International Journal of Social and Development Concerns

ISSN 2524-1478 (Online)

Vol. 14 | Social and development concerns in Africa (c)
Vol. 14 Article 7 | September 2021

(An International Publisher for Academic and Scientific Resources)

THE WATER HYACINTH AND SUSTAINABILITY OF FISH TRADE IN THE LAKESIDE COMMUNITY OF KISUMU WEST SUB COUNTY, KENYA

Authors: [1]Omolo Erick Otieno, [2]Evans Wabwire and [3]Michael Tedd Okuku
[1,2&3]The Catholic University of Eastern Africa. Website: www.cuea.edu
P.O BOX 62157 – 00200 Nairobi Kenya
Corresponding author: Omolo Erick Otieno. **Email:** omoloeri@gmail.com

Abstract: *The Food and Agricultural Organization (FAO) code of conduct documents sustainable fishing as a small-scale method with social, economic and environmental benefits, in that it respects marine ecosystem and adapts to the reproductive rate of fish to maintain a balance and ensure the survival of all species, (Hudson, 2012). Water hyacinth (Eichhornia Crassipes) is an aquatic plant which lives and reproduces both sexually and asexually, and it floats freely on the surface of fresh waters or it can be anchored in mud, (Ndah, 2009). This study set out to examine the influence of water hyacinth on fish trade in the lakeside community of Kisumu West Sub County, Kenya. The study was grounded on opportunity based entrepreneurship and sustainability theories. The study targeted a population of 172,821 in which a samples size of 100 was drawn. A case study design was employed to single out the lakeside community of Kisumu West Sub County. The study used questionnaires, focused group discussion guides and key informant guides to collect data. The findings reveal that 41% of the respondents confirmed that water hyacinth impinge on fish trade. The study discovered that the weed can be transformed as an economic resource where it acts as a breeding ground for fish. The study recommended the need for the implementers of water hyacinth projects to guarantee humble time by involving the community members at the identification and the planning stages.*

Key words: *Economic resource, opportunity based entrepreneurship, sustainability, water hyacinth, survival of all species, marine ecosystem*

1.1 Study Background

Water hyacinth is now among the ten most harmful weeds in China and is found in nineteen of the countries' provinces, (Labrada, 2019). Large infestations are localized in water bodies of the Yangtze River basin, reservoirs, lakes and channels, hence negatively affecting local water flora, and leads to environmental pollution that greatly hinders economic development. The available statistics on the weed at River Huangpu in Shanghai shows that it could produce a mass of about 1,840,000 tons in 2002, but only 600,000 tones were removed while the rest still covers the Sub Rivers, (Labrada, 2019). A report that was carried out in Zambia on Sustainable fishing showed that there were about 140 dams in the Eastern Province of Zambia which were used for fisheries, (Mugisha et al 2016). Members of these communities learnt how to keep records, manage fish stocks and monitor fish in order to increase their production. The weed had undergone explosive growth on the lake causing very serious disruption to people, the economy and the ecosystem in Uganda, (Mugisha et al. 2016). Initially, the Ugandan government introduced weevils to multiply in the tank in order to fight the weed. However, this biological weed control method was later replaced by heavy duty machinery under the Uganda-Egypt Aquatic project.

According to Kenya Marine and Fisheries Research Institute (KMFRI), the Fisheries and Aquaculture sector contributes about 0.8% of the Growth Domestic Product (GDP) providing direct employment to over 500,000 people and supporting over two million people indirectly, (Odoli,2018). According to the National Environmental Management Authority (NEMA), Kisumu City generates about 400 tonnes of solid wastes daily comprised of organic and in organic forms from domestic, commercial ventures, hotels, markets, industries, health facilities and social institutions. The continued discharge of raw effluents, sedimentation from dredging activities and traditional runoffs may lead to reduced oxygen which poses potential risks to fishing sustainabilty particularly the lakeside community of Kisumu West Sub County.

A study by Nawire (2019) noted that the proliferation of water hyacinth has led to a drastic fall of fish production in Kisumu West Sub County thus diminishing the income of the lakeside communitiy which entirely depend on fishing as a source of livelihood.The presence of water hyacinth in the lake is creating major draw backs which have direct bearing on the livelihoods of the local people. The weed is usually at its peak towards festive seaons from around September to January every year. The evidence is masterminded by the fact that there is media outcry that a number of beaches such as Ngege, Osare, Paga Rota,Usoma and Lwangni beaches in Kisumu West have already been blocked by the weed thus paralysing fishing. A good number of fish mongers occassionally transfer to other neighboring beaches while others have resorted to other income generating businesses. The main objective of this study was to asses the consequence of water hyacinth on fish trade in the lakeside community of Kisumu West Sub County, kenya.

1.2 Review of empirical studies

The theoretical framework selected as bases for this study consist of the Opportunity Based Entrepreneurship Theory and the Sustainability Theory. In respect of Opportunity Based Entrepreneurship Theory, Drucker contends that entrepreneurs excel at seeing and taking advantage of possibilities created by social, technological, and cultural changes, (Drucker, 2019). Stevenson 1983 develops the theory to include resourcefulness, (Brown, 2001). He conceptualizes

entrepreneurship as a management approach that has its heart on all consuming passion for the pursuit and exploitation of opportunity without regard to resources currently controlled. He asserts that certain business and environmental factors pull individuals and firms towards entrepreneurial behavior. Generally, the theory pays less attention to how entrepreneurs think about, manage, and cope with downside risk than how they pursue, and achieve the upside potential of opportunities, (Sarasvathy, 2014). The word opportunity seems to be enticing because it brings to mind a positive connotation of success, achievements, health and happiness. However, the most compelling opportunities are the ones where the upside is not clear, but the downside is clear and can be brought within an individual's control. Therefore, there is a gap and the need for a complementary theory. The second supportive theory, Sustainability Theory, relates to the Malthusian economics. According to Malthus, (BjornOla, 2003), population increases faster than the supply of food available for its need, thus the former is expected to exceed the growth of agriculture thus may fail due to food shortages. He came out with an idea of a mathematical basis with the principal that the population growth is in a geometrical rate of 2,4,8,16,32 …. while food supply increases only in arithmetical fashion of 2,4,6,8 going onwards. Nevertheless, Malthus could have failed to account on improvements in technology which enabled food production to increase at rates greater than the population growth.

The idea of sustainability came to public attention after a report of 1972 known as, Limits to Growth, issued by international body of Rome, (Anderson, 2016). Later on, there was a move by the World Conservation Strategy under the International Union for Conservation of Nature in collaboration with the United Nations Environmental Program and World Wild Life Foundation to make sustainability a benchmark of international action. Notably, the term sustainable development achieved international public prominence through the 1987 Brundtland Report of the World Commission on Environment and Development chaired by former Norwegian Prime Minister Gro Harlem Brundtland. It clearly defines Sustainable Development as that which meets the needs of present without compromising the ability of future generations to meet their own needs, (Anderson, 2016).

According to Gordon(2005), models of economic and ecological change are traditionally based on common property theory a tenet of sustainability theory. The theory predicts that unchecked increases in the use of common resaurces eventually lead to over exploitation and resource collapse, a tragedy of the commons. Brox in Gordon (2005) maitains that changes in technology are usually associated with good capital investments. All in all, both technology and economy change with time thus there is need for some dynamics to address the issue of water hyacinth and the sustainability of fishing industry. Therefore; the inclusivity of sustainability theory fully anchors the study in a bid to effectively tackle the water hyacinth and the sustainability of fishing industry.

Review of Empirical Studies

a. Effects of water hyacinth on the fishing gears

This plant impedes transportation, irrigation and water drainage through canals or ditches, it hinders navigation, fishing, human food production, and finally poses health risks to human beings and livestock. A research that was done at Dianchi lake in China indicate that a large area of water hyacinth invasion has contributed to fishermen finding themselves in economic hardship since it reduced their income, (Amarasinghe, 2020). They recorded the low fish catch during the season

of invasion which affected the net profit of the traders. Some of the fishermen were said to rely on credit to repare their fishing equipment. A cross sectional study that was done among fish traders at river Tano in Jomoro district, Ghana, revealed that the fishermen undergo difficulties such as denial of access to fishing grounds, and delays in preparatory work for fishing, which negatively hit on fish business, (Gopal, 2018). The majority of fish traders perceived that water hyacinth invasion brought about reduction in the quantity of fish they bought from fishermen. These traders got less fish to trade on for profit because the presence of weed prevented the fishermen from regular fishing. In the absence of the weed, the fishermen could sell up to Cedis 400, but in presence of water hyacinth, they sell as little as Cedis 20. On the other hand, the fishermen in Jomoro District experienced the deterioration on the quality of fish because of long fishing hours which make the fish stale at the time they are traded on. According to Mwendwa (2018), the weed sometimes vanishes in the lakeside community of Kisumu West Sub County, only to reappear when it is highly dense than before, a situation that renders it impossible for fishermen to cast their nets. It is also noted by a research scientist that the weed has caused devastating change on the life cycle of fish because they spread diseases to fish especially when the raging southerly wind moves the weed in the lake, (Mwendwa, 2018).

b. The influence of water hyacinth on boat navigation

A study that was done at Florida in United States of America, denotes that water hyacinth mats blocks drainage causing floding. The large rafts sometimes accumulate where water channels occassionally cause bridges to collapse and in turn collide with the sailing boats, (Bajkov, 1948). In lake Florida, the weed sometimes shift to an unpredicatable direction thus hindering the boats from landing into the shores. In Jinja Uganda, it is realized that the presence of water hyacinth blocks fishing grounds for species like Nile perch and tilapia in Lake Victoria. The weed damages fishing equipment which causes a decrease in fish production therefore, reduction in net profit generated by fishers, (Nyeko, 2021). The governent of Uganda recently launched an investigation on the likelihood of the death of fish which was realized to be the rotten water hyacinth which sank in the lake, (Nyeko, 2021). As the weed continues to grow, the fishing boats lie idle at Usoma, Ngenge, Lwangni and Osare beaches of Kisumu West sub county, rendering hundreds of men and women jobless. Therefore a good number of fishermen have abandoned the work and ventured into other businesses such as motor-cycle riding.

c. Consequences of water hyaciath on fish trade

In Kenya, the fishing sector earns the country sh.35billion annually from fish exports particularly to European Union, (Mailu, 2001). Therefore, the Lake Victoria market stands at 85 percent of inland fish exports. A research by the Kenya Marine and Fisheries Research Institute opines that the invasion of water hyacinth in Lake Victoria has led to dwindling of species of fish such as Nile perch, silver fish, and tilapia, (Ageng'o, 2013). A study which was done at Baringo County in Kenya disclosed an estimated annual loss of Sh. 5 billion following the invasion of the killer water hyacinth on Lake Baringo, (Njoka et al 2019). The fish production had dropped from 482 tons in 2014 to 192 tons in 2016. There has been a decline in fish production at the lakeside communities in the Kenya section of Lake Victoria (Migori County, Homabay County, and Kisumu County), because water hyacinth has blocked many fish landing beaches, and sheltered bays which were breeding grounds of fish. The mats have also posed obstruction to fisheries exploitation which led to higher operation cost thus increase fish prices. Many landing beaches along Lake Victoria are now abandoned and income generation from the sales of fish has been negatively affected because

fish catch has decreased by 45 percent, (Ageng'o, 2013).

The water hyacinth covers the entire lakeside community of Kisumu West Sub County which had the biggest population of Nile perch and tilapia, (Ageng'o, 2013). However, the weed has been found to be cherished by some species of unique fish such as mud fish and cut fish which many people do not prefer to trade on, and the dwindling of the prefered tilapia and Nile perch (Mailu, 2001). A kilogram of fish could be sold at ksh.40 before the invasion of water hyacinth in Kisumu West Sub County. Lately, the prices have shot to ksh.400 per kilogram forcing many traders to quit the business. Alternatively, a good number of traders are said to have ventured in selling frozen and affordable China tilapia, cage fish and fish pond fish(Mailu, 2001).

1.3 Methodology

The study adopted a mixed method research. According to Creswell and Plano Clark, in Almalki (2016), mixed research method enables a greater degree of understanding to be formulated than if a single approach was adapted to specific studies. A case study research design was used in the selected mixed research method. The choice of the design is in line with the thought of Depoy and Gitling (2016), that the design investigates a contemporary phenomenon within its real life context especially when the boundaries between the phenomenon and the context are not clearly evident. Furthermore, Yin clarrifies the design as an excellent theory-generating tool because the findings of a single case can be theoretically explained and tested through other design strategies, (Ongehana et al, 2019). The questionnaires, were used as tools for data collection among the members of the community. Similarly, an indepth interview guide tool was used to collect qualitative data from key informants such as Fisheries Inspector; and the focused group discussion guide was used for beach management units (BMUs), in order to get a a coherent understanding of the problem and triangulation purposes. The researcher prefered to use the direct interview method to collect data, and the sets of data were collected concurrently. The researcher prefered to rely on the assistance of trained data enumerators for a good data collection. The 3 enumerators administered the questionnaires to community members (fishermen, fisher vendors, the youths, and business persons) at the various places within the lakeside community. The rationale behind this lied on the fact that the study cuptured the views of the community members who are directly or indirectly affected by water hyacinth and minimized the influence and interference from other members who had very little knowledge about the bottle necks surrounding water hyacinth and the sustainability of fishing industry. The researchers ensured that the identities of the interviewees were concealed, and not much time was utilitized in the interview. The interview instruments such as audio recorders and note books were used particularly in indepth interwiews of key informants.

The Sub County had a target population of 172,821. A 90% confidence level, 10% margin of error and Yamane (1967) formula of $n=N/(1+N(e)^2$ were used in guiding the researcher in determining the sample size of 100 comprising of 83 community members, 3 focused groups and 14 key informants. This was proportionately stratified based on the individual population sizes of the five wards. The participants considered for inclusion in this study were being selected using stratified random sampling method in which the population was divided into smaller sub groups known as strata, based on the members shared characteristics. This method converted heterogenous groups of population into homogenous sub groups of trata thus giving true representation of the population
.

Yamane Formula; $n=N/(1+N(e)^2$.
N-Population size; e-Margin of error; n-Sample size, 1- Constant.
$n=172,821/(1+172821(0.1)^2$, n=100.

Table 1 Sampling Table

Target Population	Percentage	Sample size	Target Number
50207	50207/172821*100%	29%*100	29
29134	29134/172821*100%	17%*1*100	17
32774	32774/172821*100%	18%*100	19
29162	29162/172821*100%	17%*100	17
31544	31544/172821*100%	18%*100	18
172,821			**100**

Source: Researcher, 2021; n=100
Source: Field data

1.4 Discussion of Findings

The findings showed that ninety seven (97) out of 100 participants translating to 97% of the response rate responded while three (3) participants never turned up, forming a non response rate of 3%. This was acording to Mugenda and Mugenda (2003) who observed that the response rate of 50% is edequate for data analysis and reporting, a response rate of 60% is good and that of 70% and above is very good. Therefore, the response rate of 97% was very appropriate for the study.

The Consequence of Water Hyacinth on Fish Trade in the Lakeside Community

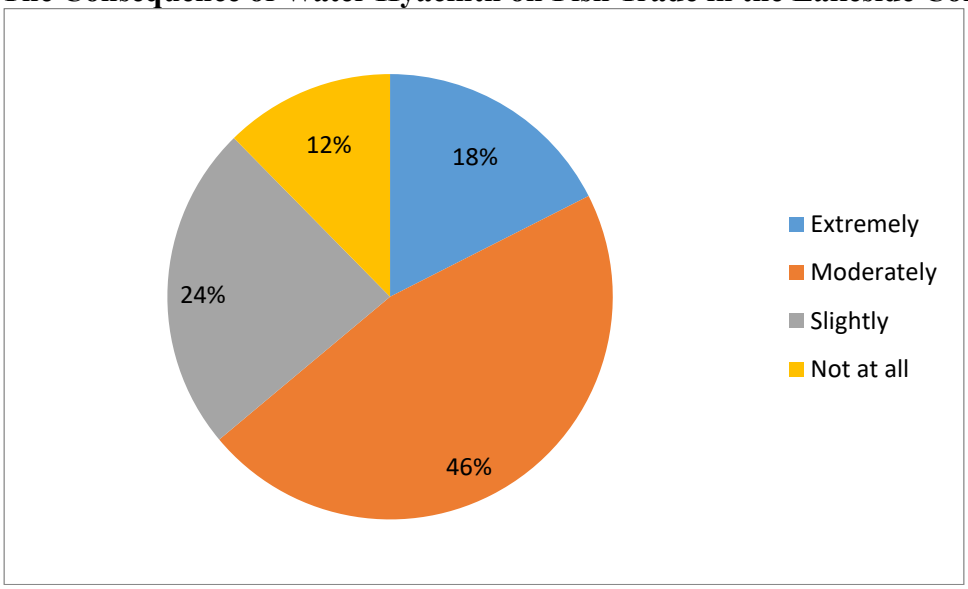

Figure 1: The extent in which water hyacinth affects fish trade
Source: Field data, 2020

The findings show that the majority of the respondents 46% had the idea that water hyacinth moderately affect fish trade. They claimed that the weed hinders the catch of economically value

fish varieties such as Nile perch and Tilapia that tend to migrate to clear water. It instead facilitates the by-catch of some varieties of fish such as mud fish and lung fish which have little economic value. The 24% of respondents argued that water hyacinth has slight effect on fish trade because as it covers the lake, fisher folks trap some mud fish fingerlings which have high economic value because they are used to trap big fish such as Nile perch. They also mentioned that the migratory tendency of water hyacinth leaves behind a lot of by-catch fish which are very beneficial to fisher fork. It was noted that 18% respondents said that the weed has extreme effect on fish trade because it covers the lake shore thus hindering boat navigation, and when it covers the fishing environment it leaves no space to cast the fishing nets or fishing lines, hence little amount or no fish to trade on. Finally, 12% did not know if water hyacinth has effect on fish trade. These findings are confirmed in a research that was done at Lake Dianchi in China by Amarasinghe (2020) where fisher folks recorded low catch of fish during the season of invasion of water hyacinth which hit on the net profits of fish mongers. Fish prices have increased and fish has become increasingly inaccessible to the local fishing communities that have placed other poor Kenyans seriously threatened by food insecurity, (Abilla et al, 2006).

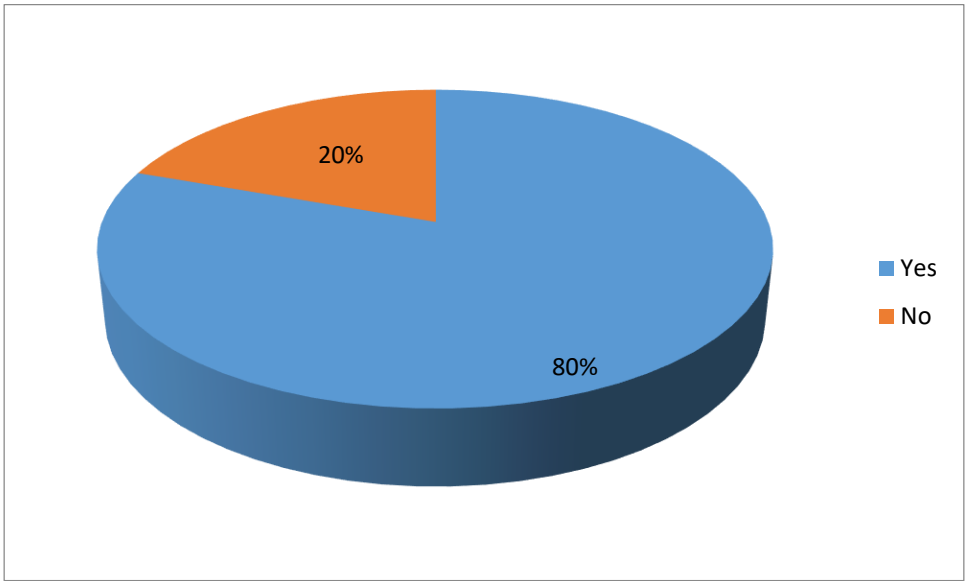

Figure 2: Water hyacinth on price of fish
Source: Field data, 2020

The respondents were further questioned on whether water hyacinth has effect on prices of fish in the lakeside community. The majority 80% gave a Yes response while 20% gave a No response. The majority were for the idea that, when the water hyacinth invade the lake, the fisher folks end up with small catch of fish because some fish particularly Nile perch, Tilapia and silver fish tend to migrate to the clear ground in far deep water. Moreover, the fisher folks using engine boat would move far away to catch fish, as a result they use a lot of fuel, that compel them to increase the price of fish. Others claimed that fish caught between water hyacinth tend to be deoxygenated, thus they look whitish and stale when they reach the beach, thus lowering their prices. A respondent posited that if there is water hyacinth invasion, there will be low supply of fish which in turns escalates the price. However, the minority 20% said that the price of the fish will still remain the same. The price of 1 kilogram of Nile perch is ksh.300, though, the price keeps increasing with big sizes of

Nile perch. For instance, 3 kilograms of single fish may be charged ksh.350 per kilogram, while 10 kilograms of single fish and above maybe charged ksh.450 per kilogram. The price for tilapia ranges from ksh.300- ksh.1000 depending on the size and demand. More so, sardine (dagaa) sells at ksh.1200- ksh.1500 per big handled basin depending on the clarity of water and the darkness of the night. When there is emergence of water hyacinth, fisher fork only return with small quantity of fingerlings of tilapia, sardine and Nile perch which do not give much profit. Moreover, the fisher folks using engine boat would move far away to catch fish, as a result they use a lot of fuel, that compel them to increase the price of fish. In Ghana, the researchers found water hyacinth to be disruptive to fishing industries by denying fisher fork access to fishing grounds, delays in preparatory works, fishing trap siltation, low fish supply thus reduced profit, (Abilla et al, 2006).

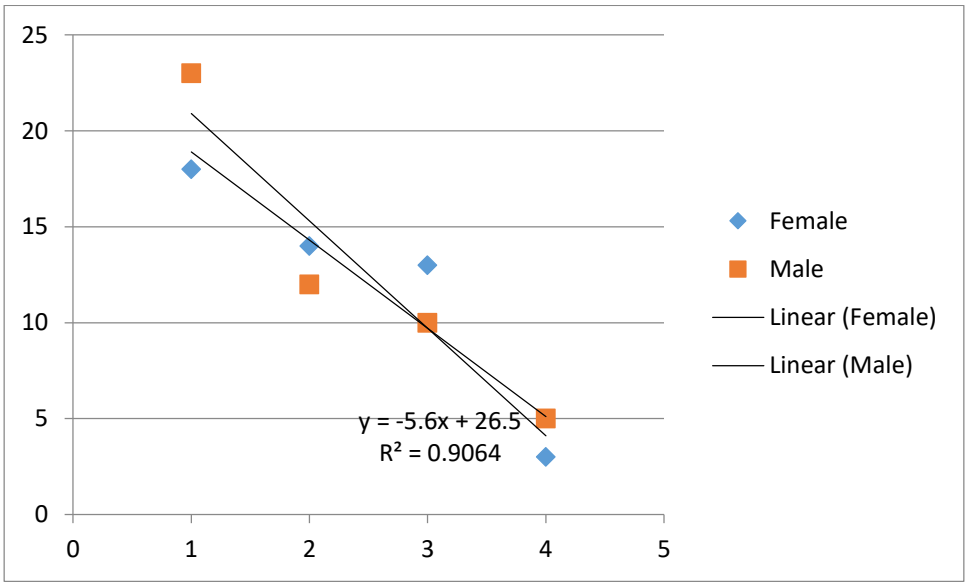

Figure 3: The a scatter plot showing relationship between gender and the effect of water hyacinth on species of fish breeding
Source: Filed data, 2020

In the above figure, the researcher tested if there is a correlation in which males and females understand the effects of water hyacinth on species of fish breeding. A strong positive correlation of 0.87418 was realized. The result was confirmed by the degree in which 23 male respondents and 18 female counterparts responded that water hyacinth has extreme effect on fish breeding. They discovered that varieties of fish such as tilapia and Nile perch usually migrate to far deep clear water when the lake shore is invaded by water hyacinth. Their concern was that the two types of fish are the most traded upon, thus their migration leads to loss. Secondly, water hyacinth is a breeding ground to some species of fish such as mud fish and lung fish. The 12 male and 14 female respondents were for moderate effect, the 10 males and 13 females were for slight effect, while 5 males and 3 females were not sure. The findings of Abilla et al (2006) posit that 97.8% of fisher fork who involve in actual fishing activities are men while women were only involved in beach seining and others were boat owners.

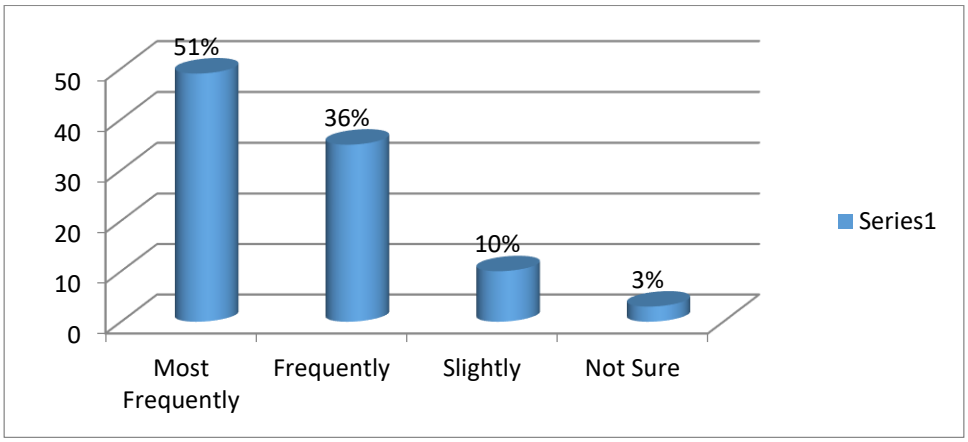

Figure 4: The frequency at which fish mongers trade in the lakeside community
Source: Field data, 2020

As shown in the above figure, the majority, 49 respondents had the perspective that fish mongers more frequently traded in the lakeside community, 35 respondents saw that the fish mongers frequently did fish trade, 10 respondents said that fish mongers slightly traded and 5 respondents were not sure of the frequency in which fish mongers traded in the lakeside community. The community is within the city thus there is high demand for fish as part of diet. In addition, there was the idea that fish trade is one of the main sources of livelihood in the lakeside community of Kisumu West Sub County. This is reflected by the report by Nyongo (2019) which opined that the hundreds of men and women who depended on fish trade had been rendered jobless in the lakeside community while some ventured into selling cage fish, fish from fish pond and frozen China fish.

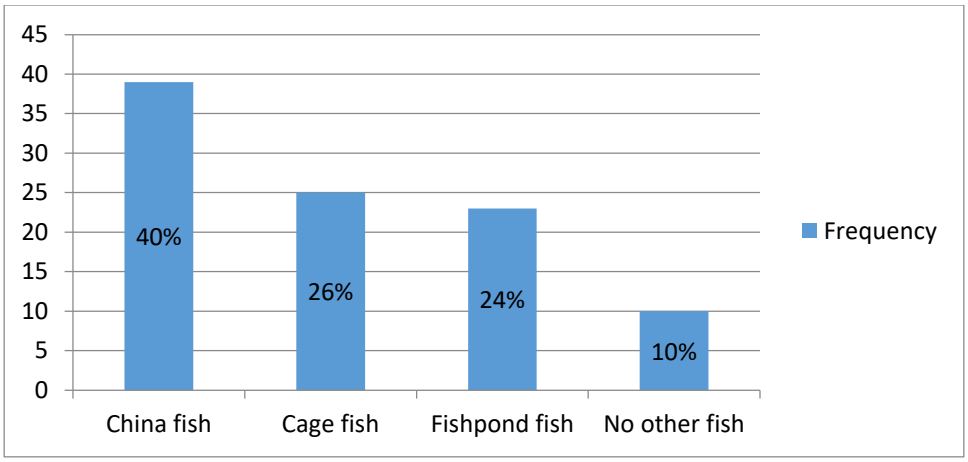

Figure 5: Sources of fish supply to supplement the dwindling fish catch
Source: Field data 2020

In the above graph, the participants were asked to mention some sources of fish supply that help in supplementing the low catch of fish in the lakeside community. The majority of the respondents 39 were for the opinion of China fish. The 25 respondents said that caged fish was the source, while 23 respondents mentioned fish reared in fish pond. The 10 respondents argued that there are no other sources, instead the fish mongers would move to other clear beaches in the neighboring counties. The finding is in line with Odidi (2019) that a good number of traders ventured into selling frozen China tilapia to supplement the dwindling fish production. The business is booming for traders but very little of that money goes to the local fishermen due to cheap farmed China fish which get market when the lake is carpeted by water hyacinth thus hindering fish, (Dijkstra, 2019).

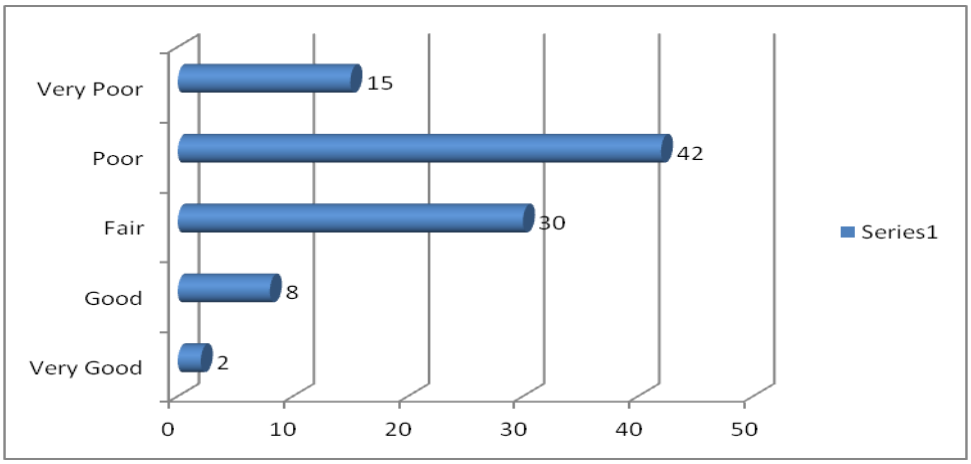

Figure 6: Rating the current fish trade
Source: Field data, 2020

In the above graph, the respondents were tested on the plight of the current fish trade in the lakeside community. It was noted that 15 respondents viewed the trade to be very poor; the majority 42 respondents said the trade was poor. They alluded the fact that the weed still invades the surrounding lake shore, a situation that render fish mongers to depend on small scale trading on by- catch fish which are not marketable. The 30 respondents were seeing the trade to be fair, and

8 respondents saw the trade to be good, while 2 respondents saw the trade to be doing very good at that moment. The proposition of low fish catch is reflected in the work of Amarasinghe (2020) when he alluded that the presence of water hyacinth has prevented the fish mongers from carrying out trade, in order to service their loans.

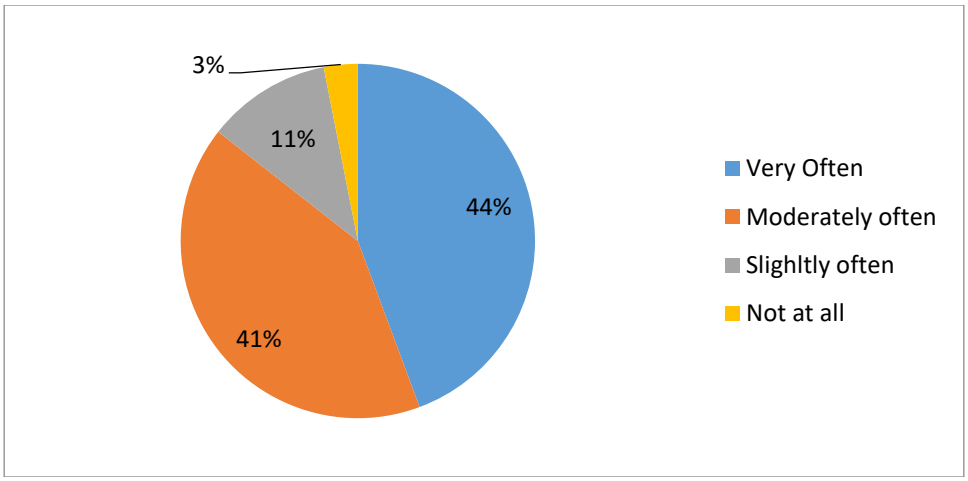

Figure 7: Fish diet in meals
Source: Field data, 2020

The respondents were probed on the number of times they take fish diet. The results were shown in the figure above. The 43 respondents said that they often include fish in their diet, while 40 respondents said that they moderately eat fish. This being to the fact that some are fisher folks and fish mongers, thus they easily get access to fish. However, 11 respondents maintained that they slightly eat fish because it is very expensive due to the proliferation of water hyacinth, and some reasoned that they touched it most often hence they have little appetite. The 3 respondents replied that they strictly do not take fish in their diets. The researcher deduced that some respondents may not afford fish because of little source of income. Even those who eat fish quit often may be lacking other food varieties to supplement fish, thus stunted growth among the lakeside children and poor health among the people in the community. Food being a necessity for one's life, there is malnutrition along the sampled beaches because majority of fishers depend on fish earnings to buy food that is also scarce, (Abila et al, 2006). It has also been found out that omega 3 fats in fish protect the heart against the development of deadly cardiac disturbances; they lower blood pressure, improve blood vessel function and ease inflammation.

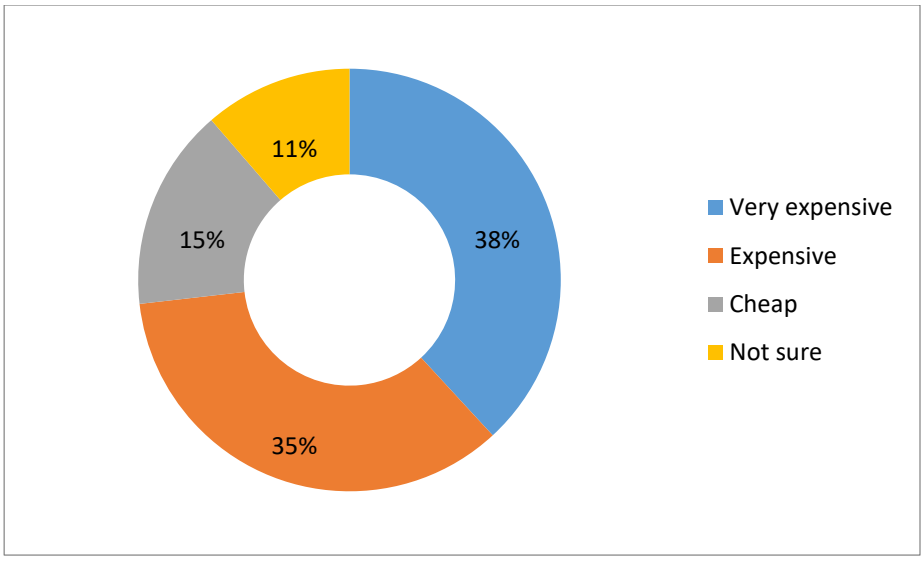

Figure 8: The price of local fish compared to the supplement
Source: Field data, 2020

The researcher questioned the respondents on the price of local fish compared to the supplement as in the figure above. In the response, 38% of the respondents replied that the price of the local fish is very expensive. They justified that the local fish feed on natural habitat hence tend to taste nice a reason why it is liked by many people. 35% of the respondents had the idea that the price is expensive. 15% of the respondents were on the contrary argument that the price is cheap, while 11% of the respondents were not sure. According to Ojina (2020), due to the decrease of cheap China fish, residents will have to bear with wild catch which is very expensive. The local fish price is sometimes determined by the landing prices and the distance covered by fisher fork, the collusion to set prices and the choice of fish.

1.5 Conclusions and recommendations

The study exposed that the majority of the community members depend on sustainable fishing. Water hyacinth leads to dwindling of value fish varieties such as Nile perch and tilapia in the shallow water thus negatively affecting fish trade. The study underlined that when there is high infestation of water hyacinth, the supply of fish reduces because some varieties migrate to clear water far away, a situation that escalates the price of fish. However, the same findings pointed out that the weeds help in breeding of some species of fish such as mud fish and lung fish, though these are not much preferred by fish mongers because of their low income generation.

The research study clearly depicts the proliferation of water hyacinth as great hindrance to fishing sustainability in the lakeside community of Kisumu West Sub County. The phenomenon has been proved by the fact that fisher forks complain about fall in income of fishing since the invasion of water hyacinth. However the weed is being transformed as an economic resource whereby it acts as breeding ground for mud fish fingerlings *(Dek/Nyapus)*, which are used to trap big fish. Secondly, the migratory tendency of water hyacinth helps fishermen to catch a lot of fish at the area it invaded before. Thirdly, a good number of local people are using the water hyacinth waste products as a fuel in their local oven, while other fish mongers use biogas from water hyacinth wastes in order to fry fish. Finally, other architects are making good furniture and ornaments from

water hyacinth by-products which earn them good income.

Several recommendations were deduced from the study. The data collected on the gender distribution of participants gave a reflection of the opinions of more males than females. This is because the work of fishing is mostly being done by men for the *Luo* culture has it that women have bad omen thus should not go fishing, instead they can sell fish. The findings alluded that fish trade featured as a very crucial aspect in the realization of fishing sustainability and the lakeside community development at large. A good number of respondents were for the opinion that water hyacinth extremely impinge on fish trade, thus a lot need to be done particularly to achieve the Sustainable Development Goal, which cites life below water. The findings revealed that the community, mobilized by Kenya Marine and Fisheries Research Institute, contributed to water hyacinth management through waste collection along the lake and the voluntary physical removal of water hyacinth.

Nevertheless, some key informants were for the idea that the opinions of the lakeside community members might have been undermined especially in implementation of some projects meant to boost the decline of fish trade due to water hyacinth invasion. This might have led to poor projects such constructing cages in the lakes. Another weakness that the study revealed is that the dredging machine that was brought by the national government has no capacity to exhaust all the water hyacinth from the lake, thus fish mongers continue to count losses due to the proliferation of the weed.

Therefore, the study pinpoints that water hyacinth should be given close attention particularly by the national government in collaboration with the county government of Kisumu in order to ensure sustainability achievement. Secondly, the entire lakeside community members should change their mind set on how to manage both biodegradable and non biodegradable wastes in order to control the proliferation of water hyacinth. The study also recommends that the implementers of water hyacinth projects should roll out the physical removal of the weed in which the local community members may be rewarded for the work done at the end of the day. This research further pinpoints that there is a great need to involve the community members when the government wants to initiate a project of water hyacinth because the former are the sole bearers of the challenges. Finally, the Fisheries Department through the Beach Management Unit should ensure that fisher fork follow strictly the laid down rules and regulations guiding fisheries.

REFERENCE

Ageng'o, G. (2013). *Effects of water hyacinth on economic activities of the community around lake Victoria, a case of Dunga beach in Kisumu, Kenya.* Nairobi: University of Nairobi.

Almalki, S. (2016). Integrating Quatitative and Qualitative Data in mixed Methods Research-Challenges and Benefits. *Journal of Education and Learning*, 288-296.

Amarasinghe, R. L. (2020). *The Problem of Water Hyacinth in China.* Rome : Food and Agricultural Organization

Anderson, R. C. (2016). *Berkshire, a Ten Volume Set, the Encyclopedia of Sustainability.* Oxford: Ofxford University Press.

Bajkov, G. a. (1948). *Water Hyacinth.* Florida: US Department of Agriculture.

BjornOla, L. (2003). *The Return of Malthus: Environmental and Post War Population-Resource Crises.* Cambridge: White House Press.

Brown Terrence, D. P. (2001). An Operationalization of Stevenson's Conceptualization of Entrepreneurship as Opportunity Based Firm Behavior. *Strategic Management Journal*, PP 953-968

Dijkstra, A. (2019). *Chineese Imports driving fishermen in despair.* Kisumu: BBC News.

Drucker, P. F. (2019, October 15th). *Google*. Retrieved from https//innovationgarden. typepad.com/innovation-garden/2015/08/innovation and entrepreneurship-book-by Drucker html:https://innovation-garden

Elizabeth DePoy and Laura N. Gitlin(2016). *Introduction to Research.* Maryland: Hopkins University.

Gordon, D. (2005). Growth without capital a renascent Fishery in Zambia. *Journal of South African Studies*, 495-511.

Gopal, S. (2018). *Researchers Innovate to make Money out of Water Hyacinth.* New Delhi: Mongabay publishers.

Hudson, A. (2012). *Saving our Fisheries.* New York: United Nations Development Program.

Kakuru, Turyahabwe, Mugisha. (2016). *Wetland Atlas Volume II.* Kampala: United Nations.

Labrada, L. A. (2019). *The problem of water weeds in China.* Hong Kong: Food and Agricultural Organization.

Mailu, A. (2001). Preliminary Assessment of Social, ECONOMIC and Environmental Impacts of Water hyacinth in the Lake Victoria Basin and the Status of Control. *Biological and Integrated control of Water Hyacinth*, 102.

Mugenda, O.M and Mugenda A.G (2003). *Research Methods, Qualitative and Quantitative Approaches.* Nairobi:ACT

Mwendwa, M. (2018). *Water Hyacinth Threatens the Future of Fish and Fishing Community around Lake Victoria.* Nairobi: Talk Africa.

Nawire, S. N. (2019). Effects of Water Hyacinth on the Fisheries Industry in Kisumu Municipality. *Journal of Anthropology*, 1.

Ndah, K. (2009). *Water Hyacinth Poses Great Challange to the Society.* Kigali: The New Times.

Njoka, K. M. (2019). *Biological Control of Water Hyacinth, a Case Study of Lake Victoria.* Kisumu: Kenya Agricultural Research Institute.

Nyeko, J. (2021). *Uganda Investigates Hundreds of dead fish Washed Up on Shores of Lake Victoria.* Kampala: Xinhua Africa.

Nyong'o, P. (2019). *Kisumu County Integrated Development Plan II 2018-2022.* Kisumu: The County Government of Kisumu.

Odidi, M. (2014). *Influence of water hyacinth on livelihoods of the riparian community of South West Seme location.* Nairobi: University of Nairobi.

Odoli, C. (2018). *KMFRI Baringo Station.* Nairobi: KMFRI.

Patrick Ongehana, Bea Maes, and Mieke Heyvaert. (2019). Mixed Methods Single Case Research: State of the Art and Future Directions. *Journal of Mixed method Research*, 461-480.

Richard Abila and Reuben N. Omwenga. (2006). Fishing and Poverty Levels around Lake Victoria(Kenya). *International Fund for Agricultural Development*, 1-50.

Sarasvathy, S. (2014). The Downside of Entrepreneural Opportunities. *Dans Management* , Pages 305- 315.

Taro Yamane (1967). *Statistics: An Introductory Analysis*. New York: Hamper and Row Company Limited