atmosphere, water body and biodiversity, are used directly for production (fish stock). Fisher's natural capital was negative and significantly influenced the extent of diversification of their livelihood activities in the wet season at $p \leq 0.01$. This implies that the probability of

having access to natural capital will reduce the likelihood of diversification into other livelihood activities in the wet season. A possible implication is that seasonality has a great impact on diversification. As such, during the wet season, there is an increase in the water body with a significant increase in the number of catches which, in turn, yields more income for the fishermen. The result is presented in table 44.

Table 44: Factors determining the extent of diversification among the fishermen

HDI	Dry		Wet	
	Coefficient	Std. Error	Coefficient	Std. Error
Sex	-0.657*	0.397	-0.107	0.397
Age	0.028**	0.012	0.036***	0.013
Year of education	0.051* 0.027		-0.024	0.013
Married	0.346	0.345	-0.204	0.386
No. of wives	-0.323*	0.174	-0.186	0.195
No. of children	0.006	0.004	-0.039	0.050
Household size	0.018	0.026	-0.039	0.030
Financial capital	-2.479***	0.844	-1.445	0.913
Human capital	0.598	0.502	1.005***	0.549
Natural capital	-0.087	0.725	-2.792***	0.856
Physical capital	-1.685**	0.839	-1.445	0.945
Socialcapital agg.	0.919	0.959	2.176*	1.235
Constant	1.098*	0.626	0.863	0.613
Log likelihood	-116.2	3282	-99.14	0.471
Pseudo R^2	0.1301		0.2033	
Prob> Chi^2	0.0009		0.0000	
No of Obs	204		204	
LR CHI^2 (13)	34.77		50.61 *	

***, **, and * represent statistical significance of variables at p≤ (0.01) (0.05) (0.10), respectively.

5.14.2 Factors determining extent of diversification among the fish processors

The output of data analysis revealed that the model had a log likelihood ratio of -49.91 and chi square statistics of 18.23, which was significant. The pseudo R-square was 0.1544. The diagnostics showed that the model was good for the data.

Two variables in the model were statistically significant at various levels both in the dry and in the wet season. The two variables that were significant in the dry season had negative sign. They are sex and human capital. In the wet season, the two variables that were significant were human and natural capital. These also had negative sign.

Sex

The gender of the fish processors negatively influenced the extent of diversification among them in the dry season, at $p \leq 0.10$ from the base category (Female=0). This implies that the probability of being a male fish processor will reduce the likelihood of the extent of diversification into other livelihood activities.

Human capital

Human capital represents different aspects of people such as skills, knowledge, ability to labour, and good health that together enable people or individuals to pursue different livelihood strategies enhancing their livelihood objectives. Table 48 indicates that human capital negatively influenced livelihood diversification of fish processors in both the dry and the wet seasons. The significant levels were at $p \leq 0.05$ for dry and $p \leq 0.10$ for wet seasons respectively. A possible implication is that with increase in human capital of fish processors in the study in terms of skills knowledge and labour, the likelihood for the fish processors to diversify into other activities reduces.

This factor will further enhance and increase the customer base of sampled fish processors in the study areas. With improved human capital, specialization and increased income will be stimulated.

Natural capital

Natural capital refers to the natural resource stocks from which intangible public goods, such as the atmosphere and biodiversity to divisible assets are used directly for production (fish stock). Natural capital of sampled fish processors in the study areas was negative and significantly influenced the extent of diversification of their livelihood activities in the wet season at $p \leq 0.01$.

This implies that the probability of having access to natural will reduce the likelihood of diversification into other livelihood activities in the wet season. A possible implication is that seasonality has a great impact on diversification. As such, during the wet season, there is an increase in the water body with a significant increase in the number of catches which, in turn, yields more income for the fish processors. This reduces the need to diversify into other likelihood activities. Table 45 presents the extent of diversification among the sampled fish processors in the study areas.

Table 45: Factors determining the extent of diversification among the fish processors

HDI	Dry		Wet	
Variable	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Oyan	-0.144	0.426	-0.089	0.419
Sex	-1.594*	0.950	0.587	0.795
Age	0.028	0.019	0.019	0.019
Year of Education	-0.069	0.059	-0.026	0.057
Married	-	-	-0.561	1.482
No. of Wives	0.757	0.588	-0.036	0.489
No. of Children	0.043	0.099	0.089	0.105
Household Size	-0.076	0.077	-0.065	0.076
Financial Capital	1.913	1.455	1.427	1.458
Human Capital	-1.929**	0.882	-1.870*	0.957
Natural Capital	0.655	1.120	-5.124***	1.431
Physical Capital	-1.474	1.485	0.844	1.431
Social Capital Agg.	-0.655	4.577	1.119	3.617
Constant	-0.023	1.218	-0.201	1.811
Loglikelihood	-49.91	4258	-47.08	2.129
Pseudo R^2	0.1544		0.1980	
Prob> Chi^2	0.0084		0.0388	
No. of OBS	86		88	
LR CHI^2 (13)	18.23		23.24	

***, **, and * represent statistical significance of variables at p≤ (0.01) (0.05) (0.10), respectively.

5.14.3 Factors determining the extent of diversification among the fish dealers

Four variables in the model were statistically significant in the dry season while three variables statistically influence extent of diversification of sampled fish dealers in the wet season.

Age

The age of sampled fish dealers is significant and positively influenced the extent of diversification among the fish dealers both in dry and wet seasons at $p \leq 0.05$ and $p \leq 0.1$, respectively. This presupposes that, as the age of fish dealer in the study area increases, the likelihood of them diversifying their livelihood increases in both seasons. In other words, multiplicity of activities increases with advancing age. This is in tandem with the findings of Anna (2002), that experienced persons have more prospects of getting jobs in the non-fishing sector.

Year of education

Years of education of the fish dealers were positive and significant at $p \leq 0.10$ in both seasons. This implies that as the years of education of the fish dealers in the study area increase the likelihood of diversifying their livelihood increases. Education is an important factor influencing the extent of livelihood diversification. This result is consistent with the results from other studies on diversification behaviour in Africa (Awudu and CroleRees, 2001; Winters et al., 2009; Oluwatayo, 2009; Idowu *et al.*, 2011), where education was found to be a key determinant of the diversification of income-generating activities. Education enhanced the potential of the respondents and made them grab available opportunities with little or no stress.

Financial capital

Financial capital comprises the financial resources that the fish dealers used to achieve the objectives of their livelihoods. The most common financial sources were credit system,

remittances, business and salary from jobs. Financial capital was negative and significant at p≤0.05 in the dry season. This result is probably because accessing financial capital is an important investment which is necessary for increasing fish production. Therefore, those fishermen that could access financial capital were less diversified in their income sources and were probably more involved in fishing activities. This result is in line with the findings of Barrett et al. (2001), where complete reliance on own fishing activities was found to be common among the wealthier rural African fishing households. Such households were those able to access better financial capital.

Social capital

This focuses on the social networks and connections among the members in society. Affiliation to or membership of formal groups, associations and organizations develop trustworthiness and reciprocity, which ultimately enhance the knowledge, information, skills and access to resources to achieve better livelihood. Social capital was negatively significant at p≤0.05 andp≤0.10 in the dry and the wet seasons, respectively. This implies that the probability of a fish dealer being in a social group or organization will decrease his/her likelihood of diversification into other income-generating activities. A possible implication is that members of a social group have market information and social insurance in the form of capital which enables fish dealers to access ready market targets and cope with any shortfall that may arise during trade, thus reducing the likelihood of diversifying into other income-generating activities without these social benefits. The result is presented in Table 46.

Table 46: Factors determining the extent of diversification among the fish dealers

HDI	Dry		Wet	
Variable	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Oyan	1.954**	0.877	1.892**	0.754
Sex	0.792	1.439	0.190	1.265
Age	0.060**	0.029	0.049*	0.026
Year of Education	0.209*	0.117	0.168*	0.101
No. of Wives	-0.236	0.962	0.352	0.823
No. of Children	0.188	0.139	-0.007	0.126
Household Size	-0.163	0.108	-0.105	0.101
Financial Capital	-6.379**	3.239	-4.535	3.008
Human Capital	-1.270	1.500	-2.635	1.570
Natural Capital	-0.236	1.839	-1.526	1.613
Physical Capital	1.892	1.932	0.747	1.821
Social Capital	-28.189**	11.285	-15.713*	9.226
Constant	-1.384	1.238	-1.233	1.153
Loglikelihood	-20.02	6464	-22.39	6883
Pseudo R^2	0.3669		0.3307	
Prob> Chi^2	0.0260		0.0361	
No. of OBS	49		49	
LR CHI^2 (13)	23.21		22.13	

***, **, and * represents statistical significance of variables at p≤ (0.01) (0.05) (0.10), respectively.

5.14.4 Constraints encountered by fisherfolks

Livelihood diversification is an important survival strategy for the rural households in developing countries. However, there are several constraints to successful livelihood diversification. Identification of the constraints for a particular agro-ecological region is crucial for programme planning and policy formulation. This study has identified some of the socio-economic, technological, institutional and policy constraints encountered by fisherfolks in the communities around Oyan and Ikere Gorge Dams. The under listed constraints were highest among the constraints identified by fisherfolks during pre testing of instrument. The result is presented in Table 47.

Inadequate extension service

The extension organization provides authentic advisory information and services. This can be market information, transfer of technology to fisherfolks and sustainable fishing practices in order to increase productivity of fisherfolks. In communities around Oyan, 93.13% of the total fisherfolks said extension service was a constraint encountered, while 6.11% revealed that inadequate extension services was not a constraint encountered. The finding in Oyan was similar to that of Ikere Gorge where 100% of fisherfolks revealed that inadequate extension service was a major constraint to sustainable livelihood.

Labour shortages

In communities around Oyan Dam, 14.12% of fisherfolks said labour shortage was not a constraint to their livelihood. More than two-thirds (85.88%) of fisherfolks said labour shortage was a major factor affecting their livelihood. In Ikere Gorge, 96.8% of fisherfolks said labour shortage was a major constraint to sustainable livelihood. The results showed similarity in the constraint encountered by fisherfolks in both areas.

Poor credit facilities

Table 48 shows that about half (42.75%) of fisherfolks around Oyan Dam reported that poor credit facilities were not a constraint, while more than half (57.25%) revealed that poor credit was a major constraint encountered by fisherfolks. Conversely, 64.84% of fisherfolks around Ikere Gorge Dam revealed that poor credit facility were not a constraint to diversification into other livelihood activities. This further buttresses the importance of credit facilities in fishing activities.

Inadequate input supply

The result showed that inadequate input supply was not a constraint to 15.27% of fisherfolks in Oyan, while 83.59% of fisherfolks revealed that inadequate input supply was a major constraint encountered. This finding is similar among fisherfolks in communities around Ikere Gorge Dam, where 90.63% of them encountered inadequate input supply as a major constraint. This finding revealed that more than half of fisherfolks in both Oyan and Ikere Gorge had input constrained.

Limited technical knowledge

This refers to the knowledge and abilities needed to accomplish fish-related activities as well as other specific tasks towards increase in productivity in an efficient and effective way. About 100% of the total fisherfolks revealed that limited technical knowledge required in the fish-related activities was a major constraint encountered by fisherfolks in communities around both Oyan and Ikere Gorge Dams. This implies that almost all fisherfolks in the study area do not use modern technology when carrying out fish-related activities.

Distance to market

Fisherfolks living in communities around Oyan and Ikere Gorge Dams had access to market. A total of 66.41% and 54.69% said distance to market was not a constraint in Oyan

and Ikere Gorge Dams respectively; while 33.21% and 43.75%, respectively, revealed that distance to market was a major constraint to sustainable livelihood.

Table 47: Constraints to livelihood diversification encountered by fisherfolks.

Constraints	Oyan Dam			Ikere Gorge Dam		
	None	Minor	Major	None	Minor	Major
	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)
Inadequate extension service	16(6.11)	2(0.76)	244(93.13)	0(0)	0(0)	124(96.8)
Labour shortages	37(14.12)	0(0)	225(85.88)	3(2.34)	1(0.78)	116(90.63)
Poor credit facilities	112(42.75)	0(0)	150(57.25)	41(32.03)	4(3.13)	83(64.84)
Inadequate input supply	40(15.27)	3(1.15)	219(83.59)	11(8.59)	1(0.78)	56(43.75)
Limited technical knowledge	3(1.15)	0(0)	257(58.02)	0(0)	0(0)	128(100)
Health problem	14(5.34)	0(0)	87(33.21)	5(3.9)	2(1.56)	121(94.5)
Restriction on use of boat	1(0.38)	4(1.53)	248(94.7)	1(0.78)	0(0)	85(66.41)
Poor transportation	110(41.98)	0(0)	152(98.85)	42(32.81)	1(0.78)	127(99.22)
Distance to market	174(66.41)	1(0.38)	259(98.09)	70(54.69)	2(1.56)	128(100)

Source: Field survey (2012)

Figures in parenthesis are in percentage.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of the major findings of the study, the conclusion and recommendations made based on the findings put forward for policy formulation and implementation of fisherfolks in the study areas.

6.1 Summary of major findings

The study investigated the livelihood diversification of fisherfolks in communities around Oyan and Ikere Gorge Dams in South-western Nigeria. Specifically, the study identified selected socio-economic characteristics of fisherfolks in the study areas. The study profiled the livelihood assets and diversification activities among fisherfolks in the study areas. The study further determined the extent of diversification activities among fisherfolks and identified the factors that determine the extent of diversification among fisherfolks. The study also identified the constraints to livelihood diversification of the fisherfolks.

This study was based on primary data collected in 2012 from fisherfolks in communities around two dams located in Ogun (Oyan Dam) and Oyo (Ikere Gorge Dam) States. A four sampling technique was used to select 2 states with 2 dams that are managed by the same body and a total of 390 respondents (262 in Oyan and 128 in Ikere Gorge) were randomly selected. A well structured interview schedule was pre tested and used to collect data for the study. Data on the socio-demographic characteristics, major occupations, diversified activities of the respondents and the constraints they encountered were collected

Results of the study revealed that majority of fisherfolks (63.08%) were male, while 36.92% were females. Majority (72.5%) of fisherfolks engage in fishing as their primary occupation. The mean age of fisherfolks was 27.75 years and the mean household size of sampled

fisherfolks was About 86.92% of the respondents in the study areas were married. More than half of fisherfolks (58.0%) in the study areas were from the Ijaw ethnic group.

The income share of fisherfolks differed significantly with respect to seasonal changes. During the dry season, net makers (0.2405) had the highest income share while fishermen (0.3863) had the highest income share in the wet season. Boat makers (0.1696) was reported to have the least income share in the dry season. after fisher men's income.

The Herfindahl Index, which showed the extent of diversification among fisherfolks, revealed that net makers (0.625) were the most diversified in the dry season followed by boat makers (0.176), fish dealers (0.147), fish processors (0.139), and fishermen (0.122) in Oyan Dam. The net makers being the most diversified among fisherfolks could be linked to low demand of nets during the dry season; this would necessitate diversification into other income-earning activities so as to sustain their livelihood. In the wet season, fish smokers were the most diversified among fisherfolks (0.263), followed by boat makers (0.234), fish dealers (0.226), net makers (0.132), and fishermen (0.19). Fish smokers being the most diversified among fisherfolks could probably be due to the fact that fish dealers compete with them for the harvested fish product, bringing a drastic reduction in the income made from fish smoking and, therefore, the pertinent need for diversification.

The determinant of the extent of diversification using the Probit Model showed that age, years of education, financial capital, human capital and natural capital had both positive and negative effects on livelihood diversification by fisherfolks, depending on the actual primary engagement (fisherman, fish smoker and fish dealer). Inadequate extension service, poor credit facilities, limited technical knowledge and labour shortages were identified as major constraints encountered by fisherfolks.

6.2 Conclusion

The study concluded that fisherfolks in the study areas had a mean age of 27.75 years and were in their economically active years. Fisherfolks in the study areas were predominantly married and highest level of education was primary school. Fisherfolks had a mean household size of seven, which indicates high dependency ratio and also increased household labour. Based on the empirical evidence from the analysis, the following conclusions are drawn:

- Fisherfolks diversify into other livelihood activities.
- The diversified activities are a sustainable coping strategy to increase fisherfolks income.
- The income share generated from different fisherfolks activities are affected by seasonality.
- The patterns of livelihood diversification activities are dependent on seasonality.
- Age, years of education, physical capital, natural capital, social capital and financial capital affect the extent of livelihood diversification.
- Inadequate extension service, distance to market, restrictions on the use of motorized boats and poor transportation were the major constraints to livelihood diversification of the sampled fisherfolks.

6.3 Recommendations

The following recommendations are put forward based on the finding of the study:

1. There is a need to establish technical and vocational schools in rural areas especially for fisherfolks as this would boost thoeir basic knowledge and skills in their livelihoods thus improving their livelihood abilities and human assets in order to improve their livelihood opportunities. This will improve their level of knowledge and

skills and also provide employment and entrepreneurial skills for the fisherfolks in the study areas.

2. In the rural communities, vocational institutions should be provided so as to increase fisherfolks's educational skills and knowledge and empower them in order to improve their livelihood diversification status.
3. There is a need for the provision of rural credit institutions by government agencies. It is necessary that saving institutions (such as informal credit and savings 'ajo') be institutionalized, especially with reference to fisherfolks so that they can also access soft loans from banks with their low income wage/savings and also at low interest rates.
4. There is need to promote information sources such as the sue of GSM in the rural areas as these act as a ready, relevant and reliable sources of information for the fisherfolks in their livelihood diversification opportunities.
5. There is need to provide a conducive environment for rural livelihood activities to thrive by providing rural policies that would enhance sustainable rural livelihoods so that fisherfolks livelihood activities can thrive and blossom in the study areas.
6. Government and nongovernmental organizations (NGO) should improve and develop the rural sector through the provision of basic infrastructure such as power supply, good road networks and pipe borne water supply in order to improve the livelihoods of these fisherfolks. This will enhance sustainable livelihood and encourage livelihood diversification of the fisherfolks in their communities.

REFERENCES

A R C N,2009. Implementation of the adopted villages. Agricultural Research Outreach Center (AROCs), National Agricultural Research Institute (NARIs) and Federal College of Agriculture (FCAs).

Abiodun, J.A and Niworu, A.M. 2004. Fisheries statistical bulletin Kainji lake, Nigeria. *Kainji Lake Fisheries Management and Conservation Unit Technical Report*, series 23, Pp 1-23.

Abiodun, J.A. 2003. Evaluation of fisheries catch trend on lake Kainji, Nigeria, 1995-2001. *Journal of applied sciences and environmental management*, vol 7, (2), pp 9-13.

Adebayo E.F and Anyanwu (2013). Trends in Aquaculture Production in Nigeria: Implications for food security. Paper presented in 5th PAFFA conference, University of Burundi, Bujumbura.

Adebayo, O. and Pitan, O.O. 2003. The role of women in marketing of frozen fish in Lagos State of Nigeria. *16th Annual Conference of the Fisheries Society of Nigeria* (FISON), 4-9 November 2001, Maiduguri, Nigeria.

Adediran D.O. (2008)' Effect of livelihood diversification on the socio-economic status of rural dwellers in Ogun State, Nigeria M.Sc Thesis unpublished, University of Ibadan, Ibadan pp. 21-53

Adejare I.G.(2013): Determined of Labour available and utilization among food and tree crop farmers in Southwestern Nigeria. Department of Agriculture and Forestry, University of Ibadan. Pp56-57.

Adeleke M.L., Ajibefun I.A. and Famoofo O.O. 2011. Utilization of the indigenous systems to reducing the effect of climate change and vulnerability of the fish farmers in the coastal region of Nigeria (using Ilaje LGA of Ondo State as a case study).

Adeleke, M.L. (2013): The socio economic characteristics of artisanal fisherfolks in the coastal region of Ondo state, Nigeria. *Journal of Economic and Sustainable Development.* (Paper.) (Online). Vol.4, No.2, 2013. http://pakacademicsearch.com/pdf-files/ech/520/133-139 vol4, No2(2013)pdf

Ademola, A.O. (2010): Factors affecting livelihood activities in Ile-Ogbo community of Ayedire Local Government Area, Osun State, Nigeria. M.Sc Thesis. Unpublished, University of Ibadan, Ibadan. Pp. 73-74, 84-87.

Adeoye D, Akegbejo-Samson Y, Omoniyi T. and Dipeolu A (2012): Challenges and Investment Opportunities for large scale aquaculture farmers in Nigeria Proceeding of 2012 IIFET conference in Tanzania.

Adesimi, A.A. and Aderinola E.A. 1983. Economic Fish Import demand in Nigeria. Paper presented at the Conference of Fisheries Society of Nigeria (FISON), held in Maiduguri. Vol 2, No 5 pp 44-47.

Ahmed, Y.B. (2013): Socio-economic status of fisherfolks of Yuna Adopted village in Borgu local government, Niger state. *Journal of Fisheries and Aquatic Science*, 8: pp 136-141.

Ajayi, T.O. and Talabi, S.O. 1984. The potentials and strategies for optimum utilization of ocean and marine research (NIOMR) *Technical Paper* No–18 p 24.

Akanni K.A, 2008: Catch levels and capital Investment of Artisanal Fishermen in Lagos State, Nigeria. Turkish Journal of Fisheries and Aquatic Science 8:361-368

Akinbile L.A (2007): Social Impact of limestone exploitation in Yewa North Local Government Area of Ogun State, Nigeria. Pakistan Journal of Social Science 1:107-111, Maxwell Journal

Akinola, B.E (2008): Social Capital and Income Generating Activities of Rural Women in Ondo State, An unpublished M.Sc. Project of the Department of Agriculture and

Rural Development, Faculty of Agriculture and Forestry, University of Ibadan, Ibadan pp. 22-42.

Akinwumi F.O., Akinwumi I.O and Ogundahunsi O.A., 2011: Characterization of Artisanal Fishery in the Coastal Area of Ondo State, Nigeria. International Research Journal of Agricultural Science and Soil Science Vol. 1 (3) pp. 083-089, May, 2011.

Akinyemi O. 1998. *Sustainable managements of Nigeria's fisheries in the 21st century*. Faculty Lecture Series No 7, Faculty of Agric and Forestry, University of Ibadan. 27p.

Altarelli, V. and Carloni, A. 2000. Inter-agency experiences and lessons food and Agricultural Organisation, Rural Development Division (2000) - available online

Alwang, J., Siegel, P. B. and Jorgense, S.L. 2002. Vulnerability as viewed from different disciplines. Paper presented at the International Symposium Sustaining Food Security and Managing Natural Resources in Southeast Asia – Challenges for the 21st Century", 8-11 January 2002, Chiang Mai, Thailand.

Andrew, V.B .1984. *Fish catching methods of the world*. 3rd Edition Fishing News books Ltd. England 418p.

Anna, C.R. 2002. Rural household Strategies in Southern Mali: Determinants and Contribution of Income Diversification to income level and Distribution. World Bank Working Paper 2785. Pp 1 – 203. www.worldbank/ana October, 2005.

Araoye, P.A. 2002. Man-made lakes ecological studies and conservation needs in Nigeria. Rev. Biol. Trop., 50: 857-864.

Aromolaran A.B. 2000. Analyzing resources use efficiency on fish farms: a case Study of Abeokuta zone Ogun-State, Nigeria. *Aquafield,* 1(1): 12-21.

Ashley, C. and Carney, D. 1999. Sustainable livelihoods: lessons from early experience. Department for International Development, London. *http://www.livelihood.org/into/docs/nrcadc.pdf*

Ashley, C., Start, D. Slater, R. 2002. Understanding livelihoods in rural India. *Diversity Change and Exclusion*. ODI, 2002, pp 46.

Awudu, A and CroleRees, A. 2001. Determinants of income diversification amongst rural households in Southern Mali. *Food Policy*, 26: 437–452.

Ayorinde, B.J.O. 2006. *Aquaculture and hatchery practices in Nigeria,* Ijebu-Ode: Lucky Odoni Press, Ijebu-Ode pp 10-14.

Azam – Ali, S.H. and Judge, E.C. 2001. Non-farm income Diversification and Household livelihood Strategies in Rural Africa: concepts, dynamics and policy implications, Food Policy. 26:4, pp 315-331.

Babatunde, R.O. 2008. Income inequality in rural Nigeria: Evidence from farming households' survey data. *Australian Journal of Basic and Applied Sciences* 2.1: 134-140.

Babatunde, R.O. and M. Qaim, 2009: Pattern of Income diversification in rural Nigeria: Determinants and Impacts Q.J. Int., Agric., 48:305-320

Barret, C.B.T Reardon and P. Webb, 2001: Non Farm income diversification and household livelihood strategies in rural African: Concepts, dynamics and policy implications. Food Policy, 26:315-331

Barrett, C. B., Reardon, T. and Webb, D. 2001a. Non farm income diversification and households livelihood strategies in rural Africa: concept, dynamics and policy implications, *Food Policy*. 26(2), pp 315.

Bello M.O. (2000): Categorization of potential adopters for organic based fertilizer among vegetable farmers in Ojo, Lagos State. B. Agric Project, Department of Agricultural

Economics and Farm Management, Federal University of Agriculture, Abeokuta, Ogun State.

Bolorunduro P.I and Falaye A.E. 2003. Socio-economic characteristics as predictors of adoption of fish making kilns by fish processors in North-west Nigeria. *Nig. J. Fish*., 1: 70-84.

Bryceson, D. F. 2002. Rural African at the cross roads. Livelihood practices and policies. Odi working papers No 52.

Bryceson, D. F. 2000. The scramble in Africa: reorienting rural livelihoods. *World Development*. 30(5), pp 725.

Bryceson, D.F. 1999. African rural labour, income diversification & livelihood approaches: A long-term development perspective. *Review of African Political Economy*, 26(80): 171-89.

Carletto, G.K., Cvarrubias, B., Davis, M., Krausova, K., Stamoulis P., Winters and A. Zezza. 2007. Rural income generation activities in developing countries: Reassessing the evidence. *Electron J. Agric. Dev. Econ.*, 4: 146-193.

Carney, D. 1998. *Sustainable Rural Livelihoods: What contribution can we makes?* London: DFID.

Carney, D. 2002. *Sustainable livelihoods approaches: progress and possibilities for change.* London: DFID.

Carney, D., Drinkwater, M., and Rusinow, T., 1999. *Livelihood approaches compared: a brief comparison of the livelihoods approaches of the UK Department for International Development (DFID),* CARE, Oxfam and the UNDP. *A brief review of the fundamental principles behind the sustainable livelihood approach of donor agencies. Livelihoods Connect.* London: DFID.

Carswell, G. (1997) Agricultural intensification and rural livelihoods: a think piece. IDS working paper 64, IDS, UK.

Carter, M.R. and May, J. 1999. Poverty, livelihood and class in rural South Africa. *World Development*, 27(1): 1-20.

Central Bank of Nigeria (2005): Statistical Bulletin 264-267

Central Bank of Nigeria (2005): Statistical Bulletin, Pg. 264-267

Chambers, R. 1983. *Rural Development: Putting the Last First.* London. Longman Publications.

Chambers, R. and Conway, G. 1992. Sustainable rural livelihood practical concept for the 21st century IDS Discussion paper. No 296. Brigton; IDS. Pp 27.

Choo P.S, Nowak B.S, Kusakabe K., William M.J (2008): Gender and fisheries Development 2008:51:176-179 doi:10.1057/dev.2008.1

Choo, P.S.; Hall, S.J. and Williams, M.J. 2006. *Global symposium on gender and fisheries.* Seventh Asian Fisheries Forum, 1-2 December 2004, Penang, Malaysia. World Fish Center, Penang.

Christopher C.D., Nikolas, W., Mark, W.R., Siet, M. and Malifuzddin, A. 2003. The future of fish issues and trends to 2020. Fish for all. *IFPRI and World Fish Centre*. P.6.

Chukwuezi, B. 1999. De-agraianisation and rural employment in Igboland, Southeastern Nigeria. ASC working paper 37. Afrika-studiecentrum: Leiden/centre for research and documentation (CRD).

CIMMYT, Economics Program, 1993. The adoption of agricultural technology: a guide for survey design. CIMMYT, Mexico, ISBN, 13:9789686127775 pg. 88

Clark C. 2006. *The worldwide crisis in fisheries*. Cambridge: Cambridge University Press. Pp54-62

Clark, C.W., Munro, G. and Sumaila, U.R. 2005. Subsidies buybacks and sustainable fisheries. *Journal of Environmental Economics and Management*, 50: pp47-53 .

Clay, S., Collett K. and Gale, C. (2009): Training for Rural Development: Agricultural and Enterprise skills for women small holders. City and Guilds Centre for skills development. Retrieved April 10, 2014 from www.skill.development.org/TfRD

Cleveland, B.C. 1985. Adjustments to changes in fisheries law and economics. *FAC Fish Tech. Pap*; (269): 115p. FAO. Rome.

Conover D.O, Munch S.B.2002. Sustaining fisheries yields over evolutionary time scales. *Science*. 297:94–96.

Coulthard, S. 2005. The interplay between fishing access and the ability to adapt: Insights from a South Indian fishery. Paper presented at the International Conference on "People and the Sea", 7-9 July 2005. Amsterdam, Netherlands.

Daniel, S. and Johnson, C. 2004. Livelihood options? The political economy of access opportunity and diversification: *Overseas Development Institute*. (ODI) working Westminster, London, U.K. 233: 112-216.

Davies, S. 1993. Are coping strategies a cop out? *IDS Bulletin*, 24(4): 60-72.

Davis, B; Winters, P, Carletto G, Coarrubias K, Quinones W. Zezzan A, Stamoulis K. Azarri, C and Digiuseppe, S (2010): "A cross-country comparism of rural income generating activities", world development, forthcoming.

Daw T., Adger W.N., Brown K. and Badjeck M.C. 2009. Climate change and capture fisheries: Potential impacts, adaptation and mitigation. Climate change implications for fisheries and aquaculture: overview of current scientific knowledge. Fisheries and Aquaculture Technical Paper No. 530. K. Cochrane, C. De Young, D. Soto and T. Bahri (eds).Rome, Pp. 107 – 150.

De Haan, L. 2000. Globalization, localization and sustainable livelihood. *Sociologia Ruralis* 40 (3), 339–365. DOI: 10.1111/1467-9523.00152.

De Janvry, A. 1981. *The agrarian questions and reformism in Latin America*. Baltimore John Hopkins University Press. Pp48-50.

Department for International Development (DFID) .2004. Drivers of change. Public Information Note, September 2004. London: DfID. Available from: *http://www.gsdrc.org/docs/open/DOC59.pdf* [Accessed 17 March 2014].

Dercon, S. 1998. Wealth, risk and activity choice: cattle in Western Tanzania. *Journal of Development Studies*, 55: 1-42.

Dercon, S. 2001. Assessing vulnerability to poverty. Paper prepared for the UK Department for International Development, Department of Economics, University of Oxford, Oxford, UK. Pp43-49.

Dercon, S. and Krishnan, P. 1996. Income portfolios in rural Ethiopia and Tanzania: choices and constraints. *Journal of Development Studies*, **32(**6): 850-75.

DFID 2000. Sustainable livelihoods building strength. http/:wwwdfid.org/sustainablelivelihood.

DFID, 2001. Sustainable livelihoods guidance sheet. Department for Food and International Development. www.livelihood.org/info/infoguidand sheet. Html No 6 p1-11.

Drinkwater, M. and Rusinow, T. 1999. Application of CARE's livelihoods Approach, CARE International UK. Pp 39-45

Eboh, C.E., Oji, G.O., Amakom, S.U. and Ujah, C.O. 2004. Towards the ECOWAS common agricultural policy framework: Nigeria case study and regional analysis. Africa Institute for Applied Economics, 128 Park Avenue, GRA, P.O. Box 2147 Enugu, Nigeria pp 3-20.

Edward J.B. 2013. *Evaluation of the fisheries potentials of Egbe Reservoir*, Ekiti State, Nigeria. Pp41-52.

Ellis, F. 1998. Households strategies and rural livelihood diversification. *The Journal of Developmental Studies.* 35(1) pp.1.

Ellis, F. 1999. *Rural livelihood diversity in developing countries: analysis, policy, methods*. Oxford University Press. Pp47-50

Ellis, F. 2000a. *Rural livelihood diversity in developing countries: analysis, policy, methods.* Oxford: Oxford University Press.pp39-43

Ellis, F. 2000b. The determinants of rural livelihood diversification in developing countries: *Journal of Agriculture Economics* 51(2): 289-302

Ersado, L. 2003. Income diversification in Zimbabwe: welfare implication for urban and rural areas. *FCND Discussion Paper No.* 152. Washington DC: International Food Policy Research Institute.

Etim L. 2010. *The tragedy of the commons: alleviating the tragedy by managing the commons in Nigerian waters.* The 27th Inaugural Lecture of the University of Uyo held on 27th May 2010. University of Uyo Press, Nigeria. Pp 60.

Ewebiyi I.O. (2012): Livelihood Diversification of Rural Households in Southwestern Nigeria. Post Data Seminar Paper, Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan, pp. 16-21

FAO, 2010: Gender and Rural Empowerment Policy Brief N4: Investing in skills for socio-economic empowerment of rural women. Agricultural value chain development. Retrieved on August 20, 2014 *http://www.fao.org/dolrep/013/i2008e/i2008e04.pdf*

FAO, 2009: Women and Rural Employment and social perspectives policy B. Ref 5 Rome/am 307e00.pdf.

F.A.O,2007. Food and Agriculture Organization Statistics Divisions <.*pag http:faostat.fao/site/desktopdefault.aspx.ID=340*>

F.A.O. 2006a. Promoting literacy to improve livelihoods in fishing communities: Policies linking education to fisheries management. New Directions in Fisheries. A Series of Policy Briefs on Development Issues No. 05. Rome, FAO.

F.A.O. 2006b. FAO expert consultation on the economic, social and institutional considerations of applying the ecosystem approach to fisheries management. Rome, 6-9 June 2006. *FAO Fisheries Report*, No. 799. Rome, FAO.

F.A.O 2004: Livelihood diversification and natural resources access. FAO Livelihood Support Programme Working Paper No 9. Pp56 *http://www.fao.org/sd/dim_pe/4/pe4_050502_en.htm.*

F.A.O. 2002. *The state of world fisheries and Aquaculture*. FAO Information Division, Rome 148 pp.

F.A.O. and World Bank. 2001. *Farming systems and poverty – improving farmer's livelihoods in a changing world*, Rome and Washington D.C.

F.A.O. 1993. Marine fisheries and the law of the sea: a decade of change. *F.A.O of the United Nation Fisheries Circular* No 853, Rome.

F.A.O/SFLP 2006. Gender polices for responsible fisheries: Policies to support gender equity and livelihoods in small-scale fisheries. New Directions in Fisheries. A series of policy briefs on development issues. No. 06. Rome, FAO

Fabusoro, E., Omotayo, A.M, Apantaku, S.O., and Okuneye, P.A. (2010): Forms and Determinants of Rural Livelihood Diversification in Ogun State, Nigeria, Journal of Sustainable Agriculture, 34 (4): pp 417-420.

Fagade, S. O. 2010. Climatic change: implication for fisheries and coastal aquaculture. Key note address delivered on 25th Annual Conference of Fisheries Society of Nigeria held at Administrative Staff College of Nigeria, Badagry, Lagos State, Nigeria, 26th, October, 2010.

Falaye, Z.M. 2007. Fisheries in Nigeria: refreshing notes. *Applied Tropical Agriculture* Vol. 6 No 2: pp 129-135.

Fapohunda O. O, GodStates, R. 2007. Biometry and composition of fish species in Owena Reservoir, Ondo State, Nigeria. *Journal of Central European Agriculture*. 8(1): 99-104.

Fatunla, G.T. 1996. Socio-economic issues in the education of children of migrant fishermen in Nigeria. *Journal of Sustainable Agriculture*, 9(1): 31-61.

Federal Department of Fisheries (FDF) 2009: Nigerian national aquaculture strategies. Assisted by FAO, Formally Approved by Government, pp 18.

Federal Department of Fisheries (FDF). 1996: Strategy paper on fisheries development in Nigeria. Submitted to Federal Ministry of Agriculture and Natural resources, Abuja.

Federal Department of Fisheries (FDF). 2009. Nigeria national aquaculture strategy. Assisted by FAO, Formally Approved by Government, pp: 18.

Federal Department of Fisheries (FDF): Fisheries Statistics of Nigeria Projected Human Population; fish demand and supply in Nigeria from 2000-2020; 2008; 56.

Federal Department of Fisheries. 2007. *Fishery Statistics of Nigeria* 4th Edition Federal Dept. of Fisheries Abuja. pp. 49.

Fish for all Summit (2005): Presentation of Nigeria's Fisheries Resources, Abuja, Nigeria 22-25 August 2005.

Food and Agricultural Organization 2006: Gender Policies for responsible fisheries. FAO, Rone, Italy, 12pp.

Food and Agriculture Organisation. 2007. *The state of world fisheries and aquaculture 2006*. Rome. FAO: 162pp.

Food and Agriculture Organization (FAO) .1998. Fisheries bio-economics theory: modeling and management (FAO Fisheries Technical Paper 368, Seij, J. C., O. Defeo and S. Salas, Food and Agriculture Organization of the United Nations, Rome.

Food and Agriculture Organization FAO .1993. Marine fisheries and the law of the sea: A decade of change. FAO of the United Nations Fisheries Circular no 853, Rome.

Food and Agriculture Organization, 2005: Socio Demographic Characteristics and Challenges in Coastal Fishing Communities www.fao.org/docrep/005/x8294E06.htm

Food and Agriculture Organization. 1999. *World production of fish, crustaceans and mollusks by major fishing areas.* Fisheries Information Data and Statistical Unit (FIDI), Fisheries Department, FAO Rome.

Frakenberger, R.T., Drinkwater, M., and Maxwell, D. 2003. *Operationalizing household livelihood security*. Pp 54-78.

Frank, E. 1999. Rural livelihoods diversity in developing countries: Evidence and policy implications Odi: Natural resource Perspectives No 40.

Freeman, A.H. and Ellis, F. 2005. Implications of Livelihoods Strategies of Agricultural Research: A Kenya Case Study: in *Rural Livelihood and Poverty reduction policies*, Ellis and Freeman (Eds), London and New York, Routledge, pp 198-212.

Fregene, B. T. 2002. Poverty assessment of fishing communities of Lagos State, Nigeria, unpublished Ph.D Thesis, University of Ibadan, Nigeria. 227pp.

Fregene, B. T. 2007. Profile of fishermen migration in Nigeria and implication for a sustainable livelihood; African migration workshop, Understand migration dynamics in the continent, International, International Migration Institute James Martin 21st century school, University of oxford, United Kingdom in collaboration with center for migration studies, University of Ghana, Legon Ghana in Accra, Ghana- 18-21 September 2007, 20 pages, http://www.imi.ox.ac.uk/pdfs/research-project-

pdfs/african-migrations-workshops-pdfs/ghana-workshop-2007/Fregene%20Ghana%2007.

Fulginiti, L.E., Perrin, R.K. and Yu, B. 2004. Institutions and agricultural productivity in sub-Saharan Africa. *Agricultural Economics* 31.2: 169-180.

Gaffar, J.A., 1996: Twenty years of fisheries development in Nigeria. *Proceedings of the 13th Annual Conference of the Fisheries Society of Nigeria (FISON).* New Bussa 3rd – 8th Nov. A.A. Eyo (ed) FIDSON, Lagos Nigeria. pp42- 46.

Gaillard, J.; Maceda, E.; Stasiak, E.; Le Berre, I. and Espaldon, M. 2009. Sustainable livelihoods and people's vulnerability in the face of coastal hazards. *Journal of Coastal Conservation* 13 (2), 119–129. DOI: 10.1007/s11852-009-0054-y.

Geiser, U.; Bottazz i, P.; Epprecht, M.; Fakou, G.; Fritschi, A.; Ramakumar, R.; Shahbaz, B.; Steimann, B. and Strasser, B. 2011a. Access to livelihood assets: inclusion, exclusion, and the reality of development interventions. *Research for sustainable development: foundations, experiences, and perspectives. Perspectives of the Swiss National Centre of Competence in Research (NCCR) North-South*. Wiesmann, U. and Hurni, H. (eds.): Geographica Bernensia 6. Bern, 313–330.

Graham, H., Harvey, D., Nick, F.T., Peter, E. and Eric M. 2000. Aquatic resource management for sustainable management for livelihood of poor people. Paper presented at Conference on Livelihood Strategies. June, 2000, Coutonou, Republic of Benin.

Greboval, D., Bellemans, M and Fryd, M. 1994. Fisheries characteristics of the shared lakes of the East Africa Rift. CIFA *Technical paper* No 24. FAO Rome 81p.

Hazell, P.B.R. & Norton, R.D. 1986. *Mathematical programming for economic analysis in Agriculture*. New York, Macmillan Publishing Company.

Hill, N.A.O. 2005. Livelihoods in an artisanal fishing community and the effect of ecotourism. MSc Thesis. Faculty of Life Sciences, Imperial College, London.

Hiremath, B.N. 2007. The changing faces of rural livelihood in India, *National Civil Society Conference on What it Takes to Eradicate Poverty, held at Institute of Rural Management, Anand, 4-6 December.*

Hussein, K and Nelson, J. 1999. Sustainable livelihoods and diversification. *IDS Working paper*, No. 69 Institute of Development Studies, London.

Hussein, K. & Nelson, J. 1998. Sustainable livelihoods and livelihood diversification. *IDS Working Paper*, 69. Brighton, UK, Institute of Development Studies.

Ibrahim, B.U., Auta, J., Balogun, J.K. 2009. *A survey of the artisanal fisheries of Kontagora reservoir, Niger state, Nigeria.*

ICSF .1994. International collection support of fish Workers. Cebu Conference, held at Cebu the Philippines on 7th June.

Idowu, A. O., Aihonsu, J. O.Y., Olubanjo, O. O. and Shittu, A. M. 2011. Determinants of income diversification among farm households in Southwest Nigeria. *Economics and Finance Review* Vol.1(5) pp 33 – 34.

Ifejika, P.I. 2011. Preliminary evaluation of mobile phone among fisherfolks for mainstreaming fisheries extension in Kainji lake, Nigeria. Master of Philosophy thesis, Department of Agricultural Extension and Rural Development, Ladoke Akintola University of Technology, Ogbomosho, Oyo state, Nigeria. Pp41-70.

Illiya, M.A. 1999. Income diversification in the semi-arid zone of Nigeria: a study of Gigane, Sokoto, Northwest Nigeria *ASC Working paper* 39. Afrika-studiecantrum: Leiden/centre for Research and Documentation (CRD).

IMM 2003. *Sustainable coastal livelihoods: Policy and coastal poverty in the Western Bay of Bengal. Sustainable coastal livelihoods project main report.* IMM, Exeter.

IMM, CFDO and CBNRM L.I. 2005. *Understanding the factors that support or inhibit livelihood diversification in coastal Cambodia. An output from DFID-funded research in Cambodia.* IMM Ltd, Exeter.

Ipinmoriti O. (2012): Salvaging Fisheries systems in the face of climate change in: Etim, L and Oribhabor, B. (Editors). Current Issues in sustainable Tropical Agriculture Faculty of Agriculture University of Uyo, Uyo. 18:167-179

Ipinmoroti O. 2012. Salvaging fisheries systems in the face of climate change. *Current issues in sustainable Tropical Agriculture*. Etim, L. and Oribhabor, B, Eds. Faculty of Agriculture, University of Uyo, Uyo. 18: 167 – 175.

Ita E.O. 1993. Inland Fishery Resources of Nigeria. FAO, *CIFA Occasional Paper No, 20, Rome, FAO,* 120pp.

Ita, E.O, Sado, K; Balogun. J.K, Pandogari A., and Ibitoye.B. 1985. Inventory survey of Nigeria inland waters and their fishery resources. Part 1. A preliminary checklist of inland water bodies in Nigeria with special reference to ponds, lakes, reservoirs and major rivers

Ita, E.O. 1987. *Commercial fisheries of IITA Reservoir, Ibadan, Nigeria*. Kanji Lake (1986) Annual Report.

Ita, E.O. 1995. Fishery resources of the arid zone of Nigeria. *Proceedings of National workshop on sustainable management and conservation of fisheries and other aquatic resources of lake Chad and the Arid zone.* 8 -44 pp.

Jamu, D.M., Ayinla, O.A. 2003. Potential for the Development of Aquaculture in Africa. *NAGA,* 26(3): 9-13.

Kabore, *C.* 2006. Progress report on Institutional support: implementation of Bagré gender community action plans. Rapport de progrès : Appui institutionnel pour la mise en

oeuvre des plans d'action genre de la communauté de Bagré. Rome, FAO/DFID, Sustainable Fisheries Livelihoods Programme (SFLP). (Unpublished document).

Kamala-Ral 2011. Journal of human Ecology, 324 () PP91-100 (2011) Retrieved on August 16,2014 from http://www.oc9605223c/f9993570000000. pdf.

Kostov, P. and Lingard, J. 2001. Rural development as risk management. *Working Paper* 65. Centre for Rural Economy Working Paper Series. Newcastle upon Tyne, University of Newcastle School of Agriculture, Food and Rural Development.

Kramer, R.A., Simanjuntak, S.M.H. & Liese, C. 2002. Migration and fishing in Indonesian coastal villages. *Ambio*, 31(4): 367-372.

Kumar, P., Singh, N.P. and Mathur, V.C. 2006. Sustainable agriculture and rural livelihoods: a synthesis. *Agricultural Economics Studies*, 32(6): 850-75.

Laglar, K.F, J.E. Bardach, R.R. Miller and D.R.M. Passion .1977. *Ichthyology*, 2nd edition, John Wiley and Sons. Pp34-42

Le Sann, A. 1998. *A livelihood from fishing globalization and sustainable fisheries policies.* London. Intermediate Technology Publication. Pp20-25

Loubser, J. 1995. Sustainable livelihoods: a conceptual exploration Paper presented at the workshop on civil society, sustainable livelihoods and women in Development, held at Kuala Lumpur, Malasia.

Mabawonku, A.F. 1985. *Fisheries development planning in Nigeria 1970 -1980.* Ibadan: University Press. Pp 28-31

Masatsume, N. and Tomeyoshi, Y. 1997. Fishing techniques (1): complication of transcript of lecturer. Presented at the Training Department SEAFDEC.

Masatsume, S. 1998. Agricultural development and poverty in Africa. Paper presented at the workshop on Agricultural sector strategies for poverty reduction in Eastern and Southern Africa. 23rd- 25th November, 1998. Wegeningn. The Netherlands. Pp12.

Mattar B. and Mendy, P. 2006. Analysis of gender impact of the NACCUG policy. Rome, FAO/DFID, Sustainable Fisheries Livelihoods Programme (SFLP).

Maxwell, S. 1998. Agricultural Development and Poverty in Africa. Paper presented at the Workshop on Agricultural Sector. Strategies for poverty reduction in Eastern and Southern Africa. 23rd – 25th November, 1998. Wegeningen. The Netherlands. Pp12.

Meaghar, Kate .1999. If the drumming changes, the dancing changes: de-agraianisation and rural non-farm employment in Nigeria Savana. ASC working paper 40. Afrika-studiecentrum: Leiden/centre for research and documentation (CRD).

Mendy P. and Njia, S. 2003. Gender and micro finance study in Tanji, the Gambia. Rome, FAO/DFID, Sustainable Fisheries Livelihoods Programme (SFLP).

Meye J.A., Ikomi, R.B. 2008. A study on the fish fauna of Urie creek at Igbide, Niger Delta. *The Zoologist.* 6: 69-80.

Minichiello, G. Arone, R., Timewell, E. and Alexander, L. 1990. In-depth Interviewing: researching people. Melbourne: Longman Cheshire, Pg 931.

Ministry of Fisheries and The World Bank 2005. *Vietnam: fisheries and aquaculture sector study. Final report.* Washington, USA, World Bank.

Minot, N., Epprecht., M., Anh., T.T.T. and Trung, L.Q. 2006. Income diversification in the northern uplands of Vietnam': *Research report No.145. International Food Policy Research Institute, Washington D.C.*

Moses B.S. 1990. The status of artisanal fisheries and fish resources conservation in southeastern Nigeria. *Trans. Nig. Soc. Biol. Conserve.*, 1: 43 – 60.

Moses B.S. 2002. *Tropical fisheries.* Abeam Publishing Co.,150p.

Moses, B.S. 1983. *Introduction to tropical fisheries*, Ibadan: University press. 117 pp.

MRAG 2003. *Understanding fisheries livelihoods and constraints to their development: Kenya and Tanzania. Final Technical Report.* London, Marine Resources Assessment Group (MRAG).

Mustapha M.K. 2002. A pre-impoundment survey of the flora and fauna communities of Oyun lake in Ilorin, Kwara state, Nigeria. *Nigerian Journal of Pure and Applied Sciences* 17: 1200-1209.

Mustapha, A.R. 1999. Cocoa farming and income diversification in South-western Nigeria. ASC working paper 42. Afrika-stuicecentrum: Leiden/centre for Research and Documentation (CRD).

Neefjes, K. 1999. Oxfam GB and sustainable livelihoods: lessons from learning, Oxfam – available online.

Nigeria Fishery Statistics 2016. Summary report www.fcwc.fish.org/fisheries/statistics/nigeria/901-nigeria-fisheries-statistics-2016-summary-report

Njoku, I. F .2007. The information needs and information seeking behavior of fishermen in Lagos State, Nigeria. *The International Information and Library Review*. Vol 36, pp 297-307.

ODI .2001. Diversification, poverty and public policy. Project Summary Draft working paper. Pp 60-64

ODI .2001. Understanding livelihoods in rural India: diversity change and exclusion. *Journal of conservation Biology* vol. 6, No1, pp 4-5.

ODI .2003. Policy guidance sheets for the ODI livelihood options study. Website: http://www.livelihood option into.

ODI .2003. Understanding livelihood in rural India: diversity, change and exclusion. Policy Guidance Sheet. http*://www.livelihood option into*.

Odum O. 1995. Fish distribution in Ethiope River, Southern Nigeria. *Tropical Freshwater Biology*. 4: 53-64.

Offem, B.O., Samson Y.A., Omoniyi I.T. 2009. Fish composition and abundance in the wetlands of Cross River, Nigeria. *Aquatic Ecology* DOI: 101007/S10452-009-9240-0.

Ogbe, F.G. and Odiba, J.Y. 1996. The role of Extension in Fisheries Development Among Rural Communities. *Proceedings of the 13th Annual Conferences of the Fisheries Society of Nigeria (FISON). New Bussa 3rd – 8th Nov.* A.A, Eyo Ed. FISON, Lagos Nigeria p. 7-13.

Ogundameru, B.O. Gwary, M.M, Idris, Y.L, Oni, A.O. and Yero, A.B (2006): Empowerment of women through urban Agriculture Development in Maiduguri Metripolitan Borno State. Proceeding of 11th Annual National Conference of the Agricultural Extension society of Nigeria (AESON): 3rd – 6th April, pp. 147-156.

Ogunfowora, O. 1997. Input supply and its impact on agricultural extension. *Proceedings of Workshop on the National Agriculture Research Strategy Plan and Extension Services, Input Delivery, November 25-29, 1996*, NARI, Abuja, pp: 421-435.

Ogun-Oshun River Basin and Rural Development Authority (O-ORBRDA) 1998: What it is, What it does and how it works. Vol. 5 pp27-32.

Okeke, C.P and Shittu, A.M. 2013: Patterns and Determinants of livelihood diversification among farm households in Odeda Local Government Area, Ogun State, Nigeria. Research Journals. Journal of Economics Vol. 1, No 1, November, 2013.

Okere, C.P and Shittu, A.M. 2001. Determinants of livelihood diversification among farm households in Odeda local government area, Ogun State, Nigeria. Research Journals: *Journal of Economics* Vol. 1, No.1, Nov. 2013.

Okwu, O.J., Yahaya, M. A. and Obinne, C.P.O. 2011. Analysis of artisanal fisherfolks information needed and accessibility in Benue state, Nigeria. *Asian Journal Of Agricultural Science* 3(5): 408-413.

Olaniran T.S. 2000. Ecological evaluation and sustainable management of fish production in International Institute of Tropical Agriculture (IITA) Lake, Ibadan Nigeria.

Olaoye O.J (2010): Dynamics of the Adoption Process of Improved Fisheries Technologies in Lagos and Ogun States Nigeria. A Ph.D thesis in the Department of Aquaculture and Fisheries Management University of Agriculture, Abeokuta, Ogun State, Nigeria pp. 367.

Olaoye, O.J, Idowu, A.A. Omoyinmi G.A.K Akintayo, I.A., Odebiyi, O.C and Fasina, A.O. (2012): Socio-Economic Analysis of Atisanal Fisherfolks in Ogun Water-Side Local Government Areas of Ogun State, Nigeria.

Olatunde A.A. 1989. Approaches to the study of fisheries biology in Nigeria inland water.

Olawoye, J.E. 2000. Agricultural extension delivery in a democratic and deregulated economy. A paper presented at the 6th Annual Conference of Agricultural Extension Society of Nigeria, Ibadan.

Olawuyi, E.I.O. 1992. Strategies for meeting the fishing input requirements of small scale artisanal Fisheries. *Proceedings of the 10th Annual Conference of the Fisheries Society* of Nigeria. (FIDSON) Abeokuta 16th – 20th.

Olomola, A.S. 1991. Capture fisheries and agriculture in Nigeria. A comparative economic analysis. *African Rural Social Sciences Networks Arkansas:* 343-361 pp.

Oluwatayo, I. B. 2009. Poverty and income diversification among households in rural Nigeria: a gender analysis of livelihood patterns. *2nd Instituto de Estudos Sociaise Economicos (IESE) Conference on Dynamics of Poverty and Patterns of Economic Accumulation in Mozambique. Conference* Paper No.4.

Omoniyi I.T., Akegbejo Y and Adeosun F.I. 2006. Heavy metals in some commercial fish of Ikere gorge, Oyo State, Nigeria. *Asset series* 6(2): 311-316.

Omorinkoha W.S. Ogunfowora O.O., Ago N.D, and Mshelia M.B (2011): Artisanal fisheries activities in Lake Kainji *In*: Forty years on Lake Kainji Fisheries Research (Eds: A Raji, A.N Okaeme and M.O. Ibeum), 43-53.

Oni, A.O. and Yusuf, S.A. 2006. Determinants of expected poverty among rural households in Nigeria. Final Report Presented at the AERC Biannual Workshop in Nairobi, Kenya.

Onuoha G.C. 2009. *Fundamental principles of fisheries science.* New Edition. Umuahia: Digital Press, Umuahia. 164p.

Oparinde L.O and Ojo S.O. (2014): Structural Performance of Artisanal fish Marketing in Ondo State, Nigeria. American Journal of Rural Development 2.1, (2014) pp. 1-7.

Oso, J.A., Fagbuaro O. 2004. Fish fauna of Ero Reservoir, Ekiti State, South- Western Nigeria. *Journal of Biological and Physical Sciences.* 3: 20-23.

Oversees Development Institute (ODI) 2000, "Understanding livelihood in rural India": Diversity change and exclusion *Journal of Conversation* Biology Vol. 6 No 1 pp4-5.

Oyekale, A., Adeoti, A.I and Oyekale, T. 2006. Measurement and sources of income inequality among rural and urban households in Nigeria, University of Ibadan. PMMA Working Paper No. 2006-20. Retrieved 23rd November, 2009, from *http://papers.ssrn.com/so13/cf_dev/absbyauth.cfm.*

Oyesola, O.B and Ademola, A.o(2011): livelihood in ileogbo community of osun state, Nigeria. M.Sc thesis in the department of Agricultural Extension and Rural Development, University of Ibadan. Pp 28-35

Oyo State Government (2010) ; the Official Website of the Oyo State Government – the Pacesetter State www.oyo state.gov.ng

Paris, T.R. 2002. Crop-animal systems in Asia: socio-economic benefits and impacts on rural livelihoods. *Agricultural Systems*, 71: 147-168.

Raji, A. and Ovie, S.I. 2007. Biodiversity conservation and sustainable livelihood: The case of Nigerian inland water fisheries. *Proceedings of the National Stockholders Workshop on Inland Capture Fisheries Development in Nigeria (ICFDN'07) Kaduna*, Nigeria.

Ralitza D and Kunal S 2010: Is household income diversification a means of survival or a means of accumulation? Panel data evidence from Tanzania BWPI working Pappe 122 www.manchester.ac.uk/bwpi

Reardon, T. 1997. Using evidence of household income diversification to inform study of the rural nonfarm labour market in Africa: *World Development* 25(5):735-47.

Reardon, T., Delgado, C. and Matlon, P. 1992. Determinants and effects of income diversification amongst farm households in Burkina Faso. *Journal of International Development*, 28(2): 264-297.

Regier, H.A. 1982. Training course on the management of small scale fisheries in the inland waters of Africa's conceptual framework and approaches for the acquisition of the key resources information. *Food and Agricultural Organisation of the United Nations (FAO) fish circular* No. 752: p25.

Reynolds, J.E and Greboval, D.F. 1998. Socio-economic effects of the evolution of Nile perch fisheries in lake Victoria: a review. *CIFA Technical Paper* (17):148p.

Salas, S. and Gaertner, D. 2004. The behavioural dynamics of fishers: management implications. *Fish and Fisheries*, 5: 153-167.

Satia, B. 1995. The programme for integrated development of artisanal fisheries in West Africa. NAGA. *The ICLARM quarterly*.

Schwarze I. and Zeller P. (2005): Income diversification of rural households in central Sulawesi, Indonesia, Journal of International Agriculture 44 (1) pp. 61-73

Scoones, I. 1998. Sustainable rural livelihoods: a framework for analysis, *Working Paper 72*, Brighton: Institute for Development Studies.

Sewanyana, S.N. 2002. Sustainability of livelihood security among rural households in Uganda; *Issue in African Development Monograph Series*. No. 3, August.

Smith, L.E.D., Nguyen Khoa, S. and Lorenzen, K. 2005. Livelihood functions of inland fisheries: policy implications in developing countries. *Water Policy*, 7: 359-383.

Stamoulis, K. 2009. Assets, activities and rural income generation: evidence from a multicountry analysis. *World Development* Vol. 37, No. 9, 1435–1452

Start, D. 2001. *Rural diversification: what hope for the poor? ODI Meeting on Rural Development Food Security: Towards a New Agenda.* London: ODI.

Sustainable Fisheries Livelihood Programme 2004. www.livelihoods.org/sustainable.

Sustainable Fisheries Livelihood Programme (SFLP) 2005: Report on West African Sustainable Fisheries Livelihood Programme. Stakeholder forum, Burkina Faso, October 2005. Sustainable Fisheries Livelihood Programme (SFLP). Rome, FAO (*available at www.sflp.org)*

Tafida, A.A., Adebayo, A.A, Ayanda J.O., Wura, A., and Adedeji R.B. 2009. Rural infrastructure and poverty alleviation in fishing communities around Kanji lake basin, *Nigeria. Nig.J. Fish. Sci. Technol.*, 1 : 135-142.

Tait R.V. 1981. *Elements of marine ecology*, 3rd Edition, Butterworths.

Tawari-Fufeyin P, Ekaye S.A. 2007. Fish species diversity as indicators of pollution in Ikpoba River, Benin city, Nigeria. *Reviews in Fish Biology and Fisheries.* 17(1): 21-30.

Tietze, U., Lash R., Thomasen, B. and Rihan, D. (2005) Economic performance and fishing efficiency of marine capture fisheries. *FAO Fisheries Technical Paper*. No 482. Rome.

United Nations Conference on Environment and Development (UNCED 2000): www.livelihood.org/sustainable development.

Unni, J. 1996. Diversification of economic activities and non-agriculture employment in rural Gujarat. *Economic and Political Weekly*, 31(33): 2243-51.

Vabi, M.B and Williams C.E. 1991. Factors determining technology adoption behavior of ruminant livestock farmers in Kwara state of Nigeria. *J. Rural Dev., Nig.,* 4: 8-15.

Valdivia, C., Dunn, E.G., and Jetté, C. 1996. Diversification as a risk management strategy in an Andean agropastoral community. *American Journal of Agricultural Economics*, 78: 1329-1334.

Verstralen, K. 2005. *Micro-finance: How can it contribute to fisherfolks's livelihoods and responsible fisheries?* Rome, FAO/DFID, Sustainable Fisheries Livelihoods Programme (SFLP). (available at: www.sflp.org).

Welman J.B. 1948. *Preliminary survey of the freshwater fisheries of Nigeria.*

Williams M.J (2008): Why look at fisheries through a gender lens? Development 208:15:180-185. doi:10.1057/dev.2008.2

Williams, S. (2007): Gender and Youth perspectives in effective fisheries extension methods. Proceedings from the National stakeholders workshop on land capture fisheries development in Nigeria. Feb 20-22, aduna, pp.12.

Winters, P., Davis, B., Carletto, G., Covarrubias, K., Quinones, E.J., Zezza, A., Azzarri, C., and World Commission on Dam WCD (Nov. 2000) Dams and development: A new framework for decision-making.

World Bank, 2012: World development report 2012: gender equality and development (WDR) p 112 Washington DC retrieved on Dec. 12, 2014 from http://siteresourcesworldbank.org/INTWDR2012/resources/report.pdf

World Commission on Dam WCD (Nov. 2000): "Dams and Development" A New Framework for Decision-making.

Zimmerman, F. and Carter, M.R. 1999. Asset smoothing, consumption smoothing and the reproduction of inequality under risk and subsistence constraints. *Staff Paper Series* No. 402 (Revised). Madison, Department of Agricultural and Applied Economics, University of Wisconsin.

APPENDICES

APPENDIX 1

QUESTIONNAIRE

Date:_____ Community:_____ LGA:_____

State:_____ Phone No:_____

Name:_____

(1) Sex: Male [ ] Female [ ].

(2) Age ……. Years.

(3) Ethnic group: ……

(4) Religion: a. Christian [ ] b. Muslim [ ] c. Others (specify) ……

(5) Years of Education ……

(6) Level of Education: a. No formal [ ] b. Primary [ ] c. Secondary [ ] d. Tertiary [ ] e. specify ……..

(7). Marital status: Married [ ] Single [ ] Divorced [ ] Separated [ ] Widow [ ].

(8) Number of wives ……

(9) No. of children ……..

(10) Household size ……..

(11). Primary Occupation …….

(12) Secondary Occupation ……

(13) Monthly Income …… Naira.

NATURAL CAPITAL

Natural capital	Possession		When do you have access to it?				What its used for
	Yes	No	Wet season	Dry season	Both seasons	Not at all	
Land (size)							
Forests							
Lakes							

River							
Well							
Others (specify)							

Physical Capital

Please tick the physical capital you own and when it is accessible to you.

Physical capital	**Ownership**		**Accessibility**		
	Yes	**No**	**All the time**	**Sometimes (specify)**	**Never**
• farm implement: Hoe, Cutlass, Shovel, Watering can, tractor etc					
• Fishing nets: gillnet, cast net, longline, traps, basket					
• Building: face to face, flat, storey building, bungalow, duplex.					
• Livestock: chicken, goat, sheet, turkey, cow, donkey, dock, dog					
• Fish processing drums					
• Keke Napep					
• Traditional processing equipment: Local oven, firewood stand.					
• Fishing boat, canoe					
• Motorcycle					
• Bicycle					
• Bus: Private/commercial					
• Cars: Private/commercial					
• Others specify					

SOCIAL CAPITAL: Family Members

	Type of Benefit	**Availability**			**Timeliness**		**Adequacy**		
		All the time	Some times	Never	Timely	Not timely	All the time	Some times	Never
1	Information on livelihood opportunities								
2	Finances								
3	Labour								
4	Fish production material								
5	Fish processing material								
6	Remittances								
7	Land								
8	Others (specify)								

Neighbours

	Type of Benefit	**Availability**			**Timeliness**		**Adequacy**		
		All the time	Some times	Never	Timely	Not timely	All the time	Some times	Never
1	Information on livelihood opportunities								
2	Finances								
3	Labour								
4	Fish-production material								
5	Fish-processing material								
6	Remittances								
7	Land								
8	Others (specify)								

Friends

	Type of Benefit	**Availability**			**Timeliness**		**Adequacy**		
		All the time	Some times	Never	Timely	Not timely	All the time	Some times	Never
1	Information on livelihood opportunities								
2	Finances								
3	Labour								
4	Fish-production Material								
5	Fish-processing Material								
6	Remittances								
7	Land								
8	Others (specify)								

Membership of Social Groups

	Social groups	Membership		Positions held			Benefits derived
		Yes	No	Executive member	Committee member	Floor member	
a	Women/female farmers association						
b	Religious groups						
c	Traders' union (market association)						

d	Cooperative group						
e	Labour union group						
f	Health group						
g	Skill development group						
h	Educational group/Adult Literacy						
i	Work exchange group						
j	Community based organizations						
k	Age-grade groups						
l	Entertainment group						
m	Fish processors Association						
n	Fishermen societies						
o	Net makers association						
p	Fish dealers association						

Religion Groups

	Type of Benefit	**Availability**			**Timeliness**		**Adequacy**		
		All the time	Some times	Never	Timely	Not timely	All the time	Some times	Never
1	Information on livelihood opportunities								
2	Finances								
3	Labour								
4	Fish-production Material								

5	Fish-processing Material								
6	Remittances								
7	Land								
8	Others (specify)								

Livelihood groups

	Type of Benefit	**Availability**			**Timeliness**		**Adequacy**		
		All the time	Some times	Never	Timely	Not timely	All the time	Some times	Never
1	Information on livelihood opportunities								
2	Finances								
3	Labour								
4	Fish-Production Material								
5	Fish-Processing Material								
6	Remittances								
7	Land								
8	Others (specify)								

Financial Capital: Please tick the type of finance that is available to you.

Financial Capital	**Availability**		**Amount**	**Period**			
				Monthly	Once in 6 months	Once a year	Never
Formal							
Current account							
Savings account							
Bank loan							
Informal							
Esusu							
Remittances from families							
Pension							
Assistance from religious bodies							
Community assistance							
Daily contribution (ajo)							

Human Capital

a) Do you use hired labour? Yes/No

b) How many hired labours do you have?

c) Are your family members involved in fishing?

d) How many of them are involved?

Livelihood activities and income Generated

Please tick livelihood activities you engage in within the dry season and income generated per month from each activity.

Livelihood activities	**Income**					
	Dry Season					
	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.
Fishing						
Fish dealer						
Petty trading						
Fish selling						
Tailoring						
Net making & repair						
Transporter						
Poultry						
Barbing						
Okada riding						
Hair dressing						
Shoe making						
Carpentry						
Brick laying						
Paid employment						
Crop farming						
Fuel wood selling						
Food vendor						
Food stuff milling						
Processing and selling of farm products						
Soap making and selling						
Textiles selling						
Mining activities						
Rearing of animals						
Craft waving						

Paid employment						
Hair plaiting						
Traditional medicine						
Crop processing						
Gathering and selling of non-timber forest products						
Barbing						
Shoe making						
Food stuff selling						
Selling of cooked foods						
Sewing and knitting						
Potting						
Carving						
Hunting						
Mat making						
Carpentry						
Driving						
Brick making and laying						
Selling of Agricultural products						
Tailoring						
Leasing land or property						
Others (specify)						

Livelihood Diversification Activities

Please indicate other livelihood activities that you are engaged in, stating reasons for doing so and order of importance.

		Periods for diversification			**Reasons for diversification**							
Secondary occupation	Order of importance	Wet season	Dry season	Both seasons	A	B	C	D	E	F	G	H

Seasonality = A

Spreading of risk = B

Coping with insufficiency = C

Compensating for failure in market = D

Gradual transition to new activities = E

Building on complementarities = F

To increase income = G

Others = H

Sources of information on Livelihood

Information sources	**Availability**		**Frequency of access**			**Activity influenced**
	Yes	No	Always	Monthly	Yearly	
Extension services						
Family members						

Mass media (Radio, TV)						
Friends						
Neighbours						
Group participation						
Others (Specify)						

Constraints

Constraints encountered	**Major constraint**	**Minor constraints**	**Not a constraint**
• Inadequate extension services			
• Poor processing facilities			
• Labour shortages			
• Poor credit facilities			
• Inadequate input supply			
• Poor storage facilities			
• Lack of information			
• Inadequate technical knowledge			
• Health problems			
• Marginalized groups			
• Bad access roads			
• Poor transportation			
• Limitations to the use of fishing gear			
• Distance to market			
• Unfavorable government natural resources policy			
• Others (Specify)			

APPENDIX II

QUESTIONS FOR FOCUS GROUP DISCUSSION

SECTION (A): INFRASTRUCTURAL FACILITIES

2. What type of road do you have?
3. Do you have electricity? If no, what is your source of power?
4. Do you have pipe borne water? What is your source of drinking water?
5. What are the types of schools in your community and its environs?
6. Where is the nearest health care facility? What type do you have? How far is it (in km)?
7. Do you have financial institutions? If no, where is the nearest one?

SECTION (B): FOR FISHERFOLKS

1. What is the quantity of fish you catch daily?
2. Can you compare the catch within 5 years ago?
3. If low, what are the possible reasons?
4. Have you tried to diversify to something else? What are those things?
5. How much do you make from fishing?
6. How much do you make from other activities you diversify into?
7. Do you make more money from other businesses
8. What are the problems you are facing in your business?
9. What other things do you make money from?
10. What period of the year do you make more money from fishing?
11. Has the income from fishing been able to meet your needs?
12. If no, what else do you do to meet your needs?
13. If government wants to help, in which area would you want government to help?

APPENDIX III

Extract from focus group discussion

Information was collected from community leaders, chairmen and secretaries of each association and staff of Ogun-Oshun River Basin Development Authority. The result of the in-depth interview is presented below.

Electricity supply

Most communities visited in the project sites had no electricity supply. Power generating sets of various capacities were being used as alternative sources of power. These were available in few houses within the community. However, communities like Ibaro, Abuletuntun, and spillway in Oyan Dam had electricity supply, though it was irregular.

Access road

The access road leading to most communities in the study areas were bad and inaccessible to vehicles. Motorcycles were used as the best means of transportation. This mode was supported by boats and canoes. Communities like Igbobuje and Apojola (Oyan Dam) were best accessed by boats. This had negative effects on the sale of fish products, especially during wet season when the roads were very bad.

Mode of transportation

Few fish buyers (Mongers) that went to the communities bought products at a ridiculously cheap rate. Alagbede community was usually cut off from the main town during wet season owing to inaccessible road. So they lost all their products and they were unable to relate to the outside walls of their community.

Primary education

Primary schools were situated in all the communities except two (Irawote-odo and Igbobuje). The nearest school to Irawote-odo was situated at 35km from the community, while the nearest school to Igbobuje was 3km from the community. However, there was a village coaching school where pupils were taught three times in a week in Igbobuje. This consists of a classroom mixed with both young and old pupils within the ages of 5- 70 years. The class is manned by a teacher sent from Igbo-ora Local Government area of Ogun State.

Health care facilities

Health care facilities were lacking in all the communities visited. The nearest health care centre ranged from 35km (Irawote), 9km (Apojola), 30km (Spillway) to 5km (Igbobuje) from each community mentioned. As a result, drug peddlers who traded in dangerous, fake and expired drugs operated freely in these communities and most of fisherfolks patronized them (Plate 1). Some of these drug peddlers diagnosed illnesses and prescribed drugs. Some claimed to be doctors or nurses and were called by those titles freely in the community. Some of fisherfolks patronized traditional healers and spiritualists. Only a few of fisherfolks would visit the dispensaries and clinics located in the towns nearest to them.

Sources of drinking water

The results revealed that only two communities (Apojola and Imala-Odo) derived their drinking water from the bore hole provided to them by Ogun-Oshun River Basin Development Authority (O-ORBDA). All the other communities derived their drinking water from the Dam, and they would drink the Dam water directly. This has adverse health issues on fisherfolks and is more pronounced in communities like Irawote-odo, Aba-samu and Apojola where it was reported that children urinate blood, men had weak erection. Visual impairment, such as blurred vision in both the young and old was also rampant in these communities.

Other livelihoods of fisherfolks in the study area

The interviews conducted, revealed that the act of fishing as a means of livelihood is seen as a culture and God-given talent for survival. It was believed to be an act that requires time, energy,

being focused and a lot of concentration during and after fishing. Fisherfolks viewed fishing as a means of surviving daily on the natural resources available to them with minimal investment. As a result of seasonality in the amount of species and time spent fishing, most fisherfolks do fish twice daily so they do not diversify. Few that were involved in crop production do so for their family consumption and sell the excess if any.

Focus group discussion (FGD)

Focus group discussion was carried out in the study area on gender basis. The guideline for questions asked was attached to the structured questionnaire. Responses and views are summarized below.

Women

The women said there had been great reduction in the quantity of fish caught compared with 5 years ago. Dam water regulation by the management of O-ORBDA usually resulted in fluctuation in fish species. They propose opening the dam in the rainy season and for some species a closed dam is required.

Most women engaged in crop farming for domestic consumption and sold the leftover if available. Some were involved in buying and selling of farm produce; some fetched firewood for sale, while others were involved in petty trading. They made an average of #350.00 daily, making more gain from fishing in the wet season. They claimed that money from fishing is not sustainable. They combine crop farming and petty trading to make ends meet. Plate 2 shows the focus group discussion with women.

Men

Most men had more catch within the last 5 years while few experienced reduction in catch. They had adapted their fishing gears and methods of fishing to suit the water levels claiming that various water levels had different species in abundance. Mr. Samson, a fisherman in Ikere Gorge dam, stated that fishes had developed more skills to hide form gears, which resulted in fishermen spending more time fishing. Revenue from fishing increased in the last 5years. Plate 3 shows the focus group discussion with men. Bad state of road was affecting fish sale. The few buyers who went to the community capitalized on the bad road and bought at ridiculously low prizes.

Water level fluctuations, opening and closing of dam by the management of O-ORBDA were attributed for low fish catch. Some men combined crop farming and trading while others diversified into activities like barbing, trading, mat weaving and so on. Few do not diversify, they kept on fishing and changing their fishing gears according to species abundance and seasonality. Fish catch was seasonal and gear-related. Fishermen who used "gura" net caught more fishes during the rainy season, (Plate 4) while those using cast net had more catch in the dry season. Those, using set net experienced more catch in the dry season. Essentially, fish catch depended on the type of gear used.

Men made more money from fishing compared with other business. Those who diversified were using one job to complement the other. The fishermen in Ikere Gorge dam advised that the Dam should be closed from April to December and opened between December and March. However, the management of Ogun-Oshun River Basin Development Authority explained that Dam water regulation is important and depends largely on the weather condition and the water level. These must be harmonized to prevent flooding and Dam collapse.

PLATES

Plate 1: Drug peddler in Alagbon, IkereGorge dam, Oyo State

Plate 2: Grinder for food milling in Ibaro, Oyan dam Ogun State.

Plate 3: Wood setting for charcoal production

Plate 4: Making of thatched roof with elephant grass

Plate 5: A boat makers cassava farm in spill way, Ikere Gorge dam Oyo State

Plate 6: A Netmaker/hunter in Abule Sikiru Oyan dam, Ogun State.

Plate 7: A fish processor/trader in Abule tutu Oyan dam Ogun State.

Plate 8: Fishmen/community football team in Alagbede Ikere Gorge dam, Oyo State

Plate 9: Focus group discussion with men in Abule tutu Oyan dam, Ogun State.

Plate 10: focus froup discussion with women in Saka, Ikere Gorge dam, Oyo State.