

Overfishing Challenges in Lake Victoria: A Reflection on a Sustainable Solutions in Consideration to the Ongoing Industrialisation Efforts in Tanzania

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Abstract¹

Depleting fish catch and fish stock in Lake Victoria is linked to various factors. These include; increased market demand for fish particularly Nile Perch, improved fishing gears, illegal fishing, weak monitoring, control and surveillance (MCS) operations, environmental degradation, unemployment challenge in the Lake Zone and other parts of Tanzania. Continuing growth in population and migration of people to search for a living in the Lake Victoria as an open access resource, in turn it results in increased pressure on the lake resources. The population influx to Lake Victoria shores and its islands is directly linked to lack of alternative livelihood and increasing income poverty in the regions surrounding the lake. However, underutilization of other available opportunities compels people to resort into fishing since the lake is a free open access resource hence leading to overfishing. Therefore, this critical reflective article, shares some views on how an integrated rural development planning through “Opportunity and Obstacles to Development (O&OD) analysis can facilitate the exploration of the underutilized economic opportunities in districts surrounding Lake Victoria and neighboring regions in Tanzania so as to reduce population pressure and overfishing in Lake Victoria.

1. Introduction

Lake Victoria is currently facing a challenge of depleting fish catch and fish stock. Back before the 1990s, Lake Victoria’s ecology was characterized by huge biodiversity

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inhabited by over 500 species of fish, 90% of which were Cichlids belonging to *Haplochromis* species (Witte *et al.*, 1992). Coulter, (1986) recalled that during early 1950s Lake Victoria used to be known as a water body which boasted the most diverse fish environments on earth. This multi-species rich Lake Victoria fishery has continually lost her fish biodiversity wonder over years leading to dominance by only three species currently (Nile perch, Nile tilapia and a native sardine (*Rastronobela argentia*) (Odada *et al.*, 2002; Balirwa *et al.*, 2003)

Various causes have been linked to the decline of fisheries resources in Lake Victoria. These include clearance of wetlands and other natural vegetation along lake shores for fishing and non-fishing activities (Kangalawe *et al.*, 2008; Tumbo, 2008) prolific growth of algae and invasion of water hyacinths which invaded fishing grounds and blocked water ways (LVEMP, 1997), pollution of water environments due to dumping of untreated effluents from industries and other human activities (Balirwa, 1995; LVBC, 2011). as well as increased market demand for Nile Perch (*Lates niloticus*) and or its products which resulted into increased fishing pressure escalated by the use of improved fishing gears (Odada *et al.*, 2009), and predation behavior of Nile Perch which resulted into depletion of other fish species (Witte *et al.*, 1992; Geheb *et al.*, 2007; Kateka, 2010). Because of Nile Perch predation enormous quantities of small fish species were recorded to have almost completely disappeared in catches (Balirwa, 1995; Marcela, 1996; Jansen, 1997).

On the other hand, open-access nature of the lake fisheries combined with rapid population growth, lack of employment opportunities, and the increasing Nile perch market have led to an increasing number of fishers and a depletion of fish stocks (Ikiara, 1999). This decline concerns one third of the population or about 30million people supported by the

lake basin in Kenya, Tanzania, and Uganda (Lake Victoria Fisheries Organization [LVFO], 1999).

The increased vulnerability of the Nile Perch stock has been confirmed a drastic decline in stock abundance (biomass) from about 1.44 million tonne in 2006 to about 0.55 million tonne in 2008 (LVFO 2015). However, a gradual increase has been recorded in 2009, 2011 to 1.23 million tonnes in 2014 but with dominance of juvenile (immature) fish with only 5.9% of the spawner biomass above the slot size of 50 cm (LVFO, 2015). This practice has decreased fish maturity length this could be a sign of heavy exploitation, even if it could also result from environmental changes (Kolding *et al.*, 2014). In this regard, fishermen are compelled to use any means to ensure that they have enough catch (Lokina, 2014).

Poor performance in agriculture, limited employment in mining and tourism sector (Geheb and Binns, 1997) and a growing regional market for small immature fish (illegal trade), the open access regime of the fishery, and the weak delivery of fisheries management services, including Monitoring Control and Severance (MCS), which is closely linked to governance issues (LVFO, 2015) have fueled continuing growth in population and migration of people to search for a living in the Lake Victoria in turn increased pressure on the Lake resources (Jentoft and Onyango, 2010).

1.1 Immigration, Poverty and Fishing Malpractices

Population influx to Lake Victoria shores and Islands is directly linked with lack of alternative livelihood and increasing income poverty in the regions surrounding the Lake Victoria (Geheb and Binns, 1997). This has compelled the previously non fishing tribes

and communities to embark into fishing as common property resource where alternatively they can earn a living.

This has been evidenced in Kenya where previously fishing in Lake Victoria was dominated by Luos but currently other ethnic groups such as Somalis, Kikuyus, Kisiis and Kalenjins are involved in fishing which presents new challenges in the management of Lake Victoria that may compromise sustainable fisheries management (Obiero *et al.*, 2015). Same Situation happened in Tanzania where Chaggas, Hehes, and Kuryas (Magolyo, 2016) have overrun the fishing as a lucrative business during fish industries booming in Mwanza and Musoma towns.

Studies have associated immigrant fishers with less ‘ownership’ and knowledge of the fishery, therefore having less incentive and will to limit their fishing effort to protect future stocks. Immigrants’ interests have been to maximize catches in the short term through intensive reckless and unsustainable fishing (Geheb & Crean, 2003; Viner *et al.*, 2006; Obiero *et al.*, 2015).

1.2 Overfishing Threats is an Old Debatable Phenomenon with Unsustainable Solution

Overfishing has been a global challenge since late 1960s, the concern has been on how best can overfishing and other ecological and biodiversity challenges facing small scale fishers can be curbed Gordon (1954). Following this debate, two schools of thoughts emerged, one school under Garret Hardin which had it that “Limiting the freedom of access and operation in fishery commons is the key to sustainable resource management and poverty alleviation among small scale fishers around the world. On the contrary, Amartya Sen in

his book “ development as Freedom” unlike Hardin, Sen proposed that small scale fishers need to be enhanced with freedom that will enable them to use fishery resources than limiting them (Sen 1999). Sen’s ideas has been what adopted and being in practice in Lake Victoria. The option which provide unlimited freedom has resulted to overfishing due to immoral fishing practices such as the use of under sized meshes, beach seines and poison (Akan and Lokina, 2009; Obiero *et al.*, 2015, Turyaheebwa, 2014). Sen’s option made lake Victoria an open access resources; where anyone willing to pay a moderate license fee can harvest as much as desired since monitoring and control is weak (Lokina 2014, Obiero *et al.*, 2015, PCT, 2016).

1.3 Control Measures Taken so Far

Although the increased fishing malpractice in Lake Victoria compelled to the establishment of community-level fishery co-management organizations called Beach Management Units (BMUs). The aim being to enhance sustainable Lake Victoria fishery management through increasing the level of community participation to assist in the administration of fisheries rules and regulations by, and for, the fishers (Obiero *et al.*, 2015; LVFO, 2007) however, BMUs have been reported to have inadequate resources for intensive Monitoring, Control and Surveillance (MCS) operations, often unable to control illegal fishing in their areas of jurisdiction. Moreover, although fishers are well aware of the fishing rules and regulations, violation rates are high, likely due to weak MCS activities by the BMUs. Thus, the decision of fishers to not comply with regulations demonstrates the benefits of illegally fishing outweigh the costs, that fines are very cheap, and the profits from participation in illegal activities are substantial (Lokina, 2014, Obiero *et al.*, 2015).

Moreover, clanism and family relations, lack of motivations resulted to MBUs culpability instead of MCS (Obiero *et al.*, 2015).

Although measures to eliminate overfishing have been put in place include the use of selective fishing gears, ban on fishing juvenile and immature fish, closed fishing seasons, restrictions on habitat degradation and pollution (LVFO, 2007; Eggert and Lokina, 2008; Nyega *et al.*, 2011) as well as diversifying livelihood in fishing communities have been suggests. Little sustainable efforts have been made by the Tanzania government to enable fishers to diversify to other livelihood so as to reduce population pressure and fishing immoralities in the Lake.

Limited economic opportunities both rural-rural and urban-rural have compel people to resort into fishing since the lake has no entry restrictions. This article therefore tries to share some views of how integrated rural development planning; Obstacles and Opportunities to Development (O&OD) for diversifying the rural economy in the Lake Zone so as to provide more income opportunities especially in the districts along the lake shores of Lake Victoria and neighboring areas in Tanzania side so as to reduce population pressure in Lake Victoria. These districts include, Sengerema, Buchosa, Geita, Musoma Rural, Rolya, Simiyu, Misungwi, Bunda, Ukerewe and Mbogwe. However, sometimes, some immigrants come from Districts and regions far out of Lake Zone regions.

2. Methodology

This article is based on Author's personal reflections and a literature review on practical strategies related to overcoming the overfishing challenges in Lake Vitoria by the Tanzania government.

3. Capitalizing on the Untapped Economic Potentials along Lake Victoria: Keeping an Eye on the On- Going Industrialization Initiatives in Tanzania

As Tanzania strives to enhance industrialization, there are potential opportunities that need to be exploited to reduce population pressure and overfishing in the Lake Victoria. These potential opportunities include; agriculture, aquaculture and Spirulina Farming

3.1 Horticulture

Almost all districts surrounding Lake Victoria have agricultural potentials, particularly Horticulture. In their study Everaarts and colleagues reports that Tarime, Sengerema, Geita Buchosa, Mbogwe, Misungwi, Ukerewe, Geita, and some parts of Bukoba region are favorable for fruits and vegetable cultivation. These areas are favorable for tomato, onion, cucumber, water melon, cabbage and hot pepper (both *Capsicum annum* and *Chinense*). Other minor crops are amaranth, sukuma wiki, black eyed pea, African eggplant, sweet pepper, okra (short and tall varieties) and Chinese cabbage (Everaarts *et al.*, 2014). Another studies have indicated that Ukerewe has a high potential for fruits production which include; mangoes, oranges, tangerines, lemons, pineapples, paw paws and rosella (Katani, 2010, Lounio, 2014, MMA, 2017, Tungaraza *et. al.*, 2007, Vilby, 2007). Ukerewe has been the main supplier of such fruits to Mwanza, Shinyanga and Mara regions in the past 40 decades age farmers from Ukerewe used to sail fruits to Kisumu. In additional, availability of road network passable through the year and plenty motorcycles as well as motor vehicle in villages can easy enable transportation of fruits and vegetables from

cultivation sites to market areas within and outside townships and large towns in and out of the Lake Zone.

Furthermore, the Mwanza region investment guide indicate that there is a lot of untapped opportunities, if deliberate efforts are made to turn these opportunities into projects, sincerely, majority of the youths and adults abled population can be absorbed into these opportunities and earn sustainable living. Identified opportunities include; commercial irrigated farming in Magu (1000ha) Misungwi Mbalika 1,000 ha) Buchosa 200 ha for fruits, fruit farming in Sengerema at igangga (100 ha), Isole (600 ha). Buchosa, Magu, Sengerema, Ukerewe and Illemela have great potentials of vegetable and fruits farming. The above farm lands exclude individual and family farms which can equally be utilized if value adding facilities are put in place (URT, 2017).

Moreover, the government has already shown the way by investing in several schemes with the support of IFAD, AfDB, FAO and Israel government, but may require further investments to improve water use efficiency and introduce better crop husbandry practices as well as double cropping where potential irrigation schemes can be revived (URT, 2017).

Currently available fruit trees such as mangos, oranges and avocados found in Ukerewe are not well attended and majority of the trees are very old. Actually this is a structural challenge that can be resolved by introducing improved varieties and provision of extension services. There is a big untapped potential in pineapple, passion fruits farming in the Lake Zone. Apart from farming there is an opportunity for investment in vegetable and fruit processing. This can include, adding value by sorting, packaging and processing of fruits and vegetables. The growing middle class in Mwanza, Dodoma, Kahama, Dar es

Salaam and other regional towns is creating a local market for higher quality sorted and packed fruits and vegetables. Export opportunities are the presence of our neighboring countries (Burundi, Rwanda and Congo DRC) and Exporting out of Africa. Where we can export the sorted and well packed fruits and vegetables and fruits concentrate. However, the main challenge is skilled local agronomists and managers are hard to find in up counties (NEA, 2015).

3.2 Fish Farming - Aquaculture

Tanzania also imports some fish, mainly low value species (6,793 tonnes in 2014, valued at about US\$6 million, mostly small pelagic fish from China (URT-MALF, 2016). Tanzania is gifted with large water body which allows aquaculture a potential which could cover this gap of fish importation. However, there are number of challenges hindering aquaculture development in Tanzania. Aquaculture, in Tanzania started in the early 1950s (URT-MALF, 2016). However, little can be seen as prosperity in this sector given the time of its establishment. A number of challenges have been identified in hampering the aquaculture development in Tanzania. These include limited capacity building and know how, which includes limited understanding of the biology of indigenous fish species suitable for cultivation; Start up and operational capital constraints such as lack of funding and high local interest rates; low technology investments, adoption, and innovations uptake; inadequate extension services; Inadequate supply of productive resources such as quality fish fingerlings (seed) and feed; inadequate public support and private sector participation; underdeveloped aquaculture supply and value chains (Hassan, 2017; URT-MALF, 2016). The Government, Private Sector, Financial institutions, and other key stakeholders should contribute to the growth of the sector. Especially the following should

be looked upon; invest in hatcheries and affordable quality cultured seeds (fingerlings), make available quality and affordable fish feeds; ensure enough skilled personnel for providing extension services and provide adequate knowledge and skills for farmers to practice aquaculture commercially (Hassan, 2017). We have opportunities to tap the aquaculture available potentials in this country.

3.4 Spirulina Farming

Another potential to be tapped is spirulina farming. This has taken attention in Kenya, Ethiopia and South Africa. Spirulina is a less known, but potentially interesting opportunity for increased production in the region and has a high value and an established, growing market. The opportunity is particularly relevant to women from the perspective that it is an activity that can be performed with less capital intervention and can be established close to the home with minimal training and technical supervision. This has very interesting potential with respect to the diversification of the artisanal fishing sector and enhancement of regional trade and food security (Piccolo 2012, Tefera *et al.*, 2016).

3.5 Marking Furniture form Papyrus

Apart from horticulture, another untapped potential is utilization of papyrus. Currently marketable goods derived from harvested papyrus include furniture, mats, baskets and biomass energy (Jones *et al.*, 2018).

Lastly, as it has been suggested by various researchers, community members in some areas along the lake basin should be educated to acquire skills on fish farming and this will reduce their reliance on lake's fisheries and eventually provide a chance for rejuvenation of fisheries resources (Magolyo, 2016; Njiru *et al.*, 2008; Obiero *et al.*, 2015).

4. Conclusion and Recommendations

4.1 Conclusion

Considering the untapped potential found in the areas surrounding the lake zone regions, if horticulture and aquaculture are well ventured in whereby and the households get sensitized and capacitated to get fully ventured in these opportunities in a sustainable way, population pressure of youth migrating to search a living from fishing will be reduced hence reduced unsuitable exploitation of the fisheries resources. This can only be attained if the current efforts of industrialization are well articulated and integrated with the untapped potentials heightened in this article.

4.2 Recommendations

Diversification of activities and rural industrialization in the Lake Zone Regions needs not only to reduce overfishing but also to save the ecology of the Lake Victoria especially from the consequences of farming activities on the wetlands, grazing and macrophyte harvesting which is coupled with catchment degradation-deforestation but give the population around Lake Victoria a range of opportunities to venture in for income generation hence reducing population pressure in the Lake which compelled fishermen to scramble for fish which leads to overfishing including immoral fishing.

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