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Exploratory fishery survey: a review and framework for implementation in Nigeria

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Abstract

Exploratory fishery is an important prerequisite for exploitation of commercial fish on an economic basis for every coastal nation. The aim of an exploratory fishery is to carry out a systematic survey of the fishery resources using adequate methods and gear in order to provide data for proper management of fishery resources. Data obtained from exploratory fishery is crucial in tackling several fisheries management issues such as, biomass, distribution, diversity, yield, aggregation and vulnerability to gear as well as long term investment planning. The only and first exploratory fishery survey in Nigeria was conducted in 1964 at depth of 15-50m. The inshore fishing ground (10-30m) depth of Nigeria is overexploited; fishery resources catch is decreasing over the years, price of fish is skyrocketing; above all this part of the sea presently fished is ecologically fragile, being the nursery ground for juvenile of marine fishes. Latent and under- exploited species are abound in deeper sea (50-200m) vulnerable only to natural mortality. Thus, if exploratory fishery is conducted in a virgin fishing ground, it will lead to increase in marine fish production in Nigeria when the data collected is made public to investors and other stakeholders.

Keywords: Exploratory fishery, Fishing ground, Investors, Nigeria.

INTRODUCTION

Exploratory fishery forms an important prerequisite for rational exploitation of the harvestable stock on an economic basis. The term exploratory fishing' can assume different meanings depending on the context in which it is used (Greenwood, 1960). With reference to the immediate needs of the fishing industry, it is the process of locating commercial concentrations of fish and communicating such findings to the fishing fleet. On long-term basis, it is used to refer to the process of finding suitable fishing areas or grounds where commercial fishing can be carried out economically (Varuna, 1969). Exploratory fishery, in a restricted sense, applies even to the process of experimenting with the most effective means of extracting the resources of any fishing ground. For the scientists conducting exploratory fishing activities, the term may imply a more formal approach to resource assessment. As given by Varuna (1969), exploratory fishing "represents a study of the species complex inhabiting certain areas of the ocean and their relation to the environment, the areas and time distribution of the elements of the complex and the relative and absolute abundance of certain segments of the fauna inhabiting a particular region". A detailed knowledge of the availability of different faunal elements and their density in time and space is an important aspect in the scientific evaluation of the abundance of stocks with respect to an exploitable region. It also necessarily includes the cataloguing and describing, as completely as possible, all the faunal components available to certain sampling gear.

Exploratory fishing could also be defined as the use of

various types of fish-searching equipment and fishing gear to ascertain the kinds of fish present in an area and to obtain some idea of the magnitude of these stocks (Varuna, 1969). In exploratory fishing, the fish populations are studied to assess their relative abundance and to establish the distribution limits of species, particularly of species of potential economic interest, using fishing gear as a standard testing device. From a scientific standpoint, exploratory survey takes into consideration a method of sampling which will enable most effectively to determine the community or complex of animals inhabiting a particular area and at the same time derive a fundamental understanding of their spatial distribution, how the distribution patterns change with time, and to quantify as best as possible the various items that constitute the community or animal complex. Exploratory fishery is defined in the policy as the process of data- gathering, with the activities of fishers providing information on target and non-target species that can be used to determine what level, if any, of sustained harvesting of the resource can be supported in the long-term (AFMA, 1999a).

Fishing activities is considered to be exploratory where research or anecdotal information on which to base a reliable stock assessment and set an appropriate level of long-term harvesting effort. Fishing concessions take the form of management varying considerably as the fishery evolves. Fishing concession takes the form of fishing permits, which are granted to eligible operators for a limited period. As knowledge is gained, and assuming that the fishing activity can be sustained, there will be a shift from exploratory phase towards a point where a statutory management plans, complete with statutory fishing rights is in place. The issue of efficient where there is uncertainty as to the existence, and extent of the resources has been well developed in the literature for non-renewable resource such as oil, gas and gold (Industry Commission 1991, Hogan *et al*; 1996). In the case of renewable resources however, such as fisheries, there has been little economic decision, despite significant policy debate in recent years. The by Campbell *et al.* (1993) is one of the few attempts to discuss the policy options for exploratory fishery from an economic perspective. But there is a considerably scientific literature on the development of biological criteria for the sustainably development of new fish resources (Walters, 1998; McAllister and Kirkwood, 1998).

The fishing industry necessarily needs to have knowledge of long-range forecasts on the magnitudes of the fishery resource for investment planning (Varuna, 1969). But more often, the industry is directly concerned with the short-term distributional aspects, such as the areas where the fish aggregate and the availability of the resource to fishing gear. Further, the producer is keen on knowing how much he catches in what period of time and where and how he should deploy his vessels so as to obtain the maximum catch. It is not the concern of the producer to understand the average densities or total bathymetric or geographic range of the species. Exploratory fishery will help to ascertain the bathymetric zone in which fish tend to concentrate and the seasonal distribution pattern of the stock.

BENEFITES OF EXPLORATORY FISHERY

From a scientific standpoint, exploratory fishing takes into consideration a method of sampling which will enable most effectively to determine the community or complex of fishes inhabiting a particular area and at the same time derive a fundamental understanding of their spatial distribution, how the distribution patterns change with time, and to quantify as best as possible the various items that constitutes the community or animal complex. The fishing industry necessarily needs to have knowledge of long-range forecasts on the magnitude of the fishery resource for investment planning. But more often, the industry is directly concerned with the short-term distributional aspects, such as the areas where the fish aggregate and the availability of the resources to fishing gear. Further, the producer is keen on knowing how much he catches in what period of time and how he should deploy his vessels so as to obtain the maximum catch. It is not the concern of the producer to understand the average densities or total bathymetric or geographic range of the species. On the other hand, he is concerned about the bathymetric zone in which fish tend to concentrate and the seasonal distribution pattern of the stock. When a processor plans to set up his industry he would find information on geographic and seasonal distribution of the stocks, including areas and times of the year of maximum landings, useful. In addition to an idea of the magnitude of potential harvest of the fishery, he would appreciate information on the technical aspects of his processing operation in greater detail. This sort of data would help him in the selection of a suitable site for locating his plant and also in deciding upon the magnitude of investment. Exploratory fishing aim to provide this basic information.

CHALLENGES IN EXPLORATORY FISHING

The problem facing fishers who are considering undertaking exploratory fishing are numerous, some of them are:

1. How to evaluate the expected net returns from exploratory fishing (accounting for the risk associated with exploration) and from any ongoing fishery.
2. In sufficient incentives to fisherfolks
3. Restriction on the use of certain input, seasonal closure of fishing ground and output restrictions all

affect to varying degrees, the ability of fishing operators to best utilize available inputs and technology to a given amount of input.
4.Society also has an interest in the relationship between the risks and the reward from exploratory fishing.Lack of encouragement by the government for fisheryresources to be developed (or conserved) in ways which maximize the benefits to the community at large.
5. Insufficient incentive to fisher folks.
6. Efficient exploratory fishing rights
7. Exploratory fishers were faced with the problems of exploratory permit which limit the operation from 2 to 3 commercial (exploratory) fishing vessels to access the same area of water.

FISHING GEAR USED IN EXPLORATORY FISHERY

The fishing gear used during the exploratory surveys by various researchers includes otter trawls, surface drift nets, handlines, purse seine, longlines, surface troll lines, and midwater trawl. (Varuna, 1969).

TYPES OF EXPLORATORY FISHERY

Exploratory fishery is extremely diversified, comprising a large number of types of fishery that are categorized by different levels of classification. Gunderson (1993), identified five types of exploratory fishery;

1. **Fishery Scouting:** The use of survey vessels to locate concentrations of commercial fish and pass on the information to the commercial fishing fleet.
2. **Experimental Fishing:** Activities aimed at designing the best type of equipment and the best fishing strategy for increasing the efficiency of a particular fishery.
3. **Prospecting Survey:** Aimed at providing estimate of the likely catch rates in the area using a particular type of vessel and gear.
4. **Resources Appraisal Survey:** Designed to provide information on what species are available to a fishery and first estimates of their abundance and distribution, and the size of the potential annual yield.
5. **Resources Monitoring Survey:** Aimed at study year to year and longer term changes in the abundance and distribution of the stock.

CHARACTERISTICS OF EXPLORATORY FISHERY

1. The development of new (that is undeveloped or previously non-commercial) fisheries resources is best viewed as an evolutionary process from the full development of the fishery.
2. In the practice, at the exploratory stage of fishing little information is available to enable fisheries managers to defined a total allowable catch
3. From initial exploratory onwards, the fisheries resources may be efficiently managed, with the form of management varying considerably as the fishing evolves.
4. The issue of efficient exploration where there is uncertainty as to the existing and extent of resources has been well developed in the literature for non-renewable resources. Such as oil gas and gold (Industrial commission 1991, Hogen *et al* 1996).

Exploratory fishery management

Ideally, management of fish stocks should be based on accumulated information concerning the abundance of fish in the stock, the distribution of fish, the impact of fishing on the stock and other aspects of the marine environment and the effect of different harvesting strategies. In practice, at the exploratory stage of fishing, little information is available to enable fisheries managers to define a total allowable catch (TAC). In the initial stages of fishing a new stock, therefore, the major concern is to protect the integrity of the stock from overfishing, overcapacity, irresponsible fishery as proposed by FAO. The fish- down phase associated with exploiting a newly found resource provides a buffer against rapid overexploitation as it can withstand higher catch rates in the short term without unduly affecting the long-term sustainable catch rates. The size of the buffer varies according to the size of the initial biomass and the biological characteristics of the species. The larger the biomass, the greater are the quantities that can be taken in the fish- down phase. For slow growing species (such as orange roughy), the maximum economic yield is lower and the fish- down phase is shorter and sometime unnoticed.

However, the presence of this safety buffer does not mean that the initial catching phase should be free of management control, given the lack of information about the stock size. The management focus is essentially shot-team as information is gathered to enable an assessment of the sustainable catch level to take place. To facilitate this, the most appropriate form of short-term management may be to impose tight catch and operating those vessels undertaking the exploratory fishing. Management arrangement involved more informed TAC level may be introduced once addition information in collected. Indeed, this could occur quite as it is not necessary to know the absolved stock size with a great degree of certainty in order to set a TAC (Anderson 1990).

FRAMEWORK FOR IMPLEMENTATION OF EXPLORATORY FISHERY IN NIGERIA

Nigeria is a maritime nation with many types of fin and

shell fish resources. Some like shrimp is exploited to EU countries, like any other developing state, the fishing pressure is in coastal waters where their fishing technology could permit, thus leading to rapid depletion of the coastal and inshore fishery resources. The first trawling that provided information on resources potential in Nigeria was conducted during 1963 and 1964 between 15 - 50m depth. This survey evaluated the biomass of the central portion of the Nigerian continental shelf and the entire shelf area as 21,100 metric tons and 351, 000 metric tons respectively (William,1968). After 60 years of such work, couple with post independent development in Nigerian fishery sub – sector; registration and licensing of more inshore trawlers, exploratory fishery survey that extend up to 200m should be conducted to re-establish the status of Nigeria marine fishery resources. There are many issues that can provide justification and frame work or supporting statements for the implementation of exploratory fishery survey in Nigeria. These are discussed below:

Geographical Location and Maritime Areas

Nigeria is a maritime state with a coastline of approximately 853km. The Nigeria Coastline Stretches from the Western border with Republic of Benin to the Eastern border with Cameroon Republic. In 1978, Nigeria established an Exclusive Economic Zone (EEZ) which is an area beyond and adjacent to the territorial sea extending 200 nautical miles from the baseline. The surface area of the continental shelf is 46, 300km^2 while the EEZ covers an area of 210, 900km^2 (World Resources, 1990), within which Nigeria exercises sovereign rights for the purpose of exploring, exploiting, conserving, and managing the natural resources. Of the 36 states in the country, nine namely; Lagos, Ogun, Ondo, Edo, delta, Bayelsa, Rivers, AkwaIbom and Cross River are located in the coastal zone. There is need for Nigeria therefore, to routinely survey their marine fishery resources through exploratory survey.

Marine fishes vulnerable to over exploitation in shallow sea

Nigeria's coastal zone is endowed with numerous living and non-living resources. The most important living resources are fin and shellfish including shrimps – predominantly members of the family Penaeidae (Tobor and Ajayi, 1992). Because of Nigeria's extensive coastline and tropical climate, Nigeria has the potential to develop a diversified ecology for a range of commercially viable varieties of fish. The economic appeal behind fishing is tremendous, considering the secondary and tertiary enterprises it can generate. More efficient methods of inland cultivation and coastal trolling, executed in an export oriented environment, can spur rapid growth of down-the-line industries. Fishing, by itself, has the potential of driving considerable enterprise development, transforming rural economies and generating direct and indirect employment opportunities in the process. There are three main fish production systems in Nigeria, these includes Artisanal (Inland rivers, lakes, coastal and brackish waters), Aquaculture (fish farm) and Industrial fishing (inshore and offshore waters). The dominant elements of this fish community in Nigerian coatal water bodies are: *Arius, Ilisha, Pseudotolithus spp., Drepane africana, Pomadasys jubelini, Pentanemus spp., Galeoides spp., Cynoglossus, Polynemus and Pteroscionpeli, Sparuscaeruleostictus, Pagelluscoupei, Dentex spp., Lutjanus sp., Epinephelus sp., Decapterus and Trachiurus spp. Dentex congoensis, Dentexfilosus, other Dentex spp., Pagelluscoupei, Upeneusprayensis, Decapterus spp., Trachiurus trachiurus, T. trecae, Boops spp., Scomber japonicus, Trigla sp., Cynoglossus, Vomer setepinnis, Brachydeuterus auritus, Trichiuruslepturus, Raja spp., Ethmalosa fimbriata (*bonga*), Ilisha Africana,* Sardine *(Sardinella spp., Caranx spp., Chloroscombrus chrysurus, Decapterus rhonchus, Trachurus spp.,* Variousjacks *(Caranx spp.),* Atlanticpumber *(Chloroscombrus chrysurus), Caranx rhonchus, Horse mackerel (Trachurus spp.), Lesser African threadfin (Galeoides decadactylus), Royal th*readfin *(Pentanemus quinquarius),* Giant African threadfin *(Polydactylus quadrifilis),* Boedrum *(Pteroscionpeli), Dentex angolensis, Pagellusbellottii.* Redpandora *(Pagellusbellottii).* Other exploited fish include Ariidae, Bagridae, Cynoglossidae, Pomadasyidae, Serranidae, etc.

Characteristic of conventional industrial fishing ground in Nigeria and need for new ones

According to FAO (2010), the Nigerian coastline is dotted with many fishing grounds and villages of variable size, according to the number of fishing units (canoes) and number of fishermen.

The fishing ground in the western Nigeria of the Alantic sea is characterized by absent of long continental Shelf, deep water with canyons, sandy and rocky bottom. Primary productivity and fish yield is therefore low, except where network of Lagos, Epe, Badagry lagoons empties into the sea. Anthropogenic activities such as sand dredging, sewage disposal, industrial effluent discharge and navigation by merchant ship are contributed to poor fish yield.

In the Eastern flank, the sea is very rich in the primary production because of large river that discharge into the sea as well as mangrove swamp forest and extensive network of creeks, estuaries and wetlands. The sea is shallow with muddy bottom giving rise to high concentration of demersal fish and shrimps resources. Frequent oil spill in this region contribute to poor fish yield in shallow sea.

Institution and man power available for the implementation of exploratory fishery in Nigeria

In Nigeria, there are several institutions that could supports exploratory fishery activities. Fisheries research and training are the responsibilities of Fisheries Research Institutes and their affiliated colleges. Development departments, such as the Federal Department of Fisheries (FDF), also contribute to human resources development through short-term training programs and sponsorship of trainees in the colleges. The Nigerian Institute for Oceanography and Marine Research (NIOMR) is the agency of the Federal Government established to conduct research into the resources and physical characteristics of Nigerian territorial waters and EEZ. Its activities include fisheries and other aquatic resources surveys, marine geology and geophysical surveys, physical and chemical oceanography, fishery technology research, brackish-water aquaculture research, and extension research liaison. Research results in NIOMR have helped national fisheries development in many areas, including better data sourcing and management, policy design for resource management, technical improvement, environmental awareness and contributed to international cooperation.

The Federal College of Fisheries and Marine Technology also started as a division of NIOMR, but is now autonomous and, like the institute, is directly responsible to the Federal Ministry of Agriculture. The college has a mandate to train middle-level manpower for the industrial fishery sector, and it awards National and Higher National Diplomas in Marine Engineering, Nautical Science, and Fisheries Technology. It is based in Lagos, and its facilities were developed with the support of Japanese International Cooperation Assistance (JICA). They are many universities in Nigeria offering fisheries, both undergraduate and post graduate level. Therefore man- power is available to conduct exploratory fishery survey.

End users of Exploratory Fishery Activities/Findings in Nigeria

The scope of development assistance to Nigerian fishery has widened considerably in the last decade. The expansion has been in the number of international agencies involved, the value of assistance, and the target areas, subjects or beneficiaries. The magnitude of support depends on available information on fish biomass and yield in the Nigerian marine water such as data are readily obtained through exploratory survey and are always convincing factor to donor organisation .The long-term support by FAO/UNDP in the area of capacity building and project implementation has been sustained. Government continues to establish cooperation agreements with international agencies that are interested in fishery development. Some of the important agreements reached are as follows:

A World Bank Loan in support of coastal fishery management, which provides for the implementation of a Monitoring, Control and Surveillance project. Using a loan ending in 1997, the project has established and equipped control posts along the coast and is operating a functional surveillance system. An IFAD loan for the development of artisanal fishery was negotiated and became effective in 1991. It targeted coastal fishing communities in four south eastern States: Akwa Ibom, Cross River, Rivers, and Bayelsa. Its main components were credit for economic enterprises, community infrastructure and improved technology dissemination. The loan closed in September 1997, and the Federal Government has sustained the project to date. IFAD's evaluation of the project was favourable and a second phase, which will broaden the beneficiary base and enhance the project concept, is in preparation. An ECOWAS Fund loan, also directed at artisanal fishery development, finances an input supply project for fishing communities in three other coastal States (Delta, Edo, and Ondo) and two inland States (Kebbi and Zamfara). With the contribution of the Federal Government, negotiations are in progress to extend the facility to more fishing states.

According to FAO (2000), there is substantial Japanese government support to fisheries training and research, through the Federal College of Fisheries and Marine Technology. Currently, a new project on the effect of tropical shrimp trawling fishery on the living marine resources is being formulated for funding by GEF/UNEP/FAO. This project aims to address the topical issue of resource degradation resulting from inappropriate harvesting technology. Apart from international donor agency all the fishing industries (m) in Nigeria needs finding from such a survey to increase to increase their fishing fleet, procure trawler with higher gross tonnage engine horse power and vessel cubic size.

Fishing gear and methods available in Nigeria for exploratory fishery

Fishing gear that can be used in Nigerian exploratory fishery dependent on the target species, for demersal species, gears such as bottom trawling, seine netting, beam trawling, long lining and set-nets are readily available to be used in implementation and drift gillnet and purse seine are available for pelagic species.

Under-utilized and latent fish species in Nigeria

Seperidae family, dentex spp, the Ariomatidae family, Arioma bondi and the big eye, Brachydeuterus auritus have been reported to be in commercial quantity at depth greater than 50m off Nigerian Coast. These species are not exploited by the inshore fishing vessel of Nigeria whose maximum fishing depth is usually 40m. Troadae

and Garcia (1979) reported the above named species of fish to be under-utilized/unexploited fish stock in Nigeria. The abundant of these three species of fish in Nigeria is not known by industrial trawlers operators. Example FDF, (2007) listed 67 species of fishes caught in Nigeria inland and marine water, and 17 species caught only in inshore sea, these latent species were not included. This implies that their present are not known, because all the 28 registered inshore fishing trawlers and 163 shrimpers fished at maximum depth of 40m. There is therefore, the need for exploratory fishery to be conducted up to 100m depth to establish the full resource potential of these three latent species in Nigeria.

Marine fish production trends in Nigeria and the need for implementing exploratory survey

The total domestic fish production in Nigeria from all sources in 1993 was 255,523 metric tons while in 2002 production was 511,720 metric tons, an increase of 50.07 percent (FDF, 2007). Though there was a slight increase from the year 1995 figure (371,053 tons) and a slight drop from the year 1996 (355,934 tons), the artisanal fishery sub-sector contributed about 86.75 percent of the country total fish production while out of these inland water (rivers and lakes) constituted 41.33 percent. The fishery industry is a major employer of labour accounting for more than 80% of those within the riverine/estuaries areas of the country. (Abiodun, 2002). FDF (2007) reported that, the current annual demand for fish in Nigeria is 1.3 million tons, whereas the local production stands at 0.5 million tons representing 42.2 percent of the total fish supply in Nigeria, leaving a huge deficit of 0.8 million tonnes. This deficit can be met by intensifications of fishing effort, identification of fishing ground and by targeting new species which does not belong to either the croaker or snapper fauna exploited presently by inshore bottom trawlers in shallow sea with depth range of 20-0m.

Decline in landings from Industrial Commercial Trawler for Fish and Shrimp

Based on information provided by FDF (2007), catches of inshore industrial commercial trawler for fish showed that in 1995, 21,191 tons of fish was obtained, which decreased to 13,877.3 tons in 2000 and later on increased to 18,040 tons in 2007. For shrimps, catches of inshore industrial commercial trawler was 12,252 tones 1995 which decreased to 8,056 tonnes in 2000 and 5,995 tonnes in 2007. These figures implies that, the conventional fishing ground for exploitation is exhausted and more productive fishing ground need to be inventorised through exploratory fishing survey.

Reduction in the quantity of Key Commercial Species

Key commercial species in Nigeria reported by FDF (2007) include croaker, sole, catfish, ray, shrimps (prawns), groupers, sharks, tunas, crabs, lobsters and cuttlefish. However, the production of some of these species in tones was found to decrease over time. For instance, croaker decreased from 2,727 tonnes in 1995 to 2,410 tonnes in 2000 and 1,047 tonnes in 2007. Sole also decreased from 1,891 tonnes in 1995 to 1,775 tonnes in 2000 and 1,072 tonnes in 2007. Catfish is another commercial species that decreased drastically from 292 tonnes in 1995 to 98 tonnes in 2000 and but later on increased to 218 tonnes in 2007. Rays was also found to decrease from 298 tonnes in 1995 to 122 tonnes in 2000 and 90 tonnes in 2007. Shrimps (prawns) also decreased from 10,942 tonnes in 1995 to 7,815 tonnes in 2000 and 5,038 tonnes in 2007.Another species that was found to decrease was grouper which decreased from 137 tonnes in 1995 to 6 tonnes in 2000 and 75 tonnes in 2007. Over the years they have been a decreased in landing of major commercial species from Nigeria inshore trawlers, the reason been that, all the fishing pressure is on the shallow sea with depth range between 10-30m . There is therefore an urgent need for these species to be searched for in deeper water through exploratory fishery activities.

Reduction in Fish Production from Inshore Water

Fish production from inshore waters is classified into two groups, fishing and shrimping. For inshore fishing, production reduced from 6,688 metric tonnes in 1995 to 2,448.5 tonnes in 1999, to 889.5 tonnes in 2000, and increased to 6,361 tonnes in 2001 but later on decreased to 4,250.9 tonnes in 2005 and 3,405.16 tonnes in 1997 (FDF, 2007). For inshore shrimping, production increased from 26,755 tonnes in 1995 to 26,981 tonnes in 1999, and reduced to 21,043.7 tonnes in 2000, but further increased to 27,278.71 tonnes in 2006. These records shows that, there is an over exploitation in the conventional inshore water fishing ground and there is need for exploratory survey to find out new fishing ground (offshore) in other to improved and increase fish production.

Decrease in Revenue from Inshore Water

Revenue from inshore shrimping reported by FDF (2007) shows that revenue decreased with corresponding decrease in the number of vessels used. Between 1998 and 2006, the highest revenue recorded was N 25, 440,000 from 212 vessels in 2002, followed by N 24, 480,000 from 204 vessels in 2003, while the lowest revenue (N19, 440, 000) from 162 vessels was recorded in 1998. For inshore fishing, revenue also decreased with corresponding decrease in the number of vessels used.

Between 1998 and 2006, the highest revenue recorded was N 7, 440,000 from 62 vessels in 1998, followed by N 5, 760,000 from 48 vessels in 2003, while the lowest

revenue (N3, 720, 000) from 31 vessels was recorded in 1999. It is obvious that, numbers of vessels registered over the years decreases significantly with corresponding decrease in revenue as the result of low CPUE, experienced by the investors. If new productive fishing ground is discovered through scientific research involving exploratory survey and the catch data accumulated. This will convince the investors to increase the numbers of their fishing fleet for increase catches and revenue in the new and un-exploited inshore shrimping and fishing ground.

High Fish Demand in Nigeria and deficit

General economic data related to fisheries in Nigeria given by FDF (2007) indicates that total fish demand in Nigeria is 2.66 million metric tonnes (m.mt) with domestic production of 0.62 million metric tonnes and 9.68 kg/head/year. Data reported by FDF (2007) shows that fish demand increases with projected population. For example, fish demand increases for 2.66 metric metric tones in 2006 for a projected population of 140 million people to 3.02 metric metric tones in 2010 for 158.8 million people. However, this value increased to 3.53 million metric tonnes for 185.9 million people in 2015, 4.13 million metric tonnes for 217.6 million people in 2020 and 4.84 million metric tonnes for 254.7 million people in 2025. There figure shows that, the general economic data related to fisheries in Nigeria indicate that, there is an increased in fish demand due to population explosion, knowing quite well that, domestic fish production is not enough compare to the projected population. If new fishing ground is discovered through exploratory fishery survey activities they will be no deficit in fish supply, since the new fishing areas and species found is likely to be adequate for the teaming population.

CONCLUSION

Exploratory fishery is an important prerequisite for exploitation of commercial fish on an economic basis for every coastal nation. Data or information obtained from exploratory fishery is crucial in tackling several fishery management problems. Thus, enabling a rigorous and detailed assessment of the potential commercial exploitation of aquatic resources, in order to demonstrate that it is economically viable, socially acceptable and ecologically sustainable. A long-range forecast on the magnitude of the fishery resources which could be provided by exploratory fishery data, is an absolute necessity in the fishing industry which will be a guide for future investment planning. Nigeria is a maritime state with a coastline of approximately 853km and an Exclusive Economic Zone (EEZ) extending 200 nautical miles from the baseline. The surface area of the continental shelf is 46, 300km^2 while the EEZ covers an area of 210, 900km^2 making Nigeria to be one of the major coastal state in Africa. However, Nigeria's coastal zone is endowed with numerous fishery resources including fin and shellfishes. Major fishing gears used in Nigerian exploratory fishery is dependent on the target species such as bottom trawling (single-boat), bottom trawling (pair), seine netting, beam trawling, long lining and set-nets for (demersal species), purse seining, mid-water trawling (pair) and mid-water trawling (single-boat) for pelagic species and bottom trawling (single-boat) for shellfish. Although, there is manpower training and development in the sector through institutions and government supported with adequate funding by both local and international NGOs such as FAO/UNDP, ECOWAS and World Bank, there is a very big gap to be filled up in relation to exploratory activities in Nigeria. Although various efforts have been made in the past four decades by the Nigerian Institute of Oceanography and Marine Research (NIOMR) and others to survey the marine resources and estimate the potential yields of inshore marine fish and shrimp resources, the data so far generated are inadequate for effective management. Paucity of data on fish stocks inevitably warrant the over dependency on precautional approach as the only management option in Nigeria.

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