# PERCEIVED EFFECTS OF SAND DREDGING ON FISHING ACTIVITIES IN LAGOS STATE, NIGERIA

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# DEDICATION

This project work is dedicated to God Almighty, my Strength, and Helper in ages past and Hope in years to come. In Him I live, move and have my being. It is also dedicated to my loving, wonderful, adorable, caring, selfless charming and inspiring mother: Evangelist Esther. Olubukanla Ogunnowo (My jewel of inestimable worth) and my precious treasure, the love and angels of my life Esther Opemipo and Covenant Ayomikun lyama

# ABSTRACT

Fishing activities constitute the traditional occupation of communities possessing water sources such as lakes, streams, oceans and rivers. But there is a an observed decline in fishing activities as fisher-folks are diversifying into other livelihood activities while other migrate to other geographical areas for alternative job activities due to the effect of sand dredging. This study examined the perceived effects of sand dredging on fishing activities in Lagos state Specifically the study x-rayed the socio economic characteristics,knowledge,livelihood diversification activities and constraints, Multi-stage sampling procedure was used to select respondents for the study. Epe and Ikorodu were purposively selected among the five maritime divisions in Lagos State. Epe has 380 registered fisher-folks while, Ikorodu has 320 registered fisher folks in their fishing association. The second stage involved random selection of 20% of the fisher folks from registered fisher folks in Epe and Ikorodu. This gave a total sample size of 140 respondents. Structured interview schedule was used to collect data on socio-economic characteristics, knowledge, livelihood diversificationactivities and perception of sand dredging effect on fishing activities. Data were analysed using descriptive statistics, Pearson Product Moment Correlation and independent sample t-Test

The mean age of fisherfolks were 37+8, 92.1% of the respondents were males, 81.4% of the respondents were married; household size ranged from 1 to 16 persons, over 50% of the respondents had no formal education. Monthly income of fisher-folks in the study area ranged from N5, 000 to N60, 000 with mean monthly income of N22, 892+13.564, 92.9% of the respondents were members of a social group. Fisherfolks (55%) had high knowledge (18-24) on the effects of dredging on fishing. The major constraints to fishing enterprises include: Increased depths of water affects fishing activities (0.97) which was the most severe constraint

Respondents diversify most into non-farm activities such as commercial bike riding, securit and technician services. 55.7% of the respondents perceive the effects of dredging to be high fishing activities. Significant relationship existed between perceived effects of dredging fishing activities and fisher folks' social group ( 2.886), monthly income (r-0.181) a knowledge on effect of dredging on fishing activities (r-0.346).

The study concludes that the effect of dredging on fishing was perceived to be high fisherfolks diversified into non-farm activities such as commercial bike riding, security technician services. This study recommends strict compliance to government policy on dredg as well as, enlightenmenton aquaculture practices done for fisherfolks to reduce diversifica into off/non-farm activities and non-fishing activities.

Key words: sand dredging, fishing, diversification, perceived effects and fisherfolks

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## CERTIFICATION

I certify that this project was carried out by Ogunnowo, Aderonke Adonola under my supervision in the Department of Agricultural Extension and Rural Development. University of Bhadan, Ibadan, Nigeria

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CHAPTER ONE

INTRODUCTION

### 1.1. Background to the study

Sand dredging refers to the actual process of ratioval of sand from a place of thei occurrence (Langer, 2003) The places of sand occurrence are oceans, rivers, street, flood plains or hills and mountains Sand is a direct and obvious cause of environmental degradation Kondolf, Williams, Homer, and Milan, 2008). The increase in demand for sand for construction purposes has placed immense pressure on sand. Therefore, the extraction of sand for matruction is bound to have considerable ramifications on the environs of their occurrence

Rivers and their floodplains are an economical source of sand. These are required for a variety of purposes, including making concrete, backfill for houses footings, and maintenance of roads and landscaping Although sand are of paramount importance, previous studies (Kondolf, 1997; Langer, 2003; Kondolfer al., 2008) show that in-stream dredging of sand can reduce water quality as well as degrade the channel bed and banks. The dredging of sand on the floodplain can affect the water table and alter the land-use (Langer, 2003).

Globally, there is an increasing demand for beach nourishment sand and a smaller, but growing, demand for construction and stable fill" grade aggregates. As the historic landside sources of these materials have been reduced, there has been a corresponding move towards dredging the continental shelf to meet this demand. It is expected that the shift to offshore mineral extraction will continue and escalate, particularly in areas where glacial movements have relocated the desired material to the continental shelf. Typically, these deposits are not contaminated because of their offshore location and isolation from anthropogenic pollution sources. Beginning in the mid-1970s, the US Geological Survey began mapping the nature and extent of the aggregate resources in coastal and near shore continental shelf waters throughout the northeast beyond the 10-m iso bath Between 1995 and 2005, the Minerals Management Service (MMS), which oversees offshore mineral extractions, regulated the relocation of over 23 million cubic yards of sand from the Outer Continental Shelf (OCS) for beach nourishment projects (MMS 2005)

Dredging the river ports and inland waterways of Nigeria remain the key procedures for tapping economic advantages to the fullest. In the same vein, sand from rivers, streams, natural and man-made lakes continue to supply the nation millions of cubic metres of sharp sand annually for road construction, real estate development, beach replenishment and even

Remediation of oil spills, etc. (Nigeria Dredging Summit, 2012). Dredging is fast becoming one of the emergent industries in Nigeria for accomplishing projects belonging to federal, state and local governments, as well as serving the various needs of oil field operating companies. It is also now becoming useful for private sector real estate development through the demand for sand

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). The fishery activities in Nigeria are mainly done by the artisanal sector, the coastal and the brackish water constitutes the major areas of production, followed by the inland rivers and lakes. Aquaculture production and industrial fishing is still at its very low ebb (William, 2006). Quite a sizeable proportion of the Nigerian population depends on fishing as a source of income. Apart from being an income camer to many Nigerians especially people in coastal, riverine and lake areas of the country, people carn their living from fish processing and marketing while others engaged in Saberies research (Adedokan, 2006).

Lagos state is endowed with marine, brackish and fresh water of varying ecological zones and numerous fish species. As at the inception of the state in 1971, survey showed that the state harbours 30,000 actively engaged fish farmers with manual gears and craft types (Lagos State Ganette, 2009), Lagos being a maritime State with over 180km coastline of Atlantic ocean and extensive network of Lagoons and creeks has comparative advantage over most other States in fish production and could meet the demand of the whole country if resources are adequately explored (Kusemiju and Kusemiju, 2004). Records of storm surges, flash flood and rainfall of the last decade in Lagos have been higher than predicted and their impacts devastating enough to focus attention on the future of the populations at risk-communities living in coastal properties

The majority are subsistence farmers, hunters and gatherers, artisanal fishermen and small scale business Hunting and fishing in marshland and creeks is the traditional occupation in the coastal communities of Lagos.

**1.2 Statement of research problem**

Sand mining is of great importance to the economy. It should however, be recognised that the processes of prospecting, extracting, concentrating, refining and transporting minerals have great potential for disrupting the natural environment (Rabie et al., 1994). Many streams, rivers and their floodplains have abundant quantities of sand that are mined conveniently and economically for a variety of uses. Often the conditions imposed on the approval for sand mining

Activities are expressed in administrative terms, without technical consideration of their potential impact on the ecosystem.

Physical impacts of sand dredging include reduction of water quality and destabilization of the stream bed and banks. Sand dredging can also disrupts sediment supply and channel form, which can result in a deepening of the channel (incision) as well as sedimentation of habitats downstream. Channel instability and sedimentation from in-stream dredging also can damage public infrastructure (bridges, pipelines, and utility lines). Effect to the biological resources include removal of in-fauna, epi-fauna, and some fishes and alteration of the available substrate. This process can also destroy riverine vegetation, cause erosion, pollute water sources and reduce the diversity of animals supported by these woodlands habitats (Bymes and Hiland, 1995).

Nigeria has the resource capacity to produce 2.4 million metric/tonnes of fish every year, yet the country, as at 2007 is still a large importer of frozen fish annually from all sources (Fasakin, 2008). It further revealed that Nigeria imports about 560,000/tonnes of fish estimated at about $400 million annually while annual domestic fish supply in Nigeria stands at about 400,000/tonnes. In Nigeria, most of the fishing ground has been rendered unproductive by dredging of some water bodies and dumping of toxic industrial effluent (Olowosegun, 2005). Whitehead (2007) stated that sand dredging is rapidly becoming an ecological problem as the demand for sand increases in industries and for construction. Also, it is evident that there is growing threat to the environment especially the water bodies because the fisheries resources that the people depended upon are fast depleting (Aghoghovwia, 2008).

Lagos water bodies are under intense pressure due to various kinds of human activities. The most noticeable one is the indiscriminate extraction of construction grade sand by dredging operators (Ogunbiyi, 2012).Even as we are faced with the daily dredging, the activity could cause a major change for fish habitation and in turn cause a decline in the fishing business for those who rely on it for living. However, based on the problems posed by sand dredging activities, youths who are unemployed and are interested in fishing activities might be discouraged from making a living on fishing activities which may make them migrate to other geographical areas for alternative job activities.

Dredging provides major economic and social benefits like increase in cash flow, employment opportunity and livelihood diversification but also gives rise to concerns about its effects on the seabed, marine wildlife, archaeological deposits and other marine users, such as commercial fisheries (Tillin, 2011). Sand dredging is equally a direct cause of erosion which has

Destroyed lives and property of citizens and still threatens lives and property of others. It also impacts negatively on aquatic life, as sea animals that depend on sandy beaches for their nesting are sent into near extinction, destroys fishery, causing economic problems for people who rely on fishing for their livelihood. Also, it puts fisher folks out of business, thereby worsening poverty and encouraging criminal activities as these people become desperate for survival. It is on these bases that the research aims to study the perceived effect of sand dredging on fishing activities in Lagos state, Nigeria.

In view of the above, attempt will be made to address the following research question:

1. What are the socio economic characteristics of the respondents?
2. What is the respondents' level of knowledge of the effects of sand dredging on fishing activities?
3. What are the livelihood diversification activities of the fisher folks?
4. What are the constraints to fishing activities posed by sand dredging?
5. What are the perceived effects of sand dredging on fishing activities?

**1. 3 Objectives of the study**

The general objective of the study is to ascertain the perceived effect of sand dredging on fishing activities in Lagos state, Nigeria

The specific objectives of the study are to:

1. Identify the socio economic characteristics of the respondents in the study area,
2. Determine the respondents' level of knowledge of the effect of sand dredging on fishing activities in the study area,
3. Examine livelihood diversification activities of the fisher folks in the study area.
4. identify the constraints faced by the fisher folks due to sand dredging on fishing activities in the study area,
5. Ascertain the respondents' perception of sand dredging effect on fishing activities in study are

**1.4 Hypotheses of the study**

Based on the objectives, the following hypothesis stated in the null form will be tested:

Hol: There is no significant relationship between socio-economic characteristics of the respondents and perceived effects of sand dredging

Ho2: There is no significant relationship between respondents' knowledge of effects of sand dredging on fishing activities and perceived effects of sand dredging

Ho3: There is no significant relationship between constraints to fishing activities and perceived effects of sand dredging

Ho4:There is no significant difference in the perceived effect of sand dredging across sand dredging locations.

**1.5 Justification of the study**

With consistent problems faced by fisher folks due to sand dredging activities, there is proper need to find several ways to address those problems. It is a fact that many streams, rivers and their floodplains have abundant quantities of sand that are dredged conveniently and economically for a variety of uses such as construction, fishing activities have been drastically affected by this operations.

This study therefore will help to determine how knowledgeable fisher folks are on the devastating effect of sand dredging on fishing activities, thereby enabling all stakeholders concerned to come up with the proper approach in assisting fisher folks in decision making that will ameliorate the effect of sand dredging and averting future prevalence of the devastating effects.

The study will also provide information to governments, non-governmental organisation and fisher folks on the effects of sand dredging thereby encouraging other livelihood activities in other to reduce the effects posed by sand dredging activities. Furthermore, the study also will help to enhance the economic and social ways of life of fisher folks thereby improving their standard of living and also support foreign exchange and food security.

### 1.6 Definition of terms

**Perception**: Process of using the senses to acquire information about the surrounding. environment or situation

**Effect**: A change or changed state occurring as a direct result of action by somebody or something else. Eg land, water and forest resources

**Sand**: A substance consisting of fine loose grains of rock or minerals, usually quartz fragments found on beaches, deserts and in soils usually used as a building material

**Dredging**: Involves digging out and removing material (sand) from under water

**Fisher folks**: Group of individuals who catches fish as an occupation or sport

# CHAPTER TWO

## LITERATURE REVIEW

The issue of sand dredging on fishing activities is understood within the framework of the existing conditions of life of individuals, how they perceived such conditions and how these conditions defined the nature of their behaviour towards the environmental, social, physical and ecological effects emaciated from sand dredging activities. The following sub-headings provide some insights

### 2.1 Fishing activities and importance

Nigeria is blessed with inland water, brackish water, and marine water fisheries resources. On the basis of her resources, fisheries can be broadly classified into: Artisanal fisheries (85%), industrial fisheries (14%), and culture fisheries (1%) (Federal Department of Fisheries (FDF) 2005).About 6 million coastal and riverine rural fisher folks in Nigeria are engaged in artisanal fish production and its subsidiary activities as major sources of livelihood for the fisher folks (FAO, 2005).

Nigeria is endowed with a long coastline of about 960km, a large area of inshore waters, and a vast inland system comprising natural and man-made lakes, rivers, creeks, lagoons and wetlands all of which support a good variety of fisheries. Thus, artisanal fisheries occupy a very significant position in the Nigerian economy providing employment for over 400,000 people and supplying about 90% of the total local production of about 300,000 metric tons (FDF, 1997). It impacts on the quality of lives of various groups through supplying 58% of per capita animal protein intake and engagement in fishing and allied occupations as primary or secondary source of income (IFAD, 1997).

Fisheries resources represent the foci of the livelihood activities of most coastal communities. About 300,000 indigenous people and migrant fishermen, mostly Ghanaians, depend on fisheries resources as the main source of sustenance, assets and investment capital. Fishing supply 75% of their animal protein intake, and more than 98% of the population of the fishing communities is dependent on fishing and fishery related activities. Over 80% are engaged primarily in fishing as the main source of livelihood while about 95% are engaged directly or indirectly in the fishing industry. Some communities date back to the 18th century when the original settlers first arrived (e.g. Orimedu, Lagos State). Fishing is an ancient hunan tradition. It is a traditional activity involving the hunting and gathering of aquatic products for food. Fish and marine products include freshwater and ocean fish, shellfish, ocean

Mammals and seaweed as well as plankton. They represent a major food source, which is invaluable for the protein they provide and the industrial products they produce. Fish satisfies a vital food need for billions

Fish is also economically, socially and culturally important as a global dietary aspect of sustainable food security. Economically fish provides an important source of food and income for both men and women and fishing has an important social and cultural position in riverine communities. However, the tradition of fishing has been transformed over several decades of human civilization to become a resource extraction industry spanning the entire globe. Man first learned to catch fishes in traps and nets. These fishing activities were limited at first to the lakes and rivers, but as men improved on the boats and fishing technologies, they ventured into sheltered coastal areas, river mouths and eventually farther out on to the continental shelves, relatively shallow ocean plains between the land and the deeper ocean areas (Williams, 1987 and Olubanjort al, 2007). Fishing settlements represent one of the oldest forms of community living known to mankind. In these settlements, fisher-folks including children, men and women have evolved over time, different crafts, skills and technologies for fishing and for day to day survival. This is in addition, to those associated with the preservation and processing of fish catch. In typical fishing settlements (or landing sites), men are predominantly the harvester of wild fish species (Williams, 1987, and Olubanjoet al, 2007)

Despite the fact that Nigeria is blessed with 14 million hectares of inland waters, rivers and lakes, yet fish production remain underdeveloped in most of those waters which are often surrounded by poor communities in need of assistance. The extent and nature of the involvement in the capture fisheries in Nigeria however varies by locality, religion, level of education and form of fish sales, among other factors. Small-scale fisheries can be broadly characterized as a dynamic and evolving sector employing labour, intensive harvesting, processing and distribution technologies to exploit marine and inland water fishery resources.

The activities of this sub-sector, conducted full-time or par time, or just seasonally, are often targeted on supplying fish and fishery products to local and domestic markets, and for subsistence consumption. Export oriented product, however, has increased in many small-scale fisheries during the last one to two decades because of greater market integration and globalization. While typically men are engaged in fishing and women in fish processing and marketing, women are also known to engage in near shore harvesting activities and men are known to engage in fish marketing and distribution. Other ancillary activities such as net-making, boat-building, engine repair and maintenance can provide additional fishery related

Employment and income opportunities in marine and inland fishing communities. Small scale fisheries operate at widely differing organizational levels ranging from self-employed single operators through informal microenterprises to formal sector businesses. This sub-sector, therefore, is not homogenous within and across countries and regions and attention to this fact is warranted when formulating strategies and policies for enhancing its contribution to food security and poverty alleviation (FAO, 2004). Additionally, tens of millions of rural fishing families earn their living from fisheries and related activities. These women and men, who rely on fish for sustenance and livelihoods, are still some of the poorest and most neglected groups within the world's societies. Fishing women are especially vulnerable to poverty within these coastal communities (Williams et al., 2002).

## 2.2 Concept of sand dredging activities

Sand is a valuable resource and a main input in the construction industry in manyparts of the world (Erskine and Green, 2000; Gob et al., 2005). Sand dredging is the removal of sand from their natural configuration. Dredging of sand occurs both on small and large-scale in major parts of the country. With an estimated 16 million housing deficit (Ezekiel. 2010; Isah, 2011) and infrastructural development in Nigeria, there will continue to be the great demand for sand and other construction materials (Omole and Ajakaiye, 1998), Ogun State has experienced rapid population growth and physical expansion especially since the mid-1980s due to the inflies of people from different parts of the country. These in turn have exerted pressure on the needs for housing provision, in addition to the already existing demand for civil works such as construction and repair of bitumen roads, bridges, buildings by public works and house repair and construction by individuals (Hemalathaet al. 2005). The increasing rate of urbanization across the globe has brought with it several challenges ranging from physical, economic, social, to environmental among other issues (Cohen, 2006; Chelala, 2010. Kadier al., 2012). To cater for the rapid urbanization, several sites are now being exploited for the dredging of sand and other building materials. Traditionally, sites for sand dredging are rivers and beaches, however, sand is dredged from river mouths, banks and even at inland sand deposits. Many inland sand deposits, which are lateritic in nature, are under immense pressure due to various kinds of human activities among which indiscriminate extraction of sand is the most disastrous (Kondolf, 1994; Sayami and Tamrakar, 2007). Typically inland sand dredging operations begins with the removal of overburden from the top of the sand formation using scrapers or tracked excavators and off- road haul trucks. The overburden is often hauled to the perimeter of the dredge site and piled into berms. Once the overburden has been removed, the sand is excavated. Depending upon the geological formation, blasting may be used to make the sand containing material more amenable

To excavation. Large tracked excavators or rubber-tired front-end loaders typically perform excavation. In most of the inland sand dredging sites in Ogun state, the excavated sand materials are loaded on trucks by hired labourers using shovels Rapid urbanization is a major cause for sand demand and is responsible for unsustainable extraction of sand from the many illegal inland sand dredging pits found in many parts of the country. The interaction between sand dredging operators, citizen neighbours, and government becomes more confrontational as result of more sand excavation sites located in urban and residential areas. Conflicts have centred on environmental and social issues such asnoise, truck traffic, dust, stream-water quality. Reclamation, biodegradation, pollution and visually unpleasant landscapes (Willis and Garrod 1999), and the citizen concern on the adequacy of regulatory efforts of the government to control these negative effects. Environmental impacts of dredging are well documented and the literature abound with environmental impacts in the form of waste management, impacts to biodiversity and habitat, deforestation of land with the consequent elimination of the vegetation, pollution (water, air, land and even noise pollution) etc. (Willis and Garrod, 1999, Abdus-Saleque, 2008), In Ghana and many other tropical areas of dredging, it is noted that dredging is a major cause of deforestation and forest degradation, generating a large number environmental impacts (World Rainforest Movement, 2004). It is noted that large-scale dredging activities generally continue to reduce the vegetation of most of the dredging communities to levels that are destructive to biological diversity (Akabzaa, 2000; Akabzaa and Darimani, 2001). Davis and Tilton (2005) also suggest that local communities tend to bear the negative impacts of dredging-be they social, economic or environmental. It is therefore important to make effort to stem these problems through informed decision-making. However, making informed decision in many areas including monitoring sand dredging activities often involves complicated processes. For optimal decision making information from various sources is required such as spatial information, which is essential to address activities of sand dredgingand their impacts on the environment (Burrough and McDonnell, 2002)

Geographic information systems (GIS) can play major role in the management of mapped or spatial data prior to, during, and after sand dredging activities (Chindo, 2011). It can provide maps of sand dredging sites showing the level of degradation and help or serve as a decision support capability (Heywood et al., 2006; Chandra and Ghosh, 2009). Geographic information systems (GIS) are one of the most popular tools utilized in decision making concerning resource utilization. It has had a profound effect on decision support system development, especially environmental modelling and model development, because it can supply functionality for dealing with spatial information that is required in mostdecision-making processes. GIS make mapped

Information available to decision makers and field personnel in real time. Although, site requirements for sand dredging activities vary, as do their site-specific impacts on the environment, however, with GIS, we can make significant effort in the analysis or screening of potential sites by considering the requirements of sand dredging and identifying and mapping locations within a region that meet these criteria. It is important to identify the sand dredging areas and find how to monitor and control the activities so that environmental degradation can be slowed down

**2.3 Global demand for dredged sand**

The demand for sand is growing around the world, particularly in newlydeveloping countries where there is rapid growth of the construction industry. Extraction of sand resources is done in many countries. Sand is commonly dredged from beaches and inland dunes and dredged from ocean beds and river beds. Of these, river sand dredging is a common practice since the dredging locations are usually near the markets or along transportation routes, hence reducing transportation costs.

In Sri Lanka, the demand for sand for building construction within the country is approximately 7-7.5 million cubic meters per year. This high demand has led to increased and inducriminate dredging in many areas, not only is the sediment sand dredged, but also river bed sand and river bank sand. Many rivers in Sri Lanka such as Nilwala River have been experiencing the problems of sand dredging, especially in recent years (Ranjana U.K. Piyadasa 2000)

In India, sand dredging is done by the politically-controlled sand mafia. The journal India Together recently reported that “despite numerous prohibitions and regulations, sand dredging continues rapidly on the riverbed of the Bharathapuzha.” A similar situation has been observed on the rivers in the Vembanad lake catchments such as Achankovil, Pamba, Manimala, Meenachil, Muvattupuzha, Periyar, and Chalakudy (Padmalal, et al. 2008).

In Nepal, sand used to be mostly supplied from riverbeds. After riverbed dredging was prohibited by the Nepali Government in 1991 (Kharel et al. 1992), terrace dredging in the same northern regions began. However, illegal dredging continues to operate in river areas.

Most of the sand supplied to the market comes from riverbeds. In recent years, rapid development in Malaysia has likewise increased the demand for river sand as a source of construction material. This has resulted in the mushrooming of river sand dredging activities, which have given rise to various problems now requiring urgent action by the authorities (Ghani et al 2011

In Vietnam, exploitation of sand has become a problem on all the large rivers. The Vietnamese press reports that unregulated exploitation of sand has become a nationalproblem that demands a national solution. Hundreds of sand dredge sites are running along Red River. From Hanoi to Ha Tay, PhuTho, Yen Bai, Nam Dinh, and Thai Binh. Many of them are illegal. Also, hundreds of sand sucking boats work along the river. Many boats place sucked sand from sites only 20-30 meters from the bank. Many sections of dikes have become ‘sand warehouses. In central Vietnam. The Huong or Perfume River, an icon of the ancient capital city of Hue, is also suffering from illegal sand dredging. The dredging began around four years ago. Now it takes place both day and night, particularly near the villages of Thuy Bang. Huong Tho, PhuThanh. Phu Mau, Hương Vinh, and HuongPhong Hundreds of 6 big vessels, baries, and small boats are busy all day, seven days a week, transporting sand from the dredging sites. During the high season for construction, from April to July, hundreds of thousands of cubic meters of sand are taken out of Huong River. Dong Nai River, the second largest river in southern Vietnam at 800-km long, traversing 12 provinces and cities, is also a victim of sand miners Sand has been dredged for several years in the river's upper sections, the sections crossing the central highland provinces of Lam Dong, BinhPhuoc, and Dong Nai. Other big rivers in the southern region are also being harmed by sand dredging, including Saigon River in Ho Chi Minh City, Co Chien River in Vinh Long province, Tien and Hau Rivers (upper and lower branches of Mekong River), particularly the sections near Can Tho City and in Dong Thap province and Vinh Long province. The situation in this region has become critical as production has expanded to serve Singapore's sand requirements following Cambodia's embargo on sand exports in May 2009 (VietNamNet Bridge 2009).

**2.4 Sand dredging activities in Lagos state, Nigeria**

Historically, the River Niger was first successfully dredged in 1965 by the Netherlands Engineering Consultants (NEDECO). Between 1978 and 1984, Westminster Dredging also successfully dredged the River Niger and demonstrated the technical feasibility of sustaining navigable conditions of the River Niger through dredging. The dredging project by Westminster dredging enhanced the use of the waterway for transportation of goods. Presently a contract has been awarded for the dredging of the Lower Niger for the purpose of building inland river ports in northern Nigeria. The proposed project has, however, been hampered by opposition to the project by communities downstream of the proposed inland river ports, because of fears of the anticipated environmental impact of the proposed project

The economic benefits of the dredging projects (in Nigeria) has been based on the premise that, water transportation, especially for low value, time insensitive commodities, is about five times more cost-effective than rail transport and about 5% of the cost of road transportation (However, this may not be the case in all situations). Therefore, in the absence of nver dredging, the contribution of the Lower Niger to the transportation of high volume goods, for which it has economic advantage, will continually be low. Furthermore the temporary removal of water hyacinth during dredging operations could also increase the ease of navigation (PTF, 1999, Tamuno, 2005). Dredging has been proposed as a development project to meet developmental aspirations, such as social economic development. Social economic development in the context of this research has been regarded to include increased employment opportunities; and increased commercial activities. The purpose of the proposed dredging of about 600 kilometres stretch of the Lower Niger River to a depth of about 2.5 meters is to promote the economic development in Nigeria (Wolf, et al. 2005; Tamuno, 2005).

Dredging of the lower Niger has the potential of making the river navigable year-round, thereby boosting socio-economic activities in the area where inland river ports has been proposed to be located such as Kogi Sate, where four of the proposed ten inland river ports are to be located (This Day, 2002; Tamuno, 2005). The proposed dredging project would cut across approximately 50 communities along the River Niger (PTF. 1999. This Day, 2002; Tamuno, 2005), and will administratively, cover 7 states and 31 local government areas (LGAs) in Nigeria. The navigational benefits of dredging cut across the developing and industrialized world. Niger River is located in a Developing country(Nigeria) and River Scheldt is situated in an industrialized country (Belgium). In addition, dredging is often carried out in the Niger Delta to improve accenses for ail exploration, marine/coastal transportation and other water bome commerce (Ohirin, 2004)

It is widely agreed that one of the most basic needs of man is shelter and in time past man has experienced with different material in order to meet with his housing needs. In modern day history, the use of cement along with sand and gravel as come to be accepted as one of the best construction raw material because they provide durability, firmness and can withstand harsh weather conditions though other materials like steel and glass are also used. The ever increasing deficit in housing supply in Nigeria which is estimated at over sixteen million (16,000,000} units and the need for the construction of other important infrastructure if the country is to meet up with the vision 20:2020 project of becoming amongst the top 20 economies in the world by

2020 continues to drive the need to sand, an essential construction raw material and the need for the use of modem equipment in the production of sand, in order to meet with demands.

A community of artisanal sand dredgers at Ebutellaje in Bariga local government of Lagos state in Nigeria is famed for sand dredging from the Lagos lagoon. This is a trade that, according to the present generation of sand dredgers called Ifesowaso Associates, started in the 1960s Here sand of three varieties is available on demand and in any desired quantity. The ferowano Associates produce sharp sand, soft and filling sand, all from the lagoon, but not at all from the immediate shoreline (Nigerian Dredging Summit, 2008). Many things are peculiar with these sand-miners Conspicuously, western technology is scarce in their trade. The canoes are constructed locally, in fact, within the community as we saw many types at various stages of construction or repair. Secondly, these canoe men do not use any form of power generation at all.

The canoes are not equipped with any outboard engines at all. It is a wonder that all the canoes in sight, more than two hundred, are of this type- no outboard engines. They use sails made from locally available plastic tensile material, the rubberized type commonly made into sacks for grains storage. Now, these are woven together and seamed in such a way that it is able to collect sea breeze and push the canoes. With this technology, they sail the very long mileage offshore for sand dredging. Average sailing time to reach sand-digging spots, according to them. Is about five hours of rowing and sailing. The use of sail accounts largely for the overflow of bamboo poles which fill the atmosphere of this beach. The other basic equipment in each canoe is a wooden ladder which is used to climb down and back up from the seabed. From their descriptions, average depth for their scooping could be somewhere around 3-5 metres under water. Although the under-water endurance record of these workers could not be ascertained, the magazine gathered that remaining submerged for 20-30 minutes is common among them (Nigerian Dredging Summit, 2008)

2.5 Sand dredging activities and environmental, physical, ecological and social effects

Potential effects of dredging on the marine environment include effects of the dredging process (i.e. the removal of substratum from the seafloor) as well as effects caused by the process of disposal. Dredged material may come into suspension during dredging itself as a result of disturbance of the substratum, but also during transport to the surface, overflow from barges or leakage of pipelines, during transport between dredging and disposal sites, and during disposal of dredged material (Jensen and Mogensen, 2000). Dredging may affect the physical environment by changing the bathymetry, altering current velocities and wave conditions (Jensen and

Mogensen, 2000) which affect the sedimentary regime and may cause erosion under sea grass beds (MacInnis-Ng, 2003).

Dredging and disposal of dredged material can lead to a temporary decrease in water transparency, increased concentrations of suspended matter, and increased rates of sedimentation. In the case of contaminated sediment or sediments with high contents of organic matter, dredging and suspension may also lead to effects on water quality by the release of contaminants (Filho et al., 2004), an increase in nutrients concentrations and reduced dissolved oxygen in the water column. Physical removal of substratum and associated plants and animals from the seabed, and burial due to subsequent deposition of material are the most likely direct effects of dredging and reclamation projects (Newell et al., 1998).

New habitats may also be created as a result of the operation, either directly in the dredged area or by introduction of new habitats on the slopes of a reclaimed area (e.g. hard substratum in the form of breakwaters and revetments). Other direct effects may be caused by enhanced turbidity and sedimentation as a result of dredging and disposal operations. The effect of turbidity on sea grass ecosystems is two-fold. Light attenuation by suspended material affects the amount of light available to the sea grass plants and associated epiphytes, micro phytobenthos and macro algae.

Depending on the depth at which these organisms occur, high turbidity can cause a significant reduction in light availability leading to sub-lethal effects or death. High levels of suspended material can lead to reduced vitality or death in benthic fauna associated with the sea grass beds through clogging of their feeding mechanisms (cilia and siphons) and smothering. Especially in filter-feeding organisms such as mussels, oysters and other bivalves. To capture both effects of turbidity, critical thresholds for turbidity should therefore ideally be determined in terms of light availability at the bottom (in % of surface irradiance) as well as in concentration of total suspended solids (in mg/l).

Increases in turbidity can also be caused by algal blooms, sewage discharge, bio-fouling of turbidity sensors etc. Turbidity should therefore not only be expressed in terms of a reduction of light availability as the sole measure of water quality affected by dredging works, but preferably be accompanied by investigations of the suspended solid concentrations (Bogers and Gardner, 2004) Turbidity changes induced by dredging will only result in adverse environmental effects when the turbidity generated is significantly larger than the natural variation of turbidity and sedimentation rates in the area (Stern and Stickle, 1978; Orpin et al. 2004) Such natural variability can sometimes be substantial and may be caused by factors such stors, wind-induced wave actions, river discharges and other local perturbations. Dredging

Activities often generate no more increased suspended sediments than commercial shipping. Operations, bottom fishing or severe storms (Pennekamp et al., 1996).

The degree of adverse environmental impacts caused by dredging and disposal depends on the quantity, frequency and duration of dredging, methodology of dredging and disposal.. physical dimensions and water depth of the dredging location, grain-size composition, density and degree of contamination of the dredged material, background water quality (especially suspended matter and turbidity), seasonal variations in weather conditions (especially wind and waves), and proximity/distance of ecologically sensitive or economically important areas or species relative to the location of the dredging or disposal site (Pennekamp et al., 1996).

Depending on these factors, there can be considerable spatial and temporal variation in effects. In some cases, adverse impacts of dredging activities are limited to a relatively small area and of relatively short duration. Other (more large-scale) dredging or sand dredging operations, which stretch out over several years and cover many square kilometres, can have major adverse environmental impacts (Lewis, 1976).

However, main potential impacts from dredging on sea grasses include physical removal or burial of vegetation at the dredging/disposal site, and increased turbidity (light reduction) and increased sedimentation in adjacent sea grass meadows. In addition, temporarily reduced dissolved oxygen concentration, release of nutrients and pollutants from (contaminated) sediments, and hydrographic changes may also occur and have adverse (indirect) effects on the sea grass ecosystem.

## 2.6. Sand dredging activities and its consequence

The removal of sand from and immediately adjacent to river channels has direct negative impacts on a stream's habitat including channel shape, streambed stability and composition, amount of woody material in the channel, water depth, velocity, turbidity, flow amount, and water temperature (Rundquist 1980; Pauley et al. 1989; Kondolf 1994; Rivier and Seguier 1985; OWRRI 1995). These impacts are described in the following:

Channel shape flattens: In-stream dredging basically removes the channel of the river from the riverbed. It leaves behind a flat, featureless plain with virtually no place left for many, if not most, of the river fauna to exist. Streambed stability decreases: River dredging decreases streambed stability because of the removal of streambed armouring. Streambed stability is the single most important aspect of a river system's ecology. The streambed is made up of variable curves and straight sections (meanders), deep holes with slow water movement, shallow riffles with fast water movement, log or woody debris jams, long pools with slow water movement, and

Overhanging banks. A natural stream develops “armouring” along its bottom and sides. This armouring is developed over many years or decades. The process consolidates or strengthens the bed of the river where it meets the flowing water. This armouring is stronger than the gravels beneath and helps protect the stream or river from erosion due to flooding. Without this armouring, even small rises in a normal river level can create erosion that damages the river. The removal of this armouring by mining is difficult to restore naturally or with man’s assistance and can continue to impact the river long after mining is completed.

Removal of woody material from the channel:the first thing that happens with river dredging is that all of the tree trunks, branches and organic material are removed from the stream. This means that the fauna living in and around these materials no longer have a habitat. This woody material also provides the stream with a way to build bars and pools. As river water stacks up in front of these debris materials and rushes around or over them in different ways, sand, gravel and sediment are deposited, thus creating river features. When the sand removal is completed, the increased water velocity during floods tends to wash these materials downstream much faster and reduces the chance that they will catch and build back the bars and holes that benefit the stream. This process is self-continuing; that is, without these normal obstructions in the channel, the formation of the structures that capture the woody materials never occurs and the waterway stays shallow without holes and bars.

Change in water depth: The flattening of the river channel resulting from in-stream dredging allows the river water to spread out over a larger area. It may result in shallower than normal water depth. On the other hand, sand dredging in the riverbed could result in a deeper riverbed, the water level in the river can be lower.

Velocity increases: When the natural channel of a river is destroyed, water spreads out over a larger area and its speed increases relative to the stream bottom. A given amount of water can therefore erode a larger amount of streambed. If the water is confined to a deep channel, that same amount of water flowing in the deep channel that is not directly in contact with the streambed causes little or no erosion on the streambed.

Turbidity increases: Increased erosion creates greater turbidity (cloudiness or murkiness) of the river water. When a stream or river is deep, the flow slows down, and sand fine sediments drop to the bottom where they remain until a large runoff event occurs that increases the bottom water velocity.

With a shallower river, the higher bottom water speeds occur more frequently and so there is often more fine sediment in the water. This changes the character of the stream from being clear to murky. As such, fauna that require clear water canoe longer survive.

According to Kondolf, et al. (2001), in-stream sand dredging can damage private and public properties as well as aquatic habitats. Excessive removal of sand may significantly distort the rutural equilibrium of a stream channel. By removing sediment from the active channel bed, in-stream mines interrupt the continuity of sediment transport through the river system. Disrupting the sediment mass balance in the river downstream and inducing channel adjustments (usually incision) that extend to considerable distances (commonly 1 km or more) beyond the extraction site itself. The magnitude of the impact basically depends on the magnitude of the extraction relative to bed load sediment supply and transport through the reach of the miners. Collins and Dunne (1990) summarized the effects of sand mining as follows:

Extraction of bed material in excess of replenishment by transport from upstream causes the bed to lower (degrade) upstream and downstream of the site of removal. Bed degradation can undermine bridge supports, pipe lines, and other structures. It may change the morphology of the river bed, which constitutes one aspect of the aquatic habitat. Degradation can deplete the entire depth of gravelly bed material, exposing other substrates that may underlie the gravel, which could in turn affect the quality of aquatic habitat. Rapid bed degradation may induce bank collapse and erosion by increasing the heights of banks. If a floodplain aquifer drains to the stream, groundwater levels can be lowered as a result of bed degradation. The supply of overbank sediments to floodplains is reduced as flood heights decrease. Lowering of the water table can destroy riparian vegetation. Flooding is reduced as bed elevations and flood heights decrease, reducing hazard for human occupancy of floodplains and the possibility of damage to engineering works. In rivers in which sediments are accumulating on the bed (aggrading) in undisturbed condition, gravel extraction can slow or stop aggradations, thereby maintaining the channel's capacity to convey flood waters

The reduction in size or height of bars can cause adjacent banks to erode more rapidly or to stabilize, depending on the amount of sand removed, the distribution of removal, and on the geometry of the particular bend. Although river sand dredging causes serious environmental and economic impacts, studies on it are quite limited. Only a few studies have quantified some impacts of river sand dredging. One such study is by Padmalal et al. (2008) who investigated the environmental effects of river sand dredging in a river catchment of Vembanad Lake in India. They found that on average, 11.73 million tons of sand are being extracted annually from the active channels and 0.414 million tons of sand from the river floodplains. The quantity of instream dredging is about 40 times higher than the sand input estimated in the gauging stations As a result of such indiscriminate sand dredging, the riverbed in the storage zone is getting Iwered at the rate of 7-15 cm/year over the past two decades. This, in turn, has imposed severe

Damages on the physical and biological environments of the river systems. Willem de Lange et al. (2009) investigated the external cost of river sand dredging in South Africa. They estimated the benefits of sand dredging based on the market price of sand at source; whereas the costs were estimated based on the opportunity costs of sand dredging(ie., the value of services that could be lost as a result of depletion of the resource). The benefit transfer was used to estimate some value of the rivers. The external cost of dredgingof sand in the rivers was computed to be between 18- 379 rupees while the market price was around 30 rupees per m3.

However, Sand mining is widespread, highly unregulated, uncontrolled and is being carried out at an alarming rate. The gravity of the situation beyond the affected communities and the region at large is enormous and poses a threat not only to the environment but also to food security. Chiefs and land owners gave out land for monetary gains and caring less about the effects of the mining activities on the people and the environment (Imoru, 2010). Sand dredging operations can produce large quantities of suspended sediment, elevating turbidity levels and creating deposits in streams. There are several physical effects on streams caused by dredging activities: change in channel morphology, locally increased water velocity and scour, head cutting, streambed modification, enhanced fine particle deposits, remobilization of contaminants in the sediment, and increased turbidity (Brooks, 1998).

Sand dredging is a direct cause of erosion, and also impacts the local wildlife. For example, sea turtle depend on sandy beaches for their nesting, and sand mining has led to the near extinction of gharials (a species of crocodiles) in India. Disturbance of underwater and coastal sand causes turbidity in the water, which is harmful for such organisms as corals that need sunlight. It also destroys fisheries, causing problems for people who rely on fishing for their livelihoods. Removal of physical coastal barriers such as dunes leads to flooding of beachside communities, and the destruction of picturesque beaches causes tourism to dissipate. Sand mining is regulated by law in many places, but is still often done illegally (Wikipedia 2013) Rivers flood and shift their courses from time to time, resulting in natural cycles of erosion and deposition of sand and gravel. The river and its banks are home to many fauna and flora species. In this era of rapid land development, however, people have turned to rivers and floodplains as major sources of sand for construction. Sand occurs in a variety of natural settings and is a common material used in the construction industries worldwide. The extraction of sand from rivers and streams, floodplains and channels conflict with the functionality of riverine ecosystems, some of the disturbance is from the dredging methods and machineries used. The most common environmental impact is the alteration of land use, most

Likely from underdeveloped or natural land to excavations in the ground (Langer, 2003; Edmore and Humphrey, 2012)

Sand dredging has many effects on biodiversity, It causes settled sedimentary particles to enter into suspension, leading to high turbidity of water and reduced photosynthetic activity, Particles in suspension affects filter feeding in benthic organisms. Many fauna that inhabit sandy sediments are “sucked” and pumped onto land, leading to their deaths. Sedimentary plumes are carried by tidal currents inland and become deposited in nursery grounds. When this happens, reproduction success is hampered. In shallow inland water areas where suction dredging takes place, the sheer strength of flanking riverbanks weakens, riparian erosion ensues and biodiversity of the affected area dwindles or become lost entirely, Dredging/quarrying of sand and gravels along riverbanks contribute to sliding, shumping and gully development resulting in land degradation (Zabbey, 2004).

Extraction of sand dredging from the floodplains alters the functionality of both the aquatic and terrestrial ecosystems culminating in further changes in land-use, stagnant water in the excavation pits creates a good breeding ground for diseases carrying vectors. Mosquitoes and snails for example pose a danger of malaria and bilharzias to the local communities (Edmore and Humphrey, 2012). Although sand mining contributes to the construction of buildings and development, its negative effects include the permanent loss of sand in areas, as well as major habitat destruction. Sand dredging is regulated by law in many places, but is still often done illegally. The effects of dredging on aquatic organisms have been a source of environmental concern for several decades. One category of concern that has frequently arisen in connection with projects involving dredging for navigational purposes deals with mortality of fish and shellfish entrained.

In recent times, water pollution has emerged as one of the dreadful environmental challenges facing Nigeria; as many rivers and streams have become contaminated by mostly natural and man-induced activities. Water pollution involves contamination of streams, lakes. Underground water, bays, or oceans by substances harmful to living things. It is undisputable that all living organisms largely depend on water for their livelihood. Some live in it, while others drink it. Also the survival of man, animals and plants depend on water that is moderately pure; and they cannot subsist if their water is loaded with toxic chemicals or harmful bacteria. Water has always been a vital resource for human beings. However, the power conferred by fossil fuels and modern technology, people have rerouted rivers, pumped up deep groundwater,

And by so doing polluted the earth's water supply as never before (Abubakar, 2013). Illegal mining constitutes serious environmental threats to society.

**2.7. Sand dredging activities and management**

The increased demand for river sand as a construction material has resulted in themushrooming of river sand dredging, which has given rise to various problems requiring urgent action by the authorities. These include river bank erosion, river bed degradation, river buffer zone encroachment, and deterioration of river water quality. Very often, over mining occurs, jeopardizing the health of the river and the environment in general.

In 2009, Malaysia's Department of Irrigation and Drainage approved a set of river sand dredging management guidelines. The guidelines are aimed at ensuring that sand extraction is carried out in a sustainable way. They are also intended to maintain the river equilibrium with the application of sediment transport principles in determining the locations, period, and quantity of sand to be extracted. The general guidelines are as follows (MONRE-Malaysia 2009):

1)Parts of the river reach experiencing deposition or aggradations shall be identified first. Operators may be allowed to extract the sand deposit in these locations to lessen aggradations problem.

2) The distance between sites for sand dredging shall depend on the replenishment rate of the river. Sediment rating curve for the potential sites shall be developed and checked against the extracted volumes of sand.

3) Sand may be extracted across the entire active channel during the dry season.

4) Layers of sand that could be removed from the river bed shall depend on the width of the river and replenishment rate of the river.

5) Sand shall not be allowed to be extracted where erosion may occur, such as at concave bank.
6) Sand shall not be extracted within 1,000 meters from any crucial hydraulic structure such as pumping station, water intakes, bridges, buildings, and such structures

Similarly, Geological Survey of India also drew several recommendations on sustainable sand dredging in the rivers, which include the following:

1)Dredging below subterranean water level should be avoided as a safeguard against environmental contamination and overexploitation of resources

2)Dredging at the concave side of the river channel should be avoided to prevent bank erosion Similarly, a meandering segment of a river should be selected for dredging in such a way as to

Avoid naturally eroding banks and to promote mining on naturally building (aggrading) meander components.

3) Dredging of sand from the riverbed should be restricted to a maximum depth of 3 m (10 feet) from the surface. For surface dredging operations beyond this depth, it is imperative to adopt quarrying in a systematic bench-like disposition, which is generally not feasible in riverbed dredging. Hence, for safety and sustainability, restriction of dredging of riverbed material to a maximum depth of 3m is recommended.

4) Dredging of riverbed material should also take cognizance of the location of the active channel bank. It should be located sufficiently away, preferably more than 3 m away (inwards), from such river banks to minimize effects on river bank erosion and avoid consequent channel migration.

### 2.8 Theoretical and conceptual framework

To examine this issue, I employ Problem assurance theory and pressure-state response theory to examine sand dredging activities and its effects.

#### 2.8.1 The problem assurance theory

The theoretical underpinning that informed this study traces its roots from Hardin’s (1968) “Tragedy of the commons” theory which argues that users of common property cannot be left to decide how to use them and that their use has to be controlled to avoid over exploitation. It is with the objective of preventing the Hardian tragedy of the commons that governments in Africa, and other parts of the world, have, until recently, assumed the direct control and management of natural resources, such as forest, water bodies, game and wild life.

Hence, this guided government policies in their design of codes, and laws in the management of common property resources. The suitability of governments’ direct control of what should properly be locally managed for the livelihood sustainability of the poor is increasingly being questioned. This agreeswith the argument that "the alienation of local resource control to state structures among other factors, accounted for resource management failures in most parts of the third world. Rules established by governments to manage natural resources has most often been in conflict with the needed right of local residents. The theory is framed on the principle that natural resource management policies, given thefailure of the top- down (policies, codes and laws on natural resource management designed by government agencies) 'tragedy of the commons' approach, should seek to support traditional institutions where they are effective, and promote them where they no longer exist in their efforts to manage

Natural resources. This theory therefore will help to control and guide activities revolving our rivers and seas most especially, activities of sand dredging in the study environment

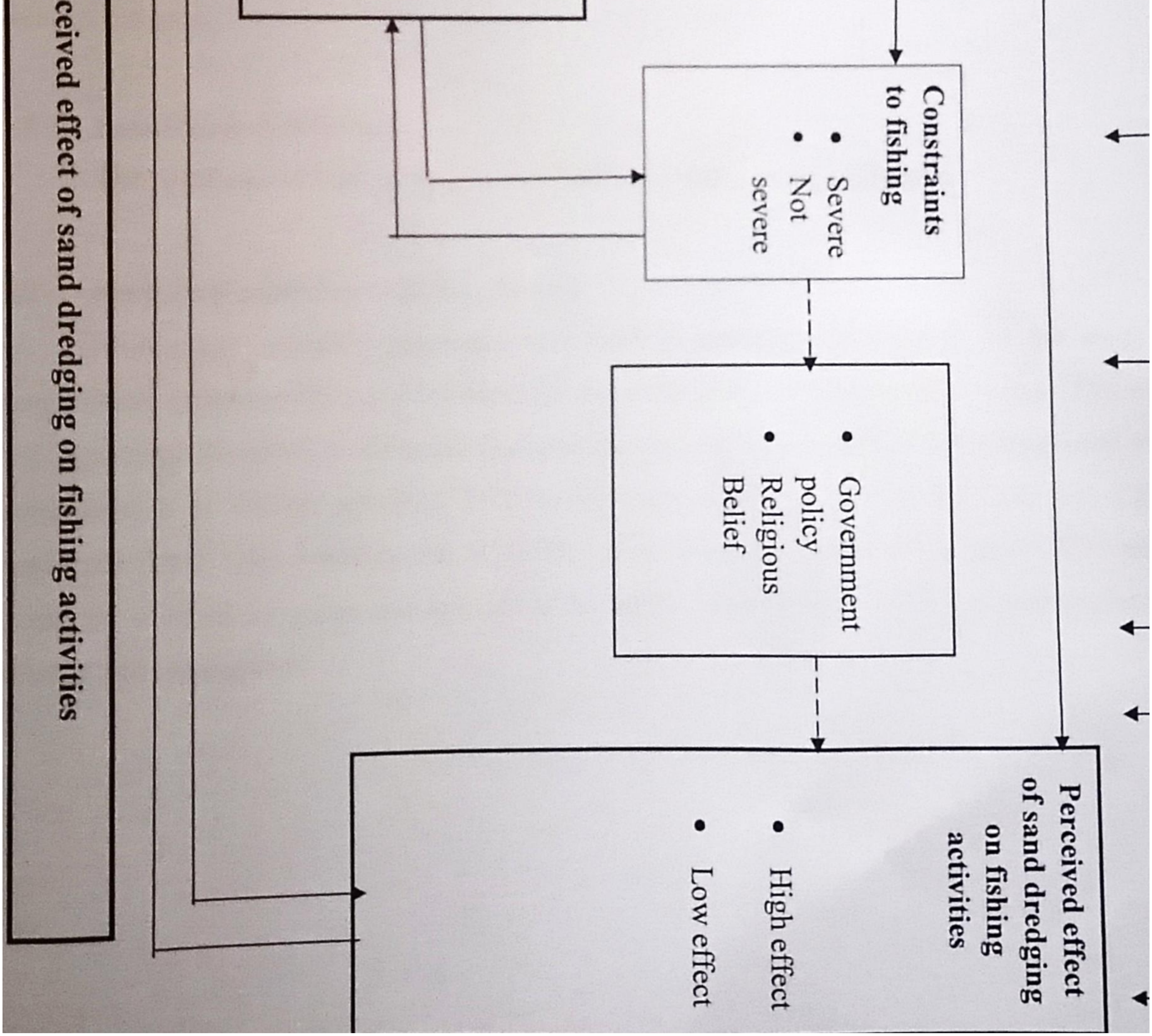
### 2.8.2 Pressure-state response theory

A modification of the Pressure-State-Response (PSR) Model proposed by Harrison andPearce (2001) is adopted for this study. In its original postulation, the PSR model is ant encompassing system alternative to both the Malthusian crisis model and the economic adaptation models. The model indicates that population pressure on the physical environment, which may be in the form of a particular human activity, such as uncontrolled exploration and exploitation of resources, causing severe economical, physical and social impact. The level of pressure is determined by population, consumption and level of resource use and waste output these generate. It is known that sand dredging activities serves as a source of employment, income to many people in order to survive with life. However, this theory will assist to reduce the threat which water bodies might be facing thereby ensuring its sustainability.

### 2.9 Conceptual framework

The conceptual framework gives a schematic representation of the interrelationship of variables (dependent, intervening and independent) considered in astudy; it shows how the variables are linked together. The framework for this study is based on the fact thatperceived effect of sand dredging (dependent variable) which is influenced by certain independent variables such as: personal characteristics of the respondents, knowledge of the effect of sand dredging on fishing activities, livelihood diversification activities and constraints faced by the fisher folks on sand dredging on fishing activities. The intervening variables are those variables that affect the dependent variable of the study but cannot be seen nor measured by the researcher.

For this study, they include: environmental factor, government policy on natural resources, and belief of people towards the use of sand dredging as a source of occupation and income.




**CHAPTER THREE**

**METHODOLOGY**

**3.1 Study area**

The study was carried out in Lagos state, Nigeria, The state is located at approximately latitude 624' and 6°31' North of equator and longitude 316 and 327 East of the Greenwich Meridian. The State is bounded in the East and North by Ogun state, in the West by Republic of Benin and in the South by Atlantic Ocean. It covers an area of 3.677km2 with a total population of 9,113.605, it has the highest population density of 2,451 persons per square kilometre in Nigeria (NPC, 2006). The state is a socio-cultural meeting point of Nigerians as well as nationals of other countries worldwide. Lagos state has 20 Local Government Areas (LGAS) and it is described as the nation's commercial nerve centre. The climate in Lagos is similar to that of the rest of southern Nigeria. The state has several industries which serve as a means of livelihood for residents for agricultural activities, there slight cultivation of maize, yam and vegetable within the sub-urban areas within the state, while fishery activities are concentrated in Epe, Ibeju-Lekki, Eti-Osa, Badagry and Ikorodu areas in the state.

**3.2 Population of the study**

The population of the study consist of all fisher folks in the study area.

**3.3 Sampling procedure and sample size**

Multi-stage sampling procedure was used in selecting respondents for the study. Lagos State comprises 20 Local Government Areas (LGAs) and S maritime divisions. Out of the 5 maritime divisions in the state, Epe and Ikorodu were purposively selected because of concentration of fishing activities in these divisions. Epe and Ikorodu has 380 and 320 registered fisher folks respectively. Secondly, 20% of the total number of fisher folks was randomly selected from Epe and Ikorodu to 76 and 64 fisher folks respectively and to give a total of 140 respondent

**Table 3.3: A table showing the summary of sampling procedures and sample size of study**

**Table 3.1: A table showing the summary of sampling procedures and sample size of the study**

| Total number of maritime divisions | Purposive sampling | No of Contact fisher folks | 20% Simple randomly selected fisher folks |
|---|---|---|---|
| 5 | Epe | 380 | 76 |
| | Ikorodu | 320 | 64 |
| **Total** | | **700** | **140** |

**3.4: Data Collection**

An interview schedule was used to oboin primary data from the respondents

**1.5: Validation of the instrument**

Content and face validity of the research instrument wasdonoby research supervisor and professionals in the field of Agestural Extension and Rund Development. The process resulted in the commction of defective questions, deletion of irrelevant items as well as inclusion of new items

**3.6: Measurement of Variables**

**3.6.1 Independents variables**

**3.6.1.1 Personal characteristics of respondents**

Age: Respondents were asked to give their actual age in years) This was measured interval level Sex: Respondents were asked to indicate their sex. Nominal values were assigned to cach

Male-1. Female-2.

Marital status: Respondents were asked to specify their marital status. Nominal values were assigned to each Single-1, married-2, divorced-3 or widowed – 4

Income: Respondents were asked to specify their monthly income in Nairs This was measured at interval level

Family size: Respondents were asked the actual number of people in their respective households. This was measured at interval level

Education: Respondents were asked to indicate their educational level. Nominal values were assigned to each. No formal education 1. Primary education-2, secondary education),tertiary education-4

Social organisation: Respondents were asked if they belong to any social group. Nominal values were assigned to each Yesel and No-0. Then those who belong to social groups were asked to list the name of the group

**3.6.1.2 Respondents' knowledge of perceived effect of sand dredging on fishing activities**

Fisher folks' knowledge on perceived effect of und dredging wat measured by ticking the respondents' response to the question asked. Their responses was scored Yer and No-0 The highest and lowest score were 24 and 0 respectively. Thereafter the mean

Core was compsited and used to categorize knowledge of fisher folks on the perceived effects of sand dredging imo high or low knslodge 3.6.1.3 Respondents' diversification into other livelihood activities

Respondents were asked to tick other livelihood activities they engage in from a list of livelihood activities. These activities were categorized into on-farm activities, off-farm activities and non form activities. On-farm activities include arabile crop farming, vegetable ming, cash crop farming, maitry, and animal husbandry, Off farm activities include farm relict processing, produce storage, produce marketing While Non-farm activities include carpentry, commercial bike riding, brick-laying, civil service, welding and teaching

**3.6.1.4 Constraints to fishing activities**

Nine (9) possible constraints items to fishing activities were listed, and respondents were asked to indicate by ticking the level of severity. Scores were assigned as severe constraint(2), not severe constraint(1). The mean scores were computed and used to rank the constraints from the most severe to the least severe constraint 3.6.2 Dependent variable

This was measured by presenting 23 perception statements to the respondents in order to assess their perception towards the effect of sand dredging on fishing activities Respondents perception was measured on a 5 point Likert scale of Strongly Agree -5, Agree, Undecided-3, Disagree-2, Strongly Disagree-1 for positive statements and strongly disagreed-5, disagree-4, undecided-3, agree-2, strongly agree-1 for negative statements. Possible maximum score was 115 while the minimum score was 23. Respondents' score was computed to find the mean scores. Respondents above mean were categorized as having favourable perception while respondents below the mean were regarded as unfavourable perception

**3.7 Analysis of data**

The quantitative data for the study was entered on the spread sheet with the codes specified providing a guide. Statistical analysis was carried out with the use Statistical Packages for Social Sciences (SPSS) Using the software, data was described with the use of descriptive statistics such as the means, frequencies and percentages. Test of hypotheses were carried out with a range of statistical package appropriate for each Tools used for different hypotheses are stati below:

Table 3.2: **Analysis of objectives for the study**

| | **Objectives** | **Descriptive statistics** |
|---|---|---|
| 1 | Socio-economic characteristics | Percentage, mean, standard deviation and frequency |
| 2 | knowledge on the effect of sand dredging on fishing activities | Percentage, mean, standard deviation and frequency |
| 3 | livelihood diversification of the fisher folks | Percentage, mean, standard deviation and frequency |
| 4 | constraints faced by the fisher folks | Percentage, mean, standard deviation and frequency |
| 5 | perception of sand dredging effect on fishing activities | Percentage, mean, standard deviation and frequency |

Table 3.3: **Analysis of hypotheses for the study**

| Hypotheses | Inferential statistical tools |
|---|---|
| Ho1 | Chi-Square and PPMC |
| Ho2 | PPMC |
| Ho3 | PPMC |
| Ho4 | Independent sample t-test |

## CHAPTER FOUR

## RESULTS AND DISCUSSION

### 4. **1 Socio economic characteristics of fisherfolks**

### 4.1.1 Age of respondents

The age distribution ranged between 18 to 19 years with the mean age at 37k. Oheir one-third (40.7%) of the respondents were within the ages of 34. 41 years, while only 57% were above 50 years of age, as shown on Table 41. This suggests that the fiber-folks in the sly area were very young and are within their active years. This suppon the findings of Soanbola and Fregene (2012). Who found that majority of the fisher folks were youths hous than 50 years of age.

### 4. 1.2 Sex of respondents

The result on Table 4.1 reveals that majority (92.1%) were males while females were only 7.9%. This implies that fishing activities were predominantys male's occupation in the study area. This corroborates with the findings of Adeleke, (2013) who found in his study on the socioeconomic characteristics of the artismal fisherfolks in the coastal region of Onde state, Nigeria that fishing activities is predominately done by males

### 4.1.3 Marital status of respondents

Table 4.1 shows that majority (N1 45%) of the fisher folks were married, 8.3% were single while only 29 were widowed. This implies that most of people engaged in fishing were married. This is consonance with Adeyemi er af, (2002) who posited the mage institution is still cherished and an indication of economic responsibilities of the respondents in caring for their dependents

### 4.1.4 Household size of farmers

Household size of fisher folks ranged from 1 to 16 person. Results on Table 4.1 shows that household having 4 to 6 persons continued the highest percentage (43.0%) followed by household of 7 to 9 person (30.0%). Furthermore, the mean 6s 3 reveals that respondents had a fairly large household. This suggests that fisher folks used family usember as source of labour as this is prevalent in most agricultural enterprise. This is in co with the findings of Adegbite and Oluwalana, (2004), Adegbite in al. (2007) that the larger the household sice, the more prospects for labour efficiency

### 4. 1.5 Educational qualification of respondents

Table 4.1 further shows that over 50% of the respondents have no formal education And 42.9% had only primary education. This implies that there is a high level of illiteracy among respondents. This could be due to the fact that most fisher folks use their children source of labour at the expense of formal education, this corroborates with the findings of Anyanwu et al (2009) who in his study on economic analysis of artisanal fishing at river Nigerfound that only 2% of fisher folks have tertiary education

### 4.1.6 Respondents' monthly income

The monthly income of fisher-folks in the study area ranged between 5,000 to 60,000 with mean income of N 22, 892. From the results, over 50% of the respondents care between N 5000 to N 18, 000 monthly, Only 2.1% of the respondents carn between N 47,000 to 60,000 monthly. This suggest that a larger percentage of fisher folk are not making sufficient income from fishing enterprise due to several constraints facing the fishing industry such as dredging. This observation is in agreement with Anyanwu et al (2009). Reported that a gross profit of about 20,000 per month by an average fisherman along River Niger in Onitsha, Nigeria

### 4.1.7 Membership of social group and membership status

Table 4.1 reveals that majority 92.9% of the respondents were members of one social group or the other the common social groups include: some of the social group fisher-folks belong to include Oloruntobi fishing association, Jejelaye fishermen group, Jerusalem fishing group, Aamioluwapo fishing association and Mijepo fishermen group. Furthermore, the result reveals that 45.5% belonging to these fishing associations were ordinary members in these associations, 32.5% were ad-hoc members while 22.0% are executive members. This suggest an active participation of fisher folks in social activities

Table 4.1 Socio- economic characteristics of respondents

| Variable | | Frequency | Percentage (%) | Mean |
|---|---|---|---|---|
| Age (years) | 18-25 | 09 | 6.4 | 37±8 |
| | 26-33 | 29 | 20.7 | |
| | 34-41 | 57 | 40.7 | |
| | 42-49 | 37 | 26.4 | |
| | 50-59 | 08 | 5.7 | |
| Sex | Male | 129 | 92.1 | |
| | Female | 11 | 7.9 | |
| Marital status | Single | 21 | 8.3 | |
| | Married | 114 | 81.4 | |
| | Widowed | 4 | 2.9 | |
| | Separated | 1 | 0.7 | |
| Household size | 1-3 | 18 | 12.9 | 6±3 |
| | 4-6 | 63 | 45.0 | |
| | 7-9 | 42 | 30.0 | |
| | 10 and above | 17 | 12.2 | |
| Education | No formal education | 79 | 56.4 | |
| | Primary education | 60 | 42.9 | |
| | Secondary education | 1 | 0.7 | |
| | Tertiary education | 0 | 0 | |
| Religion | Christianity | 62 | 47.0 | |
| | Islam | 69 | 52.3 | |
| | Traditionalist | 1 | 0.8 | |
| Monthly income (Naira) | 5000-18000 | 71 | 50.7 | ₦22,892±13,564 |
| | 19,000-32000 | 24 | 17.1 | |
| | 33,000-46,000 | 42 | 30.0 | |
| | 47,000- 60,000 | 3 | 2.1 | |
| Social group | Yes | 130 | 92.9 | |
| | No | 10 | 7.1 | |
| Membership status | Executive member | 29 | 22.0 | |
| | Ordinary member | 59 | 45.5 | |
| | Adhoc–member | 42 | 32.5 | |

Source: Field survey, (2015)

**4.2 Respondents knowledge on perceived effect of sand dredging on fishing activities**

The result of respondents' knowledge on perceived effect of sand dredging on fishing activities is shown on Table 42a. The mean was used to rank the statement. Respondents were most knowledgeable on reducality of fish capture (1.00) as effect of sand dredging followed by increase in the mortality of fishes, frequent ewape of tides during filing activities and increment of time spent on fishing activities at well at its effects on comination of wate bodies (009). Furthermore Table 4 2h shows categorization of respondent's level of knowledge. On effects of dredging on fishing activities The mean was to categorize respondents Respondents having scores below the mean 17.63205 were categorized as having low level of knowledge while respondents with scores above the mean 17.652 05 were categorized as having high level of knowledge. By this, a larger percentage 35.5% of the respondents had high level of knowledge. This implies respondents know the effect of dredging on fishing activities, this high knowledge may positively influence their perpection also widespread knowledge of on the effects of dredging on fishing activities will help fisher folks in deciding if they need to diversity imo oder fivelihood activity. This is consonance with Opby, (2012) who observed that illegal sand mining constitutes serious environmental threats and consegne to socisty of which dents and government thorities we knowledgeable about

**Table 4.2a: Respondents' knowledge on perceived effect of sand dredging on fishing activities**

| Knowledge Items | Correct | | Incorrect | | | |
|---|---|---|---|---|---|---|
| | F | % | F | % | Mean | Rank |
| Increase in the mortality rate of fishes | 139 | 99.3 | 1 | 0.7 | 0.99 | 2nd |
| Loss of river banks due to erosion | 88 | 62.9 | 52 | 37.1 | 0.63 | 18th |
| Contamination of water bodies | 139 | 99.3 | 1 | 0.7 | 0.99 | 2nd |
| Reduced quantity of fishes capture | 140 | 100 | | | 1.00 | 1st |
| Relocation of fisher folks to other geographical areas | 136 | 97.1 | 4 | 2.9 | 0.97 | 8th |
| Increment of time spent on fishing activities | 139 | 99.3 | 1 | 0.7 | 0.99 | 2nd |
| Frequent flooding of the environment | 80 | 57.1 | 60 | 42.9 | 0.57 | 21st |
| Frequent canoe accident during fishing activities | 103 | 73.6 | 37 | 26.4 | 0.74 | 16th |
| Reduction in income generation | 137 | 97.9 | 3 | 2.1 | 0.98 | 6th |
| Sea animals going into near extinction | 110 | 78.6 | 30 | 21.4 | 0.79 | 15th |
| Frequent capture of immature fishes | 35 | 25.0 | 105 | 75.0 | 0.25 | 23rd |
| Market price fluctuation of fishes | 134 | 95.7 | 6 | 4.3 | 0.96 | 10th |
| High cost of fishing inputs | 71 | 50.7 | 69 | 49.3 | 0.51 | 19th |
| Reduction in tourist activities | 25 | 17.9 | 115 | 82.1 | 0.18 | 24th |
| High occurrence of storm during fishing activities | 92 | 65.7 | 48 | 34.3 | 0.66 | 17th |
| High occurrence of fish migration during fishing activities | 137 | 97.9 | 3 | 2.1 | 0.98 | 6th |
| Loss of nursery ground for migratory fishes | 71 | 50.7 | 69 | 49.3 | 0.51 | 21st |
| Frequent escape of fishes during fishing activities | 139 | 99.3 | 1 | 0.7 | 0.99 | 2nd |
| Increase in the number of labour force during fishing activities | 123 | 87.9 | 17 | 12.1 | 0.88 | 12th |
| Frequent change in pattern of fishing activities | 128 | 91.4 | 12 | 8.6 | 0.91 | 11th |
| Lack of ability to sell fishes at the river bank | 83 | 59.3 | 57 | 40.7 | 0.41 | 22nd |
| Increase in depth of water bodies | 136 | 97.1 | 4 | 2.9 | 0.97 | 8th |
| Increased livelihood diversification of fisher folks | 123 | 87.9 | 17 | 12.1 | 0.88 | 12th |
| Reduction in the quality of water bodies | 119 | 85.0 | 21 | 15.0 | 0.85 | 14th |

Grand mean: 0.77

**Source: Field survey, 2015**

Table 4.2b: Categorization of respondents based on knowledge on effects of dredging on fishing activities

| Level of knowledge | Frequency | % | Min | Max | S D | Mean score |
|---|---|---|---|---|---|---|
| Low (0-17.64) | 63 | 45.0 | 12.0 | 22.00 | 2.05 | 17.65 |
| High (17.65-24) | 77 | 55.0 | | | | |
| Total | 140 | 100 | | | | |

Source: Field survey, 2015

### 4.3 Constraints to fishing due to sand dredging activities

Result on Table 4.3 reveals respondents frequency distribution and ranks of constraint based on the level of severity. The result shows that increase in depth of water affects fishing activities (0.9720.16) ranked first in order of severity, while the constraint of having to move far into the sea before we can have access to catching fish and reduction in the level of me (0.96+0.18, 0.96-0.20) were second in order of severity. This implies that because dredging which basically involves excavating sand in the water makes the sand bed deeper which leads to increase depth of water bodies and its ultimate effect is reduction of income as fewer fishes will be caught. This corroborates with Tamuno, (2005) who posited that the depth of the dredged sections poses an additional risk to fishers-folks and other river users:

**Table 4.3: Constraints to fishing due to sand dredging activities**

| S/no | Constraints | Severe | | Not Severe | | Mean | SD | Rank |
|---|---|---|---|---|---|---|---|---|
| | | F | % | F | % | | | |
| 1 | Contamination of water due to sand dredging affects fishing activities | 132 | 94.3 | 8 | 5.7 | 0.94 | 0.23 | 4th |
| 2 | Increase in depth of water affects fishing activities | 136 | 97.1 | 4 | 2.9 | 0.97 | 0.16 | 1st |
| 3 | Sand dredging leads to increased labour during fishing activities | 94 | 67.1 | 46 | 32.9 | 0.67 | 0.47 | 9th |
| 4 | We have to move far into the sea before we can have access to catching fish | 135 | 96.4 | 5 | 3.6 | 0.96 | 0.18 | 2nd |
| 5 | Sand dredging activities causes frequent accidents during fishing | 103 | 73.6 | 37 | 26.4 | 0.74 | 0.44 | 6th |
| 6 | Increase in the level of environmental hazard | 96 | 68.6 | 44 | 31.4 | 0.69 | 0.46 | 8th |
| 7 | Damaging of fishing traps in the water | 115 | 82.1 | 25 | 17.9 | 0.82 | 0.38 | 5th |
| 8 | Frequent flood occurrence | 100 | 71.4 | 40 | 28.6 | 0.71 | 0.45 | 7th |
| 9 | Reduction in the level of income | 134 | 95.7 | 6 | 4.3 | 0.96 | 0.20 | 2nd |
| 10 | Loss of fishing equipment and property | 78 | 55.7 | 62 | 44.3 | 0.56 | 0.49 | 10th |

**Source: Field survey, 2015**

### 4. 4 Livelihood diversification activities of fisher folks

Results on Table 4.4 show fisherfolks' livelihood diversification due to the effects of sand dredging on fishing activities li reveals that all fisherfolks diversify into at least one activity or the other as some even engage in more than one activity. Furthermore, the result reveals that fisherfolks diversity majority (77.1%) of fisherfolks diversify into non-farm activities as commercial motor bike riding, security and technician services. About 60% of fisherfolks diversify into on-farm setivities such as arable farming, animal husbandry and vegetable farming, while only 33.5% of respondents diversify into off-farm activities such as processing of agricultural produce, storage of agricultural produce and marketing of agricultural produce. This implies that fisherfolks perceive non-farm activities as a better means of livelihood as about 30% of the fisherfolks have diversified into commercial bike nding. This trend clearly shows the gradual shift of attention from fishing and other farm related activities to other income generating activities as a result of the decline in income irom fishing activities caused by sand dredging and other constraints in these fishing locations. The high diversification corroborates the findings of Olanipekun and Kuponiyi (2010) who studied the contribution of livelihood diversification to rural households welfare and found that majority of respondents diversify their income generating activities from farm related enterprises in order to make a living

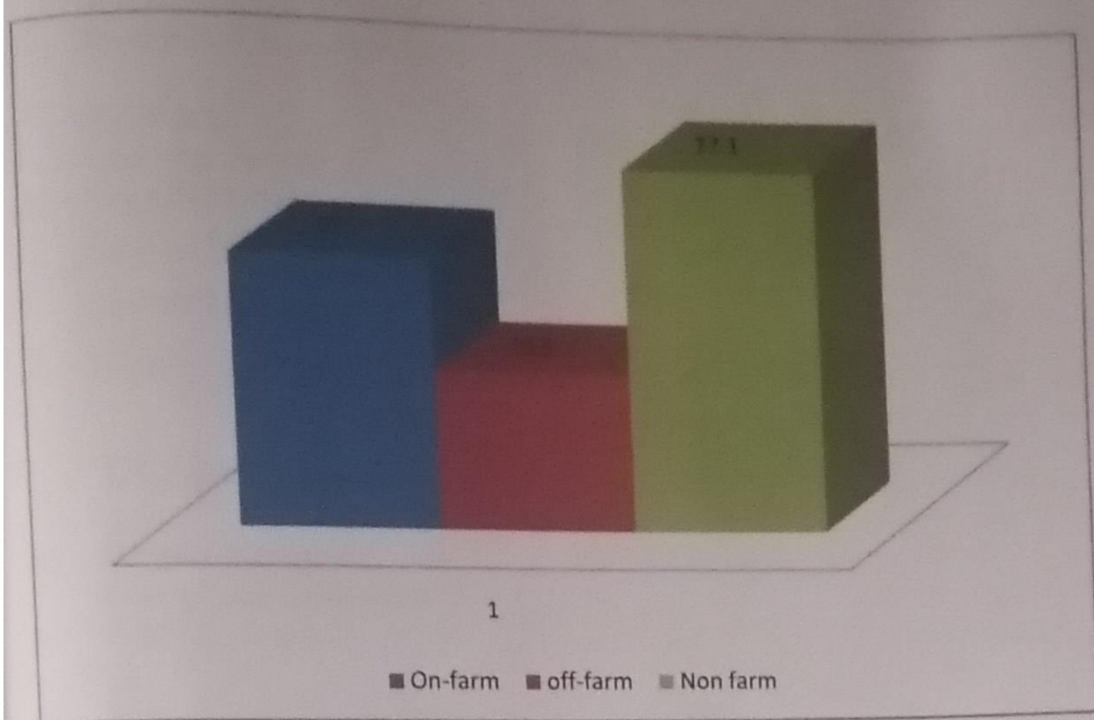



**Figure 4.1: Percentage distribution of fisherfolks' livelihood diversification**

Table 4.4: Respondents' livelihood diversification activities

| | Diversified livelihood activities | Freq. | Percent | Rank |
|---|---|---|---|---|
| A | **Farming/off farm agricultural activities** | | | |
| 1 | Arable crop | 16 | 11.4 | 3rd |
| 2 | Cash crop farming | 6 | 4.3 | 4th |
| 3 | Vegetable farming | 18 | 12.9 | 2nd |
| 4 | Farm product processing | 5 | 3.6 | 5th |
| 5 | Animal husbandry | 34 | 24.3 | 1st |
| 6 | Hunting | 4 | 2.9 | 6th |
| | **Total diversified on-farm activities** | 83 | 59.0 | 2nd |
| B | **Off –farm activities** | | | |
| 1 | Farm product processing | 8 | 5.7 | 2nd |
| 2 | Produce storage | 6 | 4.3 | 3rd |
| 3 | Marketing of farm products | 33 | 23.6 | 1st |
| | **Total diversified off-farm activities** | 47 | 33.5 | 3rd |
| C | **Non-Agricultural activities** | | | |
| 1 | Carpentry | 10 | 7.1 | 4th |
| 2 | Motorcycle driving | 41 | 29.3 | 1st |
| 3 | Taxi driving | 2 | 1.4 | 7th |
| 4 | Viewing centre | 1 | 0.7 | 10th |
| 5 | Security | 23 | 16.4 | 2nd |
| 6 | Technician | 15 | 10.7 | 3rd |
| 7 | Painting | 2 | 1.4 | 7th |
| 8 | Selling of plank | 1 | 0.7 | 10th |
| 9 | Schooling | 2 | 1.4 | 7th |
| 10 | Selling of sand | 1 | 0.7 | 10th |
| 11 | Brick laying | 4 | 2.8 | 6th |
| 12 | Fuel marketing | 6 | 4.3 | 5th |
| | **Total diversified non-farm activities** | 108 | 77.1 | 1st |

**Source: Field survey, 2015**

**4.5 Respondent's perception of the effect of sand dredging on fishing activities**

Table 4.5 shows respondents' perception of effect of sand dredging on fishing stivities. Respondents perceived: frequent dredging of sand drives fishes far into the sea (4.93), dredging of sand would allow for far travel distance before capture of fish (482) frequent dredging of sand should be discouraged (4 81), Frequent dredging of sand is likely to reduce income of fisher folks (4.79). Sand dredging activities might reduce the quantity of fish caught during fishing activities (4.66) as major effects of sand dredging on fishing activities. Furthermore, Table 4.5b shows Respondent's perception level of effects of dredging on fishing activities. The perception mean score was used to categorize respondents Respondents having scores below the mean (98.91-5.01) were categorized as having low perceived effect level while respondents with scores above the mean (98 91-5.01) were categorized as having high perceived effect level. Thus, 44.3% of the respondents had low perceived effect while, 55 7% of the respondents had high perceived effect of sand dredging This means that a larger percent of fisher folks agree that sand dredging has a high effect on fishing enterprise, this might be as a result of respondents high knowledge on the effect of sand dredging. This implies respondents perceive the effects of dredging to be harmful to their livelihood activity-fishing. This corroborates the findings of Aigbedon, (2005) that sand dredging distorts and has adverse effects on physical environment

**4.6 Hypotheses testing**

This section presents the relationship between variables in the study Chi-square(r) test and Pearson Product Moment Correlation (PPMC) were used for inferential statistics

This hypothesis tested for significant relationship between the socio-economic characteristics of respondents and their perceived environmental effect of sand dredging on fishing activities. Results on Table 4.6 revealed that respondents' social group (-2.886, p $0.05) and monthly income (-0.181, p=0.05) were significantly related to perceived effect of dredging on fishing activities. However fisherfolks' marital status (4.260, p>0.05), sex (-0.304, p>0.05), education (-1.598, p 0.05), household size (r-0.117, p>0.05), and age (r=0.095, p>0.05) were not significantly related to perceived environmental effect of dredging on fishing activities. This implies that respondents' social group and income affects the way fisher folks feel about the effect of dredging on fishing activities. The significant correlation of belonging to social group to perceived effect suggest the band wagon effect as the social group is an avenue for sharing feels and experiences. The significant relationship of income (0.181) implies that the higher the income, the lower the perceived effect, as expected fisherfolks who make sufficient income from fishing are less likely to see dredging as a problem.

Table 4.6a: Chi-square analysis of respondent's socio-economic characteristics

| Variable | N | $\chi2$ value | Df | p-value |
|---|---|---|---|---|
| Sex | 140 | 0.304 | 1 | 0.582 |
| Education | 140 | 1.598 | 2 | 0.450 |
| Social group | 140 | 2.886 | 1 | 0.049 |
| Marital status | 140 | 4.260 | 3 | 0.235 |

Table 4.6b: PPMC analysis of respondents' socio-economic charateristics

| Variable | N | r-value | p-value |
|---|---|---|---|
| Income | 140 | -0.181 | 0.032 |
| Age | 140 | 0.095 | 0.264 |
| Household size | 140 | 0.117 | 0.167 |

Hypothesis 2

This hypothesis tested for significant relationship between the fisher-folk's knowledge on effect of dredging on fishing activities and perceived effects of dredging on fishing activities. Information on Table 4.7 reveals that there was significant relationship between the fisher-folk's knowledge of sand dredging on fishing activities. (r-0.346 p 0.05). This implies that knowledge of fisher folks on the effects of dredging on fishing activities determined their perception towards effects of dredging activitie

Hypothesis 3

This hypothesis tested for significant relationship between constraints faced by fisher-folks based on sand dredging on fishing activities and the perceived effects of dredging on fishing activities. Information on Table 4.11 reveals that there is no significant relationship between constraints faced by respondents and perceived effect of sand dredging ($r=0.070$ $p>0.05$). This implies that although sand dredging is a constraint to the fishing enterprise, it has no significant relationship with the perceived effects of dredging on fishing activity. This corroborates the findings of Oladeji and Oyesola, (2002) who found that other constraints to fishing enterprise include: high cost of fishing materials among fisher folks, insufficient capital and high cost of inputs are severe constraints of fishing enterprise.

Hypothesis 4

This hypothesis tested for significant difference in the perceivedeffect of sand dredging on fishing activities between Ikorodu and Epe maritime division Results on Table 49 shows that there was no significant difference ($p>0.05$, -1.403) between the perceived effect of sand dredging on fishing activities between Ikorodu and Epe maritime division, although, the mean shows that Ikorodu (99.41) perceive the effect of sand dredging to fishing activities as more negative than Epe (98.22). This implies that the effects of sand dredging on fishing activities are similar in both divisions. Hence, programmes and remediation activities to fisher-folks should be similar across the maritime divisions

## CHAPTER FIVE

## SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents a summary of the major findings of the study, gives a conclusion and makes recommendation for reading the effect of sand dredging on fishing activities.

### 5. 1 Summary

Fishing activities continue the traditional occupation of communities pos water sources such as lakes, streams, oceans and rivers. But there is a decline in interest in fishing as fiber-folks are discouraged from making a living on fishing activities which may make some to diversity into other livelihood activities while other migrate to other geographical areas for alternative job activities due to the effect of sand dredging Hence this sady investigated the perceived effect of sand dredging on fishing activities, with a view to suggesting ways to militate against the effects of sand dredging on fishing activities

Multi-stage sampling procedure was used in selecting respondents for the study Epe and Ikorodu were purposively selected among the five maritime divisions in Lagos state Epe has 380 registered fisher-folks while, Ikorodu has 320 registered fisher folks in their fishing association. The second stage involved random selection of 20% of the fisher folks from registered fisher folks in Epe and Ikorodu This gave a total sample size of 140 respondents Structured interview schedule with open and close questions was used for data collection for the study. The statistical tools used for the analysis of data collected include descriptive (frequency, mean and percentage) and the inferential PPMC and independent sample t-Test determined at 0.05 level of significance

The result of the analysis showed that age distribution of the respondents ranged between 18 to 59 years with the mean age at 37-8. Over one-third (40.7%) of the respondents are within the ages of 34-41 years, majority (92.1%) of the respondents were males, $14 of the respondents were married, household size ranged from to 16 persons, over 50% of the respondents had no formal education, 42.9% had only primary education. Mondily income of fisher folks in the audy area rangedfrom N5, 000 to N60, 000 with mean income of №22. 392.furthermore, majority (92.9%) of the respondents were members of social group

Results of the study also sealed that 59% of the respondents had high knowledge of effests of diedging on fishing The major constraints to fishing enterprises include increased depths of water affects fishing activities (097) which was the mat severe constraint. Respondents diversify most into non-farm activities such as commercial bike riding, security and technician services. Furthermore 55.7% of the respondents perceive the effects of dredging to be high to fishing activities.

The study found that fisher folks' social group (-2.886, p 50.05) and monthly income (r-4). 181. Ps 0.05) was significantly related to perceived effect of dredging on fishing stivities. Similarly knowledge of effect of dredging on fishing activities was related (r-0346 p > 0.05) to perceived effects of dredging on fishing activities. While, the study found no significant difference (p>0.05, 1403) between the perceived effect of sand dredging on fishing activities between Ikorodu and Epe maritime division.

## 5.2 Conclusion

From the result of the study, it was concluded that:

1. The effect of dredging on fishing was perceived to be high
2. . Respondents diversified into non-farm activities such as commercial bike riding, security and technician services.
3. Increase in depth of water is a constraint caused by fishing activities
4. There is high level of knowledge onthe effects of dredging on fishing activities
5. Social group, monthly income and cred depths of water affects fishing activities

## 5.3 Recommendation

The following recommendations are based on the conclusion of this study

1. Strict determines perception towards the effect of sand dredging on fishing activities.

2. Extension agents should help in enlightening the artisanal fisher folks about aquaculture practices instead of diversifying to non-farm activities and non-fishing activities
3. Awareness and sensitization on effect of sand dredging on fishing activities should be carriied out for licensed dredging company
4. Social and environmental impact assessment should be carried out to determine the level of impact of dredging activities.