A review of the fisheries sector in Zambia. 'Fisheries Economic Management perspective.'

Preprint · November 2020

DOI: 10.13140/RG.2.2.26314.59844

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Introduction

We are living in times when the world population is growing at a terrific speed. As a result of this population growth, resources to sustain human beings are increasingly becoming scarce and people are chasing after the limited resources, in most cases, food supply is less compared to the demand. People need better and highly nutritious food to survive, stable sources of income and assurance of stable economic development. Fish and Fisheries resource is one of the key answers to these human need. Fishing is one of the world's most important industries, directly employing almost 200 million people (FAO, 993). About 19% of total human consumption of animal protein is provided directly by fish (Botsford et al. 1997), and according to (Cochrane, K.L., 2002), Fish and fisheries are an integral part of most societies and make important contributions to economic and social health and well-being in many countries and areas. He further stated that in recent years global production from capture fisheries tends to vary between approximately 85 and 90 million tonnes/year. The products from these fisheries are used in a wide variety of ways, ranging from subsistence use to international trade as highly sought-after and highly-valued items. The value of fish traded internationally is approximately US$40 billion per year.

The world has been consuming a greater amount of fish for many years now. However, (FAO, 2018) indicate that global fish production will continue to expand over the next decade even though the amount of fish being captured in the wild has levelled off and aquaculture's previously explosive growth is now slowing down. Therefore, to ensure that supply always meets demand, there is a need for sustainable and economic management of the fisheries resource. Research shows that by 2030, the combined production from Aquaculture and capture fisheries will grow to 201 million tonnes. However, future growth will require continued progress in strengthening fisheries management regimes, reducing loss and waste, and tackling problems like illegal fishing, pollution of aquatic environments, and climate change (FAO, 2018). Simply put, there is an urgent need to sustainably and economically manage fisheries resources.

This paper reviews the Economic Management of Fisheries Sector in **Zambia**. Zambia is a lower-middle-income landlocked country located in Southern Africa. It has a total land size of 752,614 Km^2 of which 60% of is considered suitable for Agriculture Production but only about 15% of arable land is currently being utilized. Zambia comprises of about 15 million hectares of water in the form of rivers, lakes and swamps (FAO, 2016) which accounts for more than 40% ground and surface water in the entire Southern African Region. This abundance of water resources thus provides the basis for the extensive freshwater fisheries, having the potential to produce enough fish for consumption and export. However, the fisheries sectors in Zambia is still in its developing stage because notwithstanding the abundance of

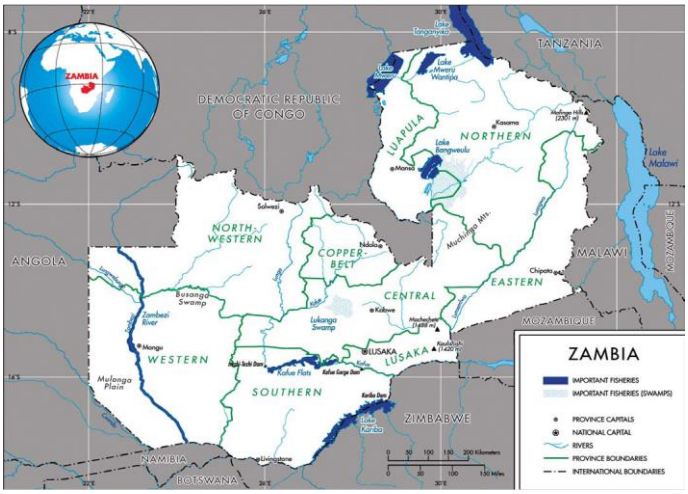
water resources, almost all the fish harvested is for consumption due to high local demands. According to (FAO, 2006), the estimates for annual fish production from capture fisheries ranges between 60 000 and 70 000 tonnes, with an estimated 5 000 produced through aquaculture. However, the national demand for fish is conservatively estimated at 120 000 tonnes/year, and this gap between supply and demand is foreseen to increase further with population growth. Therefore, only the development of Aquaculture and the Economic Management of capture fisheries will see the country sustainably produce/supply more than demand.

Fishery sector in Zambia

Zambia is endowed with abundant water resources suitable for freshwater fisheries. A huge population of Zambians enjoy fish as a primary source of animal protein. This, however, has made the demand for fish to always surpass supply. According to (FAO, 2006), the sector continues to contribute significantly to rural development in terms of employment and income generation and reducing poverty because of its mostly rural setting. It is also estimated that the sector supports more than 300 000 people deriving their livelihood directly as fishers and fish farmers, or indirectly as traders, processors and other service providers. Thus, the sector plays a key role as a driver of rural commerce especially in remote parts of the country where fisheries are the only source of income and purchasing power. A World Bank research by Musumali, (M.M *eta al.*, 2009) state that the fisheries sector has contributed between US$51 and 135 million per annum to GDP over the period 2002-2007, averaging around 1.24 per cent of GDP at current prices. This relatively small contribution at the macro level masks important contributions of fish production to the rural economy through employment, earnings and as a source of food.

Background of the fishery resources

There are 11 major fisheries sites in Zambia: four are within the Congo Basin (Bangweulu, Mweru-Luapula, Mweru-Wantipa and Tanganyika) and seven are in the Zambezi Basin (Kafue, Kariba, Lukanga, Upper Zambezi, Lower Zambezi, Itezhi-Tezhi and Lusiwashi). Fish ponds and water impoundments also contribute to the fishery resource inventory of the country (FAO, 2006).



According to (FAO, 2006), the Country profile on fisheries, the country's major basins are the Zambezi, Lake Mweru Wantipa catchment, Luapula and Lake Tanganyika. The Luapula Basin consists of the Chambeshi river, Bangweulu lakes and swamps complex, Luapula River and Lake Mweru while the Zambezi basin which is the largest, comprising of the Luangwa river, Lukanga swamps, Kafue River, Upper Zambezi, Lake Kariba and Lower Zambezi. The Lake Tanganyika

basin is the smallest, with fish fauna of Nilotic affinities. On the other hand, the Lake Mweru Wantipa catchment is considered as standalone because it is an internal drainage system with no outlet. The Bangweulu lakes and swamps complex is made up of six principal lakes and vast fringing papyrus flood plain swamps and is home to 87 recorded species of fish. Of these, 33 are of commercial importance. The fishery is dominated by-catches of the *Clupeid Angraulicypris spp., Cichlids and Characids*. Lake Itezhi-Tezhi and the Kafue flood plains fish stocks are heavily exploited in the inshore lake areas, with the *Characid Brycinuslateralis and the Schilbeid Schilbe mystus* most abundant in the catches. The Kafue flood plain and its extension of the Lukanga swamps is a *Cichlid Tilapia spp*. fishery, although of late the non-indigenous species Oreochromisniloticus has infested the flood plain, having been introduced inadvertently by the sugar plantation fish farm. The consequences of this introduction still need to be assessed. Kariba fishery has two types of fishery: an artisanal gillnet fishery based on the exploitation of fish species originally of the Zambezi River before the formation of the lacustrine environment; and a commercial fishery based on the introduced Clupeid. Lake Mweru-Luapula was once famous for its highly valued *Cyprinid Labeo altivelis* which is now rare due to overfishing and poor fishing practices. The poor performance of the bream fishery led to a fishery based on the exploitation of the *Clupeid Microthrissa moeruensis* (local name-chisense), which is now the major resource. Lake Mweru Wantipa has a collapsed bream fishery due to intensive fishing using beach seines, and as a result, there is a significant catch of juvenile Cichlids (breams) causing a further decrease in the bream stocks. *Synodontis spp*. are now providing better catches. The department carried out a restocking exercise with bream to re-establish the bream fishery. Lake Tanganyika has over 252 known species, of which 72 per cent are endemic to the lake. Of all species present, 90 per cent belong to the Cichlid family and 99 per cent of the cichlids are endemic to Lake Tanganyika. The lake supports an intensive artisanal inshore fishery and also a commercial fishery comprising 28 purse seines exploiting pelagic species of kapenta *(Clupeids), Limnothrissa miodon and Stolothrissa tanganicae, and a Latid, Luciolates starppersii (bukabuka).* Upper Zambezi consists of the Barotse Flood Plains, with an area of 700 km². Cichlids are the principal stocks and resources exploited.

1. Capture Fisheries-Categories and means of production

In Zambia, fishing is carried out by two different groups, namely; industrial fishers and traditional or artisanal fishers (small scale fishers). However, recreational fishers are also available in some parts of fishing areas where conditions are suitable such as the Kafue, Luangwa and Zambezi rivers, and lakes Bangweulu, Kariba and Tanganyika. This category is predominantly tourist-oriented and is based on the exploitation of the Tigerfish *(Hydrocynus vittatus).*

Zambia's annual fish production increased from 40,000 metric tonnes per year in the late 1960s to over 75,000metric tonnes per year in 2004 but has since stagnated between 65,000 and 80,000 metric tonnes per year. The main species of commercial

value in the Zambian markets are; **Bangweulu** *(Citharinidae, Schilbe sp., Bagridae, Hydrocyon)*; **Itezhi-tezhi** *(Claridae, Momyrids, Schlbeidae. other Characids)*; **Kafue** *(Claridae, Schilbe sp.)*; **Lukanga** *(Citharinidae, Momyridae, Synodontis sp.)*; **Lusiwashi** *(Other Cichlids*); **Mweru-Luapula** *(Bagridae, Momyridae, Hydrocyon);* and **Upper Zambezi** *(Schilbe, Claridae, Hydrocyon, Momyridae, Synodontis sp.).* (FAO, 2006).

i. The industrial category

The industrial fishers are very few, about 100 fish farmers and are found mainly on lakes Kariba and Tanganyika. They normally use large fishing vessels and mostly exploit the *pelagics species*. Of the annual average 70 000mt production, industrial fishers account for about 15%.

ii. The artisanal/ traditional fishers

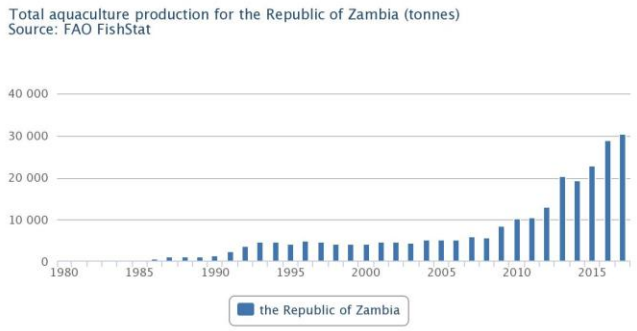
The artisanal fishers, with more than 30 000 fishers, still dominate in terms of production output and in terms of labour. The bulk of fish is distributed by private and individual traders, of which a large number are women. This is because Fisheries from a rural development standpoint is an important open employment sector. Artisanal fisher produces about 85% of the total annual fish production of the country.

2. The Aquaculture subsector

The Aquaculture subsector in Zambia though in its infant stage is doing well and has the potential to develop greatly given the abundance endowment of water that the country possesses. The commonly used species for aquaculture include the three spotted tilapia (*Oreochromis andersonii*), the longfin tilapia (*Oreochromis macrochi*) and the redbreast tilapia (*Tilapia rendalli*). The Kafue river strain of the three spotted tilapia is the most commonly farmed species, particularly in the commercial sector. Other species include the common carp (*Cyprinus carpio),* the Nile tilapia (*Oreochromis niloticus*) and the red swamp crayfish (*Procambarus clarkii*), (FAO, 2017). Zambia currently has more than 6,000 small-scale fish farmers in the aquaculture sector and over 13,000 fish ponds countrywide. These are predominant in the Eastern, North-Western, Northern and Luapula provinces and about 15 large-scale commercial fish-farms are spread along the line of rail on the Copperbelt, and Lusaka and Southern provinces (Musumali, M.M *eta al*., 2009). According to (FAO, 2006), the Aquaculture sector in Zambia ranges from extensive to intensive systems, and include both multispecies culture and monoculture. Like in capture fisheries, aquaculture also comprises of fisher categories. There are three levels of fish farmers operating in Zambia, namely: small-scale, emergent, and commercial fisher farmers.

Small-scale fish farmers rely on family labour and practise extensive culture. Emergent fish farmers have income generation from the element of food security for their households. They purchase some inputs and practise integration, that is, they combine fish farming, crops and livestock, and they may use family or hired labour for various tasks. Commercial fish farmers are usually rich, very large, practice intensive fish farming and involves large investments. They are market-oriented and may include processing for export. Although

Aquaculture subsector is growing at a fast rate in Zambia, there is currently no elaborate marketing system except for the cage fish farmers who have supply outlets in the major cities like Lusaka city and the Copperbelt. However, there are good export possibilities in neighbouring countries and beyond, but there are yet no accurate figures on how much fish is currently exported from aquaculture subsector. The graph below shows the country's total aquaculture production according to (FAO, 2019).



Fisheries Economic Management

Fisheries management can be defined as the integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities to ensure the continued productivity of the resources and the accomplishment of other fisheries objectives (Cochrane, K.L, 2002). Therefore, it can be concluded from the definition that fisheries management involves a complex and wide-ranging set of tasks, which collectively have the achievement of sustained optimal benefits from the resources as the underlying goal.

In Zambia, the marketed fish (demand and supply) depends on the population density of the fish, supplies and income of the people. The current estimates for annual fish production from capture fisheries range between 60 000 and 70 000 tonnes, with an estimated 5 000 produced through aquaculture. The national demand for fish is conservatively estimated at 120 000 tonnes/year, and this gap between supply and demand is foreseen to increase further with population growth. Therefore, the unsatisfied demand for fish in the local market has to a greater extent restricted the amounts of fish that can be traded outside the country (Export). The major import and export flows are mainly of the freshwater *sardines Limnothrissa spp. and Stolothrissa spp.*, whereas smoked and fresh *Lates stappersi* and smoked *Clarias species* are heavily traded in the region. Greater participation of fisheries in the foreign exchange earnings is only found in the ornamental fish trade (FAO, 2006), although the country has the potential to produce more fish on a sustainable basis with the development of aquaculture and rational management of capture fisheries.

Fisheries Management, constraints and development

The Zambian fisheries sector is managed by the Ministry of Livestock and Fisheries under the department of Fisheries. The department is commissioned to manage all the country's fisheries resources, capture and aquaculture fisheries through the Fisheries Act, cap 22 of 2011 of the Laws of Zambia. It also researches both capture fisheries and aquaculture and each major fishery has a research station whose aim is to assess and

analyse through quantitative methods and population models the level of exploitation of fish stocks. The mission of the department is "to facilitate and support a sustainable and competitive fisheries sector to assure food security and increased incomes at household and national levels and to maximise the sector's contribution to Gross Domestic Product (GDP)" and to preserve natural waters to increase household incomes and reduce poverty (Ministry of Fisheries and Livestock, 2019). Further, the mission is to provide technical information required for sustainable exploitation and production of fish to increase household income. Hence, to make sure that the department delivers on its mandate and see to it that there is sustainable utilization of the fisheries resources in line with the provisions of the Act, the following control measures are employed, especially to the main fisheries areas:

- ✓ There is a complete ban on the use of some destructive fishing methods such as forcefully driving of fish into set nets, using explosives, use of weirs targeting migratory fish, and beach seine nets operated in shallow waters, which incidentally destroy fish nests and foul the water by stirring up silt.
- ✓ There is Mesh size restriction of not less than 50mm for all stationary gillnets. This restriction allows recruits to attain a minimum size before being exploited.
- ✓ There is Annual Fishing Closure, from 1 December to 28 February the following year. This coincides with the rainy season and was introduced to protect the breeding of the commercially preferred species (mostly Tilapia species) whose breeding peaks in this period. The flooded plains provide ideal breeding grounds and nurseries for the juveniles.
- ✓ Introduction of permanently closed areas as sanctuaries and breeding grounds for commercially important species.

Despite the rapid growth of the Fisheries sector and the government's effort to ensure the smooth running of the sector, the sector still faces problems that can be divided into five categories; namely, problems faced by small-scale fishers, problems faced by small-scale fish farmers, those encountered by commercial fishers, the problem faced by large-scale fish farmers, and those faced by the government in the rational management of capture fisheries and promotion of aquaculture. There are still other constraints that are experienced across the sector according to (FAO, 2006). These constraints include but not limited to the following;

- ✓ Due to poor and uncoordinated systems of collection and utilization of revenue from fishing levies and licences, there is inadequate funding and re-investment in the sector despite the sector's ability to generate its resources.
- ✓ There has been an unlimited entry into fisheries. While fishing in a particular fishery is regulated by way of licensing, the number of licences issued is not limited. This has led to a reduction in catch per unit effort for preferred fish species, which in turn has led to a decline in efficiency in capture fisheries, which is a major cause of

declining incomes among small-scale fishers.

- ✓ Dissemination of information on production techniques and processing technologies to small-scale fish farmers and fishers has been of limited effectiveness. This has been due to poor evaluation of target groups and inadequate extension coverage.
- ✓ There is limited development in aquaculture owing to inadequate investment. With declining incomes in capture fisheries resulting from the depletion of stocks of preferred fish species and sizes, opportunities for growth in the sector will come from increased and coordinated investment in aquaculture.
- ✓ Non-availability of reliable sector information (statistics) severely limits the scope of interventions in the regulation and development of the sector. Information is insufficient on parameters such as statistics on fish production levels, the number of stocked and un-stocked ponds, pond yield, fish stocks, levels of exploitation and market data.

However, despite the constraints, the sector has notable development prospects in line with its overall objective of contributing to poverty reduction and economic growth through sustainable utilization of fisheries resources and development of aquaculture. To achieve this objective and to address the constraints faced by the sector, the following intervention has been put forward by the department of fisheries;

- ✓ Establishing an efficient and effective system of collection and utilization of revenue from fish and fishing gear levies, fishing licences and other related fees.
- ✓ Developing stakeholder partnerships towards sustainable and efficiently managed exploitation of fish and other valuable aquatic resources in natural water bodies. This would ensure efficient and effective regulation of fishing activities in proportion or relation to existing stocks of fish resources in all fishery areas.
- ✓ Identification and implementation of fishery development strategies through enhancements (stocking and re-stocking) of both indigenous and suitable exotic species.
- ✓ Development of aquaculture through the intensified promotion of available aquaculture opportunities. While aquaculture offers opportunities for increased incomes and food among low-income earners, its exploitation has remained minimal. This is largely attributed to inadequate sensitization. Further, as a result of inadequate promotion of the country's aquaculture opportunities, there has been little commercial investment in the subsector.
- ✓ Regular generation and provision of demand-driven information in both capture and culture fisheries. In effect, research to generate information should be demand-driven as opposed to the current open-ended approach to information generation. Experience has shown that information usually required by stakeholders includes

but is not limited to fish production, number of fishers and fishing boats in particular fisheries, number and type of fishing gear, number of stocked and unstocked fish ponds, average pond yield, fish stocks, and levels of exploitation.

The department of Fisheries under the Ministry of Fisheries and Livestock categorized these interventions and divided them into three major components that would ensure their maximum yield. The divisions are;

- ✓ Fisheries Management division focusing on the management and regulation of exploitation of fish and aquatic resources in natural water bodies;
- ✓ An Aquaculture Development division emphasizing the development of both commercial and small-scale aquaculture; and
- ✓ Research, Management and Coordination division to support and facilitate the implementation of the other two components.

Structural Organisation of the Fisheries Department

The department of Fisheries has been organised into a powerful structure that hopes to ensure that the Department's mission, objective and vision are achieved. The department is first divided into two main branches, namely; the capture fisheries and the aquaculture branch (Ministry of Fisheries and Livestock, 2019). The two branches are further subdivided into units to ensure efficiency.

1. Capture Fisheries Branch

This branch is subdivided into;

i. Capture Fisheries Research Unit.

This unit carries out the following functions;

- ✓ Conserve, utilize, manage and sustainably develop fishery resources and waters;
- ✓ Take such measures as are necessary for the protection of fish stocks from the effects of pollution and from any other effects which are harmful or potentially harmful to fish stocks;
- ✓ Take appropriate measures, in consultation with the Environmental Management Agency, for the safeguard against extinction of protected fish species;
- ✓ Conduct and support fisheries research and development;
- ✓ Investigate the health of the aquatic environment: through limnological studies.
- ✓ Investigate and promote the health of fish product from fishery: fish processing, develop appropriate fish value addition technologies;
- ✓ Sustainable fishing of entire fish species spectrum: develop appropriate fishing gears for various fish species, assess the catchability and fishing gear effectiveness;
- ✓ Fish stock assessment: determine carrying capacity of given fishery

catchment, assess standing fish biomass, estimate fish production and uptake or catches.

- ✓ Determine and/or monitor fish biology: growth, abundance, distribution and habitat.

ii. Capture Fisheries Management and Development Unit

The overall functions of this unit are to;

- ✓ Regulate the conduct of fishing operations including aquaculture and operations ancillary thereto;
- ✓ Manage, control and eliminate diseased fisheries resources;
- ✓ The issue, vary, suspend and revoke any permits and licenses for fishing, equipment used for fishing, aquaculture and other activities for which permits or licences are required under this Act;
- ✓ Ensure the fair access to fisheries resources for commercial, recreational and indigenous use;
- ✓ Create an environment of cooperation and consultation with other public institutions to enable the other public institutions to perform their functions that impact on this Act, within the context of this Act and the ambit of their respective powers and functions;
- ✓ Liaise or interface with similar organs in other countries or international institutions dealing with fisheries conservation and management.

2. Aquaculture Branch

The aquaculture branch is also subdivided into two major units;

i. Aquaculture Research Unit

The functions of the Aquaculture Research Unit are;

- ✓ Coordinate and conduct aquaculture research in fish breeding and genetics, fish nutrition, fish health, production systems and pond limnology to generate scientific information for the increased productivity and production and policy formulation;
- ✓ Develop and adopt new aquaculture products and technologies for aquaculture development;
- ✓ Supply of quality bloodstocks and fingerlings to both public and private institutions and farms to enhance fish production;
- ✓ Produce, package and disseminate the information to enhance aquaculture subsector growth;
- ✓ Collaborate with other local and international research and development institutions and universities to share knowledge and information;
- ✓ Train interested stakeholders in the developed aquaculture products and technologies to apply the improved

technologies for improved productivity;

- ✓ Mobilise funds through the development of bankable project proposals for aquaculture research;
- ✓ Revise regularly the aquaculture policy for aquaculture research to be relevant to the existing environment;
- ✓ Maintain of an up to date aquaculture research information management system for proper storage and quick retrieval of relevant information;
- ✓ Monitor, mitigate and adapt the impacts of climate change

ii. Aquaculture Extension Unit.

This unit has the following functions;

- ✓ Review regularly the implementation of the aquaculture policy to sustain the development of the Aquaculture sub-sector.
- ✓ Provision of aquaculture extension services to ensure increased aquaculture productivity.
- ✓ Establish and manage operations of fish seed production and distribution centres to enhance fish production;
- ✓ Periodically carry out the registration of fish farmers to generate the information required for planning and monitoring purposes;
- ✓ Co-ordinate effectively the live fish transfer and translocations to prevent introductions of invasive species;
- ✓ Carrying out timely monitoring and evaluation of Aquaculture extension management programmes to facilitate the implementation of appropriate interventions;
- ✓ Maintenance of an up to date Information Management System to facilitate proper storage and quick retrieval of information;
- ✓ Supervision of human and other resources to attain the objectives of the section;

Fishery Regulations

The Fisheries Regulation in Zambia is divided into two main categories; the Licence and Control of Fishing Regulation and the General Regulation, (FAO, 2006).

i. Licence and Control of Fishing Regulation

This regulation ensures that;

- ✓ Fishing licence permits fishing with authorization from the Fisheries Director. It prohibits certain of fishing equipment, restricts the use of net sizes and draws nets in prescribed areas.
- ✓ There is Prohibition of certain fishing methods, regulates the use of destructive fishing practices.
- ✓ There is Prohibition of some fishing areas, no fishing in protected sanctuaries.

- ✓ There are Restrictions on issue of licences, disqualification of applicants.

ii. General Regulations

The General Regulations ensures that there is;

- ✓ Registration of licences, record keeping.
- ✓ Partnership, licence status and change in the composition of partnership.
- ✓ Display of licences in a prominent position in places of business.
- ✓ Use of pesticides as means of curing, preserving, processing or storing fish.

Implications

The Fisheries sector in Zambia is on a serious growth trajectory. The fisheries department under the Ministry of Fisheries and Livestock (and following cap 22 of 2011 of the laws of Zambia) is doing all it can to make sure that the Fisheries Resource of the country is managed and utilized sustainably. Though the Fisheries Legislation has had a comparatively low revolution, the General legal framework is currently on its track. The Zambian government has realized the potential of the Fisheries sector to its contribution towards Gross Domestic Product (GDP), Rural and National development, food security and creation of entrepreneurial and employment opportunities to both rural and urban population. However, to fully realize this potential, targeted investments are required from a range of stakeholders and the Government needs to provide an overall policy environment that will stimulate these investments. It is undeniable fact that Zambia though being a landlocked country is endowed with an abundance of freshwater in the southern region, far greater than any other country in the region. This is a blessing that if properly utilized can ensure vast production of fish from both capture and aquaculture and Zambia has the potential to become the largest producer of fish in Africa (Fish basket of Africa), a production that can be able to sustain local demand and assume stable export. In the 'vision 2030' for the Republic of Zambia, the Zambian government hopes to Increase fish population to 300,000mt by 2030 and ensure that the sector significantly contributes to the Government's goal of more inclusive, diversified and sustained economic growth. However, this is not an easy undertaking but can only be achieved through a concerted effort which may include but not limited to; strengthening the governance system for water resources, implementing a plan of action to more efficiently apply existing resources to productive purposes, enhancing the value of capture fisheries through post-harvest investments, facilitating trade and improving markets; and fostering the growth of sustainable aquaculture. The potential of the Fisheries sector to provide employment opportunities is also enormous. Already, an estimated 300,000 people earn part of their income directly as fishers and fish farmers or indirectly as traders, processors and other service providers (boat building and repair, net manufacturing, fuelwood supply, power supply, transportation), (Cochrane, K.L. *et al.*, 2002). Therefore, if the country is to continue enjoying the benefits that the sector provides in terms of employability, there is a need to value innovation and differentiation as opposed to the traditional

way of doing things. Thus, proper education is required for fishers and all those involved in the critical areas of the sector. Subject areas such as the need to reduce the percentage of fish stocks fished beyond biological sustainability, climate change and pollution as may be applied to fisheries resources are especially important.

According to (FAO, 2018) in the report "The state of world fisheries and aquaculture", it is indicated that climate change might cause overall global fish catch levels to vary by under 10 per cent, catches are likely to drop in many fisheries-dependent tropical regions and rise in temperate areas of the north. Zambia has been a country in the tropics is not immune to the hurdles of climate change and pollution. This, therefore, calls for the country to join the rest of the world as proposed by the Food Agriculture Organisation of the United Nations in carrying out research that will develop strategies for allowing both fisheries and the species they exploit to adapt smoothly to climate change. All these are management issues that need to be well taken care of if the sector is to thrive.

Conclusion

The Zambian Fisheries is expanding though it is still undervalued and underexploited, it is on the right growth trajectory. The growth is especially noticeable in the aquaculture subsector. The sector currently produces less than what is demanded by the country despite having the potential to produce more than demand. The department of Fisheries under the Ministry of Fisheries and Livestock is, however, working hard to ensure that there are proper management and sustainable harvest of the fishery resources. This management effort is evident in the well-organised structure of the department and the policies that the department has set, undertaken and yet to undertaken.

Recommendations

Having carefully reviewed Zambia's Fisheries sector and the sector's Economic Management, the following recommendations can therefore be put forward;

- ✓ There is a need for value innovation and differentiation if the sector is to be more profitable and attract many people/investors.
- ✓ The sector, especially the capture unit is still more informal. There is need therefore to make the sector a little more formal. This would make the sector more attractive to investors who would in turn significantly contribute to mass production that would meet local demand and leave extra for export.
- ✓ There is a need for sustainable financing mechanisms to ensure revenues in the fisheries sector are recognized and reinvested purposefully.
- ✓ Proper education and documentation/publication are needed in critical areas of the sector. This will provide a base for new entrants and investors in the sector. Proper education will also ensure economic management of the fishery resources.

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