



Small Scale Fisheries as a Livelihood Strategy; a Case Study of Lake Chivero in Zimbabwe

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Abstract

Small scale fisheries provide a source of livelihood to a significant population world over contributing to meeting the Millennium Development Goal 1; Poverty Reduction. Despite their role, small scale fisheries have often been ignored by policymakers. A case study using a descriptive survey design was conducted to investigate the operations of small scale fisheries and their contribution to livelihoods at Lake Chivero in Zimbabwe. Three categories of small scale fisheries were identified; individual fisheries with permits, cooperatives, and illegal fishers. The study revealed the presence of an institutional structure supporting access of the fishery resources to many people whilst maintaining sustainable use of the resources. Major challenges noted were related to poaching, unaffordable permits, and fluctuation of prices in the market. The study recommended regular consultations of small scale fisheries by the authority to review permit fees, introduce effective strategies to curb poaching, and coordination of the product marketing system.

Key words: Fisheries, Livelihoods, Lake Chivero, Zimbabwe

1. Introduction

Small scale fisheries play an important role in providing livelihoods to many people worldwide contributing to the meeting of Millennium Development Goal 1; Poverty Reduction. Despite this significant role, less prominence has been given to small scale fisheries resulting in their vulnerability. This study explored the operations of small scale fisheries at Lake Chivero in Zimbabwe and its contribution to livelihoods to surrounding communities.

2. Background

Fisheries provide a source of livelihood to a significant number of people around the world; an estimated 30 million fishers engaged in small scale fisheries through out the world (Coates 2002). An estimated 95 percent of the total number of fisheries globally is found in developing countries and their contribution is approximately 58 percent of the total global annual fish catch (Bene 2006). Fisheries are an important economic activity in the developing countries and small scale fisheries contribute to the largest proportion of fish stocks (Mathew 2001). Whilst developing countries such as China, India and Indonesia are amongst the leading fish producing countries in the world, fisheries are a source of livelihoods to approximately 227,000 full time fishers in Central and West Africa, with an approximate gain of \$295 million annually from 570,000 tonnes of catch (FAO 2010).

Activities involved in small scale fisheries are harvesting, processing and marketing. Small scale fisheries operate at varying levels ranging from self-employed single operators, informal micro enterprises and formal sector businesses (Coates 2002). Small scale fisheries are comprised of small groups of people who harvest fish with or without permits either for subsistence or marketing. Usually small scale fisheries use non-mechanized equipment and often employ manual operation fishing gear and they operate without electronic fish finding and navigational devices (Tieze et, al. 2000). Small scale fishermen also operate on part time or full time basis, or seasonal in some cases (FAO 2011). Men are mostly engaged in fish catching and selling whilst women are predominantly involved in fish drying and marketing. Activities such as net making, boat repair and maintenance provide additional fishery related employment and income opportunities in the fishing communities.

Various reasons are cited in literature for people joining small scale fisheries. These include the following; fish being a healthy food (Oken et, al. 2012), fishing as a profitable and stable economic activity in comparison with other rural activities (Mathew 2001), and local people engaging into fisheries by default due to their closeness to a water body (Mines et, al. 1982). Whilst fish provides a source of high protein food (IFAD 2012), small scale fisheries have contributed to poverty reduction through income generation and providing safety nets thereby reducing vulnerability in Southern Africa in countries such as Mozambique and Tanzania (Ninnes 2004). Furthermore, small scale fisheries play a major role in employment creation as the industry indirectly creates employment for fishery related activities such as nets and boat making and fish marketing (Bene 2006). Major contribution of the small scale fishing sector is providing poor households with employment either on part or full-time basis. Evidence also shows that unlike large commercial fisheries, small scale fisheries contribute to sustainable resource management through small informal and or formal community-based management approaches, which have prevented over exploitation of fishery resources (Bene 2006).

There is generally lack of accurate information on small scale fisheries. Actual catches from small scale sources could be on a global average twice the available figures (Coates 1995; Beck and Nesmith 2001). In Ghana official data showed that inland catches averaged 75,000 tonnes per year between 2004 and 2006 yet estimations of fish catch by fish market surveys at Lake Volta pointed at 346,000 tonnes (FAO 2008). Furthermore, there is absence of accurate information on fisheries outputs at Lake Chivero (Matiza 1994) yet absence of this information impacts negatively in

terms of policy and planning for the fishery sector. Despite the above evidence on the contributions of small scale fisheries to communities, small scale fisheries have been given less importance in favour of large commercial fisheries. For example a study conducted at Lake Kariba fisheries in Zambia revealed that modernization policies were targeted at transforming large scale fisheries but with little impact to small scale fisheries (IFAD 2012).

Small scale fisheries are at risk of uncertainties. This is specifically related to occupational risk, natural hazards in addition to economic conditions within those countries or on the global market (Eldin and Milleville 1989). Disruption of small scale fisheries has multiple negative effects to livelihoods of fishing families, those engaged in net and boat making, and those who depend on fish vending for income. There is a general agreement that small scale fishing communities are amongst the most vulnerable due to lower human and institutional capacities (Bene 2006, Allison and Ellis 2001). Fishing communities belong to the poor and most vulnerable sections of society in most parts of Asia and Africa (Bene 2006; FAO 2009) as small scale fisheries have low income, their children lack access to education and health services, and lack capital for their operations due to absence of collateral (Tandavanitj 2007). Zimbabwe is a land locked country with no natural lakes, and all water is stored in reservoirs constructed for drinking and irrigation. Though fisheries have a minimal contribution to the country's Gross Domestic Product, they have contributed to food security in addition to providing employment to local people in the country. There is dearth of information of the exact number and demographics of people employed in fisheries industry in the country (FAO 2004).

Provided with the above evidence; where small scale fisheries have been being marginalized and the paucity of information regarding fisheries operations in the country, this study therefore delved on the operations of small scale fisheries at Lake Chivero and their contribution to livelihoods to communities surrounding the lake. Lake Chivero is one of the largest water bodies in Zimbabwe and is situated about 37 kilometres southwest of Harare, the largest metropolitan in the country. Due to its accessibility to the capital city, the lake has attracted many people to conduct small scale fishery activities. Estimates of annual total production at Lake Chivero have fluctuated between 160 and 412 tonnes (Matiza 1994). Several fish species are found at Lake Chivero. Whilst there are 27 reported fish species in the lake, dominant species are *Oreochromis macrochir*, *Tilapia rendalli* and *Labeo altivelis*, and the *Oreochromis niloticus* is the most dominant in the commercial fishery (Matiza 1994).

The need to utilize fishery resources in a sustainable manner has been observed in literature. In Zimbabwe the Parks and Wildlife Act (Chapter 20:14 of 1996, as amended) governs the development, control and management of fisheries in Zimbabwe. Through this, the Parks and Wildlife Management Authority (PWMA) regulate fishing in controlled waters. The authority is mandated to carry out the following in the fishing industry ; control of fishery activities; authorization of fishing methods; control of introduction of fish and aquatic plants into the lake, and regulating fisheries and marketing of fish. The authority further controls fishing nets; authorizes fishing gear and regulation of type of fishing gear and effects punishment to fishers in possession of fish caught in contravention of the Act. This legislation therefore promotes an increase in utility of the fishery resources in order to strengthen the rural economy, create employment and enhance household food security. The majority of people employed in the fisheries are the artisanal/small scale fisheries than in industrial large scale fisheries (FAO 2010).

A livelihoods conceptual framework was adopted for this study. The approach stresses capabilities, assets, and activities as prerequisite for a living. Central to this approach is sustainability of a livelihood when people are able to recover from shocks and maintain their capabilities, assets, and activities for the present and the future without depleting the natural resource base (Chambers and Conway 1992). Therefore in this study a livelihoods approach provided us with an analytical framework to poverty reduction by focusing on the way the poor survive, their vulnerability, and how they relate to structural and institutional issues.

3. Methodology

A descriptive research survey was conducted using questionnaires, key informant interviews and observations. A sample of 138 participants was derived from a target population of individual fishermen, commercial companies, and fish market sellers using the formulae below;

$$n = (Z^2 * p * q) / e^2$$

Where:

n = the desired sample size;

p = the proportion of small scale fishers and market sellers (target population);

q = 1-p (proportion of the estimated total population of fishers and market sellers at Lake Chivero excluding the target population);

z = the standard normal deviate set at 1.96 which corresponds to 95% confidence level;

e = the margin of error set at 0.05.

Following that, a probability proportionate to size sampling was used to select participants from the individual fishermen, market sellers and commercial companies. Semi structured questionnaires with a mixture of both closed ended and open ended questions were administered to individual fishermen (n=48), market sellers (n=75), and commercial companies (n=10). Key Informants (n=5) were purposively selected from the PWMA to participate in the study. Observations of fisheries activities and marketing of fish were concurrently held with administration of semi structured questionnaires.

Data from closed ended questions of the questionnaires were entered into SPSS data base before analysis. Qualitative data were analyzed using a content analysis technique; which involved going through all the interviews identifying similarities and differences before coding. Coding was done through summarizing responses into groups and through that responses with similar meanings were assigned the same code.

3.1 Ethical Considerations

Voluntary participation of respondents was observed throughout data collection process and this was ensured through the administration of the informed consent form that explained the purpose, procedures involved in the study, and risk associated with participation in the study. Respondents were neither induced nor coerced to participate in the

study. Confidentiality was maintained by ensuring that information collected was not shared or accessed by other people during and after the study.

4. Results

4.1 Systems and operations of small scale fisheries

The study identified three major fishing categories of fishermen at Lake Chivero. These were cooperatives, individual/groups with permits and illegal fishermen/poachers. No individual companies were reported to be operating at Lake Chivero but an amalgamation of a number small companies under a cooperative were authorized to conduct fisheries.

Cooperatives

The study observed that cooperatives were a union of at least 10 private companies that were registered together under the PWMA. A total of 33 cooperatives were registered at Lake Chivero whilst only 11 permits were issued by the authority meaning that not every cooperative was operating at the lake. Cooperatives were entitled to use a single gillnet (76 mm) with a length not exceeding 1 600 metres. Each permit was allowed to use a maximum of 6 manual and/or motorized boats. Three cooperatives were given one permit which was charged USD10 000 annually.

Since it was regarded as illegal to carry out fishing operatives during the night and weekends, cooperatives were noted to be laying out their nets between 1600 and 1800hrs during week days, before leaving them over night. Collection of their catches was between 0600 and 1000 hrs the following day. Cooperatives employed workers for fishing and these workers were compensated on commission basis. The payment structure ranged from 15% to 30% of the weekly catches depending on the agreement. The total commission a cooperative rewarded its employees depended with the size of labour force where cooperatives with fewer employees rewarding a higher commission to their employees. *"I am paid on commission basis and I am comfortable with the 30% I get. When we catch more [fish] i pay the important things like rent and school fees and remain with some for money for savings, but when we have low catches the income only suffices for consumption"* (Male worker, Co-operative).

Catches from the cooperatives were marketed to middlemen at the landing sites who in turn sold the fish in the nearby city shopping centers including Harare, along Bulawayo Harare highway and Norton Town. Whilst the PWMA permit allowed the marketing of fish within the cooperatives' premises at the lake, marketing of fish outside Lake Chivero required a different permit, for instance a vending permit was required to sell fish in Norton urban. Respondents however, indicated that co-operatives transported and distributed fish to selling points in Norton, Whitehouse Township in Harare or other places when catches were not all sold at landing sites.

Due to several cooperatives operating under a single permit, conflicts amongst members were noted to negatively affecting operations of the co operatives. This often occurred when one of cooperative members failed to pay their contributions to the permit fees required by the PWMA resulting in suspension of the entire co-operative from harvesting fish.

Individual/group fishermen

These were individuals or groups of fishermen ranging from 2 to 6 who bought daily permits from the PWMA at the lake site. Each permit was charged between USD3 and USD6 per day and that cost depended on whether a fisherman was fishing with the use of a boat or not. Individual and group fisheries were allowed to use fishing rods, hand lines, hooks and boats with the exception of nets. Individual or group fishermen engaged middlemen when their catches were high but directly sold the fish to consumers in the event of low catches. This group also constituted people who fished for leisure mostly during weekends.

Illegal fishermen/Poachers

Illegal fishermen or poachers were individuals or groups who fished without permits either during the day or night using boats and illegal sized nets. These illegal fishermen/poachers were noted to be operating in groups of varying sizes. Small groups of between 2 to 3 people were reported to be sneaking into the lake, operate during the day, and more often catch small amounts of fish averaging 20 kilograms with the use of scoop nets. On the other hand, larger groups of between 5 to 10 people, or more, were noted to be operating during the night with the use of boats and nets, and their catches were unknown. These poachers were noted to be notorious as they also stole equipment and catches belonging to cooperatives during the night. Whilst information on the operations of small illegal fishing groups was accessible, information on the operations of the larger groups could not be obtained as they operated discreetly during the night. Poachers, regardless of type, were noted to directly sell their catches to consumers. When small groups of illegal fishers were probed on reasons for fishing illegally, they mentioned failure to raise the amount of fees needed to pay for the daily permits. *"I come to fish everyday and if I don't have money to pay for a ticket [daily permit] I sneak [into the lake]"* (Male Participant; Individual Illegal fisherman). Regarding the use of illegal fishing gear, poachers mentioned the need to harvest large quantities within short space of time. *"I use this net so that I can catch more fish, when I see the rangers I flee away because this is not allowed, but it is the only way I can get reasonable amount to sell"* (Male Participant; Individual Illegal Fisherman). The study further observed that the cooperatives worked on full time basis while sellers and individual/group fishermen worked both on part time and full time basis. Full time fishermen indicated that they carried out their activities throughout the year. *"I come to fish every day though I get very little or nothing in winter"* (Male Participant; Individual fisherman). Seasonal fisheries were also reported. *"I come here when there is enough fish in the lake. During winter I do cross border business where I import goods from Tanzania and South Africa for trade"* (Male Participant; Individual fisherman).

Institutional Structure

Respondents from the PWMA mentioned that the cooperative system was put in place to enable more people to benefit from the natural resources in line with the country's indigenization policy. Furthermore, respondents noted that

the cooperative system was a way of involving communities in resource management. *“This policy is meant to enable a large number of people to benefit from the natural resources. It is also a way to easily involve the community in the management of natural resources when these people see the benefits (KII, PWMA Official).* The officials indicated that the anti poaching team was present to protect fishermen by patrolling to monitor poachers who were reported to be stealing equipment and catches of the cooperatives. It was noted that the team’s duty included controlling illegal fishing and overexploitation of fishery resources by inspecting the fishery resources regularly. Fishing equipment including boats, size and number of nets were regularly checked by the patrol team.

Respondents pointed out that there was a research department present within the PWMA department, and its primary role was to inform on the breeding processes and resource depletion. Issuing of licenses was meant to ensure that the number of fishermen were controlled and those who were registered could operate without interference. It was also revealed that the number of fishermen had increased over the past years due to indigenization policy together with the need to address unemployment. Thus the permit system was used to limit the number of people joining the fishery business. *‘The fee is high and it is another way of controlling the number of fishermen in an effort to achieve sustainable fishing’ (PWMA Official).*

4.2 Factors that encouraging people to join the fishing enterprise

Figure 1 below illustrates factors that encouraged people to join small scale fisheries.

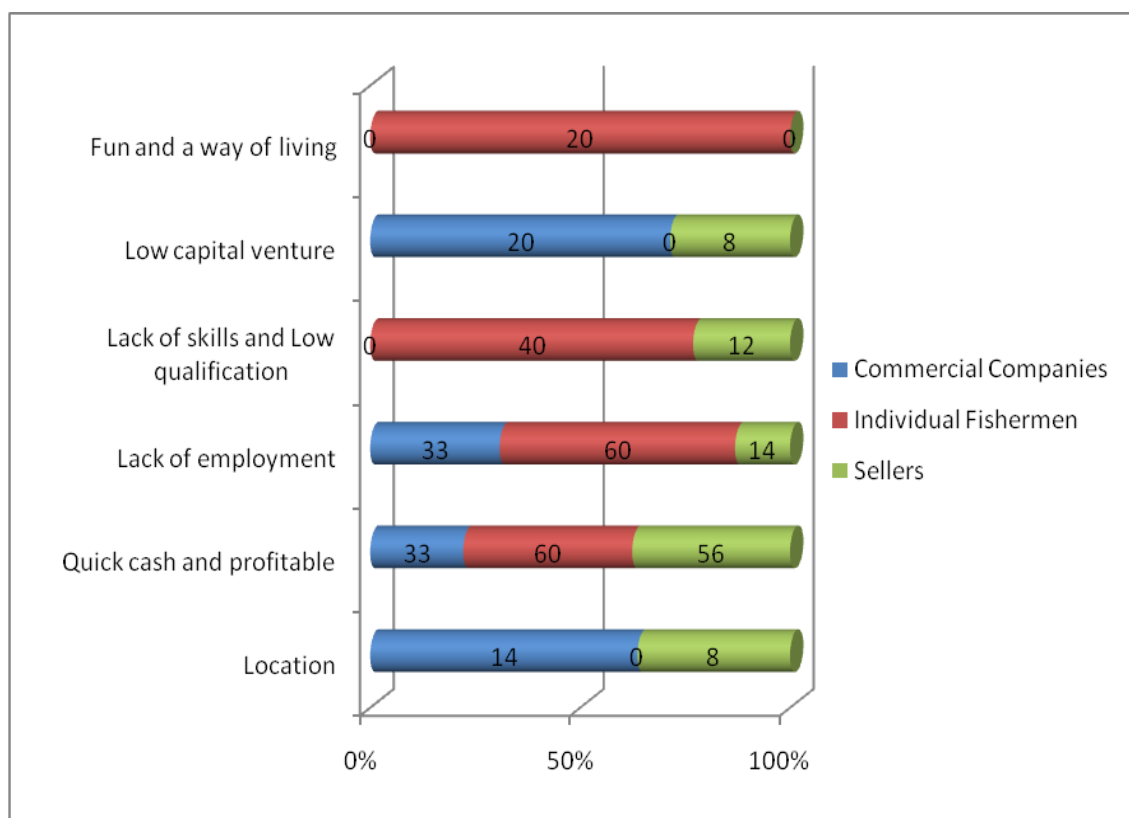


Figure 1. Factors that encouraged people to engage in fishing enterprise

Commercial companies, individual fishermen and sellers mentioned different factors that encouraged them to join the fishing enterprise. Respondents in all three groups cited several factors that prompted them to engage in to fishing enterprise. Thirty three percent of the respondents from commercial companies indicated lack of employment; 14% vicinity to the dam (location); 33% fishing as a quick and profitable business; and 20% low capital venture. *“It is better with fishing than other ventures around her. There is money coming from fish sales everyday” (Participant; Co-operative).* Sixty percent of respondents from individual fishermen pointed out ‘lack of employment’; whilst the same percentage (60%) of respondents mentioned ‘quick cash and profitable job’; 20% mentioned ‘a fun and a way of living’ as factors that encouraged them to join the enterprise. *“There are no other jobs in this area; fish selling is the only available activity here” (Female Participant; Fish vendor).*

For sellers 56% of the respondents noted fish selling as a quick cash job; 14% lack of employment while 12% revealed that it was due to their lack of skills and low qualification to compete for professional jobs. *“With fish selling I am sure I can get money every day. I completed grade seven and I do not have any other qualification. It was difficult to get employment so I decided to move into fishing. ...I can afford paying rent and take care of my family” (Male Participant; Individual Fisherman).*

4.3 Constrains faced by people in fishing enterprise

Several challenges were identified as affecting the fisheries. Figure 2 illustrates these constrains by type of small scale fishery.

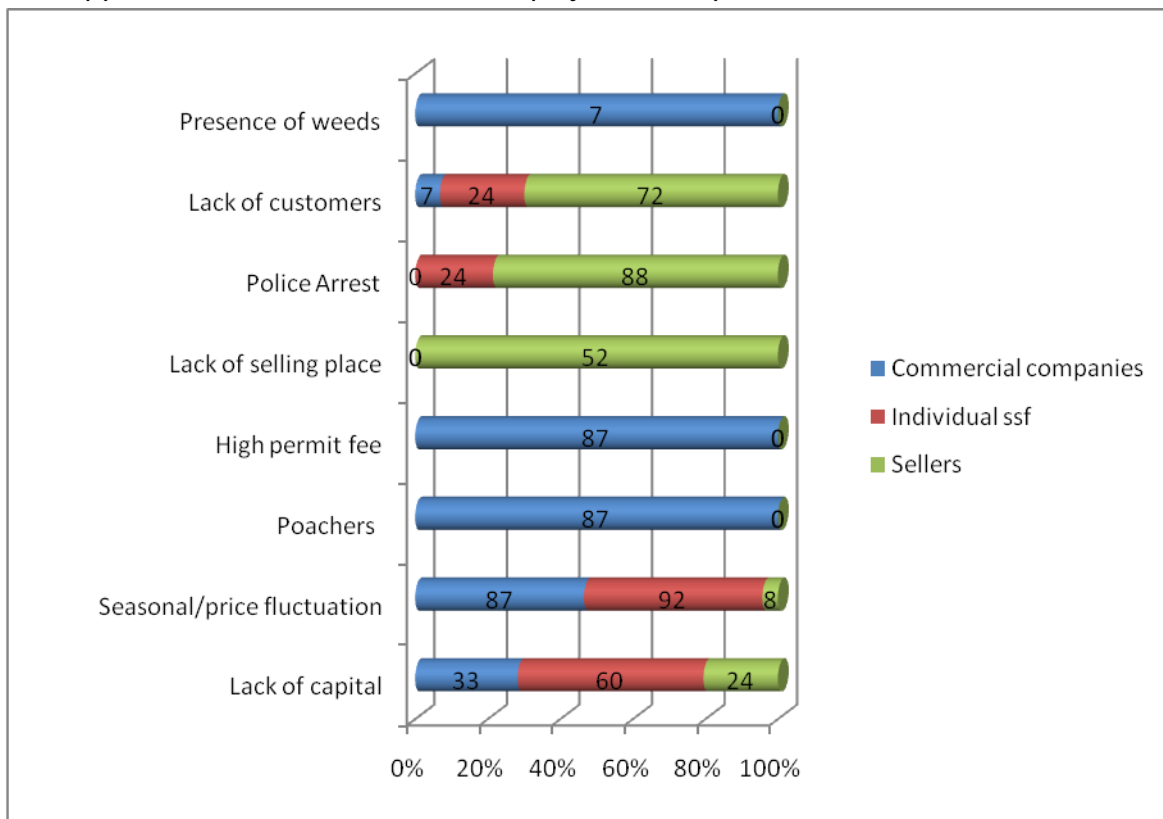


Figure 2 Constrains faced by commercial companies, fishermen and sellers

Respondents from commercial companies raised the following concerns; poachers stealing their catches and nets (87%); high permit fee (87%); and seasonal fluctuations of catch and prices (87%). Other problems raised by respondents included; lack of capital (33%), weeds (7%) and lack of customers (7%). The following was mentioned by participants, *“The authorities are not serious enough. Poachers steal our catches and nets and we have no any means to stop them. We just depend on the anti poaching team [which is not doing enough]”* (Female Participant; Co-operative). It was further noted that, *“The permit fee is too high I end up using my money from other sources to pay permit fee especially during winter. As a cooperative we are ready to prove evidence to authorities that we are no longer able to make profits as we are operating on a hand to mouth business”* (Male Participant; Co-operative).

Another challenge raised by respondents was fluctuation of daily catches. Whilst there were good catches in summer season, respondents revealed that they harvested low volumes of fish in winter which provided them with only a paltry for their daily expenses. *We put our nets over the night and come up with 200kgs of fish in a winter morning which gives us very little money. However, in summer we are able to get up to 700kgs, we are able to save, pay fees and rent from the proceeds after harvesting good volumes for selling”* (Male Participant; Co-operative).

Furthermore, the study observed that major problems to individual fishermen were seasonal fluctuation of catches and price (92%), capital (60%), lack of customers (24%) and police arrest (24%). *“I want to have my permit but I don’t have capital to purchase equipments and pay for the license”* (Male Participant, Individual fisherman). Arrest by police was another concern raised by individual fishermen. Respondents explained that corrupt police arrested them for poaching when they were on their way to the market places. *“Even if we show the fishing tickets to the police, they arrest us when they see us with fish. After arresting us they either demand a fine from us or confiscate our catches”* (Male Participant; Individual Fisherman).

Respondents also revealed that most problems faced by fish sellers were police arrest (88%), lack of customers (72%), lack of a decent selling place (52%), lack of capital (24%) and price fluctuation (8%). It was explained that police arrested vendors only if they were selling fish at undesignated market places. Participants reported that their stocks were often confiscated by the police before they were asked to pay a fine. It was however observed that at Katanga Shopping Centre in Norton, the town authorities collected tax before allowing the vendors to sell their stock. Stiff competition that led to price decreases was an additional challenge pointed out by vendors.

4.4 Discussion of Major Findings

An interesting finding from this study was the cooperative system at Lake Chivero, which was an innovation meant to widen access of the fishery resource to many people. This system is however different from management systems for other lakes within the country that allowed only large commercial companies to operate. For instance Lake Harvest and other companies were the major operators at Lake Kariba in the country (WCD 2000). Whilst authorities introduced the cooperative system to allow more people to benefit from fisheries, results of this study demonstrated the system was threatening sustainability of fisheries by allowing a more than optimum number of people to operate on the limited resources.

Results of this study identified several determinants for people joining small scale fisheries; and reasons cited had to do with issues of fisheries being a source of livelihood. Due to their perceived viability, fisheries attracted a number of people. Demographic data of the participants showed that small scale fisheries constituted a group of lowly skilled population. Having failed to secure formal employment or lost formal employment in the manufacturing sector in the neighboring metropolitan, these people resorted to joining fisheries at Lake Chivero. Small scale fisheries therefore

provided them with welfare and a safety net. This confirms Bene's assertion (2006) that poor people tended to resort to extracting the local resources including fisheries and forestry in order to sustain their livelihoods.

The presence of a legislation guiding daily fishery operations was one of the study's findings. The study however further revealed a lack of institutional capacity to fully control operations at the lake as poaching was reported to be affecting cooperatives' operations in addition to risking over exploitation of the fishery resources. This supports Coates' view (2002) that there are generally unsound regulations which are often not enforced in the fisheries in developing countries. Implication of this is for the authorities at the lake to increase their capacity possibly through allowing cooperatives to come up with their private security teams to compliment the role of PWMA anti poaching team.

The constraints of small scale fisheries at Lake Chivero were related to both institutional and non-institutional problems. This is a confirmation of Birkmann's assertion (2007) that livelihood strategies are an outcome of institutional structures and their relationship with other processes. Thus fisheries at Lake Chivero are affected by institutional processes between the cooperatives and the authorities. To craft appropriate policies that could be adapted and implemented effectively, authorities could make consultations with all stakeholders through organizing regular workshops. For instance, issues of permit reviewing can then be aligned to profits obtained by the cooperatives and co-ordination of fish harvesting and marketing systems could be strengthened. The livelihoods approach stresses the need to recognize context and relationships; meaning that development process should be process oriented (Chambers and Conway 1992).

5. Conclusion

Fisheries at Lake Chivero provided a source of livelihood to both urban and farming communities near the lake through employing a considerable number of people who have lost their jobs elsewhere. A cooperative system was found to be guiding operations at Lake Chivero. Poaching, high permit fees and price fluctuations were identified as major challenges affecting small scale fisheries. Furthermore, fishery resources were threatened by poaching and the cooperative system that potentially over exploit resources.

6. Limitations of the study

The study did not capture views of the large groups of illegal fishermen/poachers who were inaccessible due to them operating discreetly during the night. Information on this group's operatives including their numbers, reasons for not operating legally, catches and their fishing gear could therefore not be accessed.

7. Recommendations for Further Studies

Further research should be done to examine the viability and sustainability of cooperatives system at Lake Chivero considering the need to protect over exploitation of fish resource.

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Authors' Contributions

Magdalene Kupaza Brought about the ideas of the study, developed study's objectives and drafted the study's protocol. She also participated in data collection with co-authors, analyzed data before drafting of the manuscript.

Oliver T. Gore Assisted with study conceptualization, development of the methodology, took part in data collection and analysis, and finally assisted in the drafting of the manuscript.

Festus Mukanangana Contributed through refinement of methodology and reviewing of the manuscript draft.

Dr Eric Makurah Contributed through study conceptualization and provided overall guidance during conducting of the study.

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