



Distribution of Fishery Incomes between Fishers and Fishing Gear Owners: A Case Study of Lake Tanganyika Fisheries in Kigoma, Tanzania

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Author's contribution

This work was carried out by the author. He designed the study, wrote the protocol, and wrote the first draft of the manuscript. The author also managed the literature searches, and did the field work, he also analyzed the data before writing the first draft report that was presented to members of the department for comments before writing the final manuscript.

Case Study

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ABSTRACT

This study attempted to show the distribution of fishery incomes between fishers and fishing gear owners with particular focus on Lake Tanganyika. The study was cross section case study. Field work took place in Kigoma, Tanzania along the lake from May 2010 to August 2011. Participatory Rural Appraisal (PRA) methodology was used to gather information from both fishers and fishing gear owners. The sample size for the study included 33 fishers and 15 fishing gear owners. The study came up with mixed results that show that both fishers and fishing gear owners generated profit during high catch season (October – March) and experienced low profit and even losses during low catch season. During high catch season, a fisher with the highest monthly income netted Tshs. 5.5 million and that with the lowest netted 0.96 million. With fishing gear owners, the highest monthly income earner netted Tshs. 22.7 million while the lowest income earner netted as much as Tshs. 2.4 million. On the contrary, fishers were hardest hit during low catch season (April – September). Neither was the situation for fishing gear owners appealing; the monthly incomes generated during low catch season were far below those generated during high catch season, with very few exceptions. The study

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concludes that fishers are poor because of unequal distribution of the incomes that were generated. Fishers got very little of what they generated while fishing gear owners, who actually did not do the actual fishing task, took the lion's share of what was generated.

Keywords: Fisheries; fishers; fishing gear owners.

1. INTRODUCTION

Millions of people dwelling within and around Lake Tanganyika basin derive food and livelihood from it. The lake and its environs support a wide array of subsistence and commercial activity as well as a remarkable assemblage of tropical flora and fauna, including highly diverse populations of endemic fish, all within setting of striking scenic appeal. Reynolds et al. [1] pointed out that local fishers are almost exclusively men; generally fall within an average range of 18-50 years; tend to have low levels of formal education (lack of primary school certificate); often originate from places other than their current landing site bases; and generally engage in fishing as their principal job, though are commonly involved in subsistence or combined food/cash crop farming as secondary occupations.

Fishing in the Lake Tanganyika has been the major source of livelihood for men around the basin. Agriculture is also conducted along with fish fishing, however, women are the major stakeholders involved in the agricultural activities. Thus, agriculture is the second income earner for households in the lake basin. The major crops that are cultivated include: Palm oil trees, cassava, beans, maize and bananas. The crops provide the households with food and the surplus is sold to earn money for buying other households needs, including payments of school fees for the children in secondary schools. The basin supplies palm oil for cooking in various market centres in the great lakes region.

The lake is shared by Burundi, Tanzania Democratic Republic of Congo (DRC) and Zambia. Lake Tanganyika lies at 773 m above mean sea level; it is 673 km long, has a surface area of 32900 km² and a maximum width of 48 km. The maximum depth is 1470 m, making it the second deepest lake in the world. The average depth is 570 m and volume is 18800 km³ [2]. The percentage surface areas under jurisdiction of the four riparian states are Burundi (8%), Tanzania (41%), DRC (46%) and Zambia (6%) [3].

There are three recognizable types of fisheries on the Lake Tanganyika: industrial, artisanal and traditional. The industrial fishery started back in 1954 when Greek fishermen introduced the purse seine. The artisanal fishery uses mainly catamarans [4]. The traditional subsistence fishery uses many different gears (gill-nets, hooks and line, scoop-net, traps etc.).

Lake Tanganyika has active fishers that are engaged in artisanal fishing. Available information suggests that artisanal unit owners in Kigoma earn significantly more than their crew laborers do. Most of these unit owners are residents of Kigoma urban. The tenth of thousands of boat owners and fishers active in the harvest sector represent a *first tier* of fisheries employment and income generation. *Secondary* fisheries-generated employment has also to be taken into account. Local processors and traders, long-distant transporters and marketers, and various others who provide services and support at landing sites and throughout the distribution chains are reckoned to number in the hundreds of thousands [5]. Despite fisheries to have been conducted for decades in Tanzania, Kigoma region in particular, fishers' household incomes have remained low and the region has been lagging

behind in development probably because the incomes accrued to both fishers and fishing gear owners have no multiplier effects to non-fishing communities and thus compromising the poverty reduction strategies. One would expect the money generated from fisheries to have a multiplier effect through, say, construction of good houses both for residential and commercial purposes, but very little has been done to that effect. In essence this formed the problem statement for the study.

The general objective of the study was to examine winners and losers of fishery incomes, whether both fishers and fishing gear owners in Kigoma Urban attain a win-win solution from the fisheries business. Specific objectives of this study were: (i) to examine levels of incomes that were shared between fishers and fishing gear owners (ii) to examine the expenditure pattern of incomes that were generated from fisheries (iii) to examine the contribution of the incomes that were generated to poverty reduction.

2. MATERIALS AND METHODS

2.1 Materials

2.1.1 Fisheries and poverty alleviation

Using a new framework combining vulnerability and exclusion as two central dimensions of poverty, Béné and Fried [6] revisits some of the long-standing beliefs about poverty in small-scale fisheries. We argue that the issue of poverty in fish-dependent communities cannot be reduced to a simple correlation between income poverty and fishery dependence. A more thorough analysis is required that must account for the diversity of fishing-related livelihoods and the complexity of causes of poverty, both inside and outside the sector.

According to Béné et al. [7] two opposing views exist in the literature on the potential role that international fish trade plays in economic development. While some claim that fish trade has a pro-poor effect, others denounce the negative effect of fish export on local populations' food security and doubt its contributions to the macro-economy.

Bilame [8] points out that most fishers in Tanzania lacked a saving culture of the income they generated. Fishers were generally poor because they lacked saving culture. The money that was generated was consumed immediately without saving any fraction of it. However, things were different with fishing gear owners; for them the money generated was saved and invested either in the fisheries business or in other businesses such as commercial buildings. This assertion tends to support Béné and Fried [7] that there is widespread poverty in fish-dependent communities. However, Béné and Fried (op cit) do not say anything on the distributional dynamics of the incomes generated. The distribution of fishery incomes between fishers and fishing gear owners, which is centre of this study, is not addressed by Béné and Fried (op cit).

2.1.2 Species, catches and ecology

About 300 fish species recorded in Lake Tanganyika, only six are of commercial importance, contributing to more than 99 percent of total annual catches in weight Munyandorero [9]. These are the small-sized, short-lived and schooling clupeid sardine species, *Stolothrissa tanganyicae* and *Limnothrissa miodon*, and the latid Nile perch species, *Lates angustifrons*, *Lates mariae*, *Lates microlepis* and *Lates stappersii*. The first three latids, also referred to as

large Lates, are large and long-lived and the first one is mid-sized and is of an average longevity.

Lake Tanganyika has two main fishing zones [10], namely the demersal and pelagic. The pelagic water is mainly inhabited by three pelagic and endemic fish species. These are the two sardines (family clupeids)-*Stolothrissa tanganicae*, *Limnothrissa miodon* and a centropomid- *Lates stappersii*. The demersal fishery extends from shoreline down to the oxic-anoxic boundary. It includes the littoral, sublittoral, and benthic zones. There is higher fish diversity in this zone.

O'Reilly et al. [11] study shows that the fisheries of Lake Tanganyika are important source of incomes for its riparian communities. Two categories of fishery exists on the lake, offshore (pelagic) and inshore (demersal). According O'Reilly et al. [11], pelagic fishery has historically been the more one on the lake, yielding over 167,000 metric tons per year. However, because of the influence of climate change that lowers primary productivity of the lake [12] the pelagic fishery is thought to be in decline [13].

Evidence from Lake Tanganyika [14] highlights the ecological consequences of a century of observed regional warming in the lake. They associate warming with a sharpened water density gradient between warmer surface water and cooler deep water which has showed vertical mixing and reduced primary productivity. Further warming is hypothesised to continue these trends. These findings for Lake Tanganyika are supported by O'Reilly et al. [12] who show that the rise in surface-water temperature has increased the instability of the water column. This, combined with lower wind speed, has reduced mixing in the lake and primary productivity may have decreased by about 20 percent accounting for a roughly 30 percent decrease in fish yields.

Lake Tanganyika biodiversity project study [15], points that the lake's unique ecology faces many cross boundary threats including: soil erosion; pollution; over-fishing; and oil and mineral exploration. The most immediate threats to the lake environment are excessive loads of sediments and nutrients caused by erosion in the watershed; industrial and urban pollution, including boat discharges, and intensive fishing with inappropriate methods.

2.2 Methods

2.2.1 Methodology

Participatory Rural Appraisal (PRA) methodology was used. PRA method enables local communities to contribute their indigenous knowledge and experience, skills and labor in planning and implementing their activities that lead to the improvement in their livelihoods [16].

Three types of data using PRA method were collected: *Spatial data*-that gave a sense of location and a view of community problems and opportunities. *Time related data*-that gave information on connections over time. *Social data*-that were collected through interviews regarding socio-economic activities that were being carried out in the fishing beaches. An interesting characteristic of the PRA method is that it stresses the link between technical and socio-economic issues in defining problems and solutions.

The PRA was implemented in a number of specific stages. These were:

- Site selection: the first step was to select the site where PRA would be carried out
- Preliminary visit by the PRA research team. This was done with the purpose of introducing its approach to the concerned community of fishers.
- Data collocation. The third stage of PRA method was data collection.

The types of PRA methods that were employed by this study were:

- Mapping and modelling: these methods were used to map out key changes over time (on a year-to year basis). They were used to show income-generating opportunities and any other sources of incomes in the fishing communities.
- Time lines and trends: the methods were used to map out major changes in the landing sites. The techniques were useful in showing what has happened over time in a given period of time usually one year. Trends in the level of catches in different seasons were observed using this approach.
- Triangulation: Three points of view were the basis of PRA using triangulation method, they included:
 - Tools and techniques: which were the means by which information from the fishers were collected. The tools and techniques included observation of what took place in the landing sites and questionnaires.
 - Units of observation: which were the fishing landing sites, they were observed with view to getting a clear picture of what was happening.
 - Team composition; which composed of field researchers. The team included insiders and outsiders.

Field work for the study took place in between May 2010 and August 2011 and information/data from both fishers and fishing gear owners were gathered in a participatory approach in an attempt to address the main hypothesis of the study that was postulated as: incomes generated from Lake Tanganyika fisheries are unevenly distributed between fishers and fishing gear owners in Kigoma urban.

Fishers (artisanal fishers) were generally poor people who sought employment from fishing gear owners. They travelled from rural areas far from Kigoma municipality to the landing sites seeking employment. Fishers had nothing to offer except their labour power. Fishing gear owners on the other hand owned capital (fishing boats, fishing nets and other facilities that enabled fishing to take place). These fishing gear owners employed fishers not on merit basis but rather on preferential treatment. Fishing gear owner could hardly employ person who was not known to him personally. Thus, not every fisher who sought for employment secured a job. Furthermore, a fisher who secured a job was supposed to abide by the regulations that were set by the fishing gear owner.

2.2.2 Description of the study area

Katonga and Kibirizi Landing sites in Kigoma municipality were the focus of the study. These landing sites were selected because they are the largest landing sites in Kigoma municipality. Furthermore, unlike other landing sites where fishing gear owners live near the landing sites; gear owners in Katonga and Kibirizi were residents of Kigoma urban, although they were necessarily not all born in Kigoma urban. The unit of analysis was a fishing camp

composed of four fishers plus an owner of the fishing gears. Fig. 1 below shows Lake Tanganyika map and the two landing sites that were surveyed.

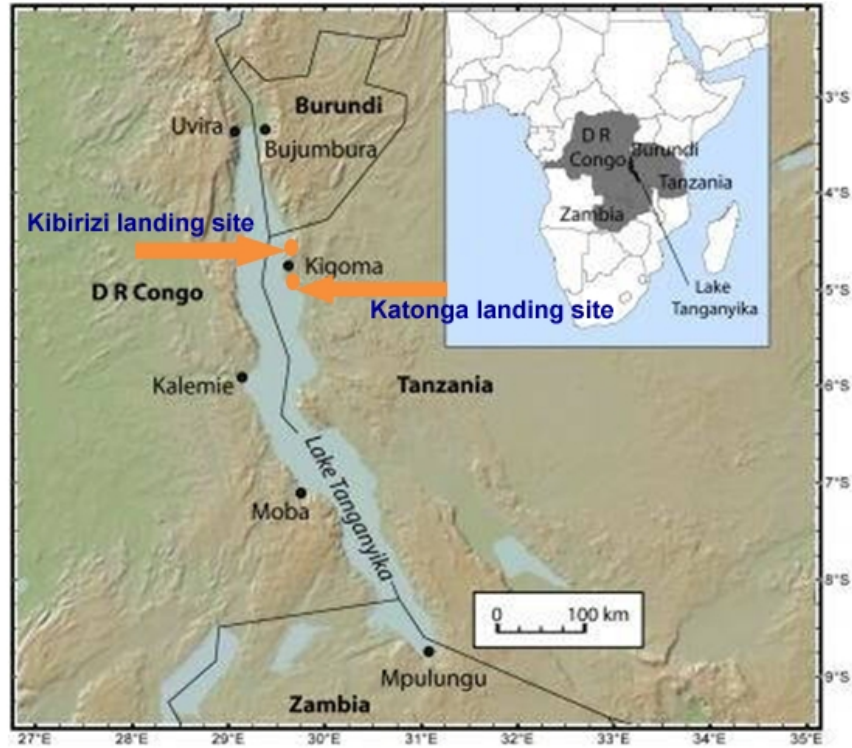


Fig. 1. Location of Kibirizi and Katonga landing sites

People in and around the landing sites that were not directly engaged in fisheries, were engaged in indirect fisheries activities. These activities, among others, included: boat construction and repairing, trading in fish and sardines, trading in perishable goods during morning markets especially vegetables and tomatoes that was done mainly by women, restaurants and tailoring. The respondents that participated in the study are indicated in Tables 1 and 2.

3. RESULTS AND DISCUSSION

3.1 Characteristics of the Respondents

Tables 1 and 2 below show characteristics of fishers and fishing gear owners respectively. In Table 1, all 33 fishers were males. Of the 33 male fishers; 87.8 percent had attained primary education and only 6.1 percent attained secondary education.

Table 1. Characteristics of fishers

Variable	Number/Frequency	Percent
Sex		
Male	33	100.0
Female	0	0.0
Total	33	100.0
Age groups		
18 – 30 years	15	45.5
31 – 40	14	42.4
41 – 50	4	12.1
Above 50 years	0	0.0
Total	33	100.0
Marital status		
Married	31	93.9
Single	2	6.1
Divorced	0	0.0
Total	33	100.0
Level of education		
Primary education	29	87.8
Secondary education	2	6.1
Adult education	2	6.1
Total	33	100.0

Sour: Field survey 2011

With respect to marital status, 93.9 percent of the fishers were married; and 6.1 percent were single. The age group of fishers that was actively participating in fishing was in the range of 18 – 30 years; equivalent to 45.5 percent.

Table 2 shows further the characteristics of fishing gear owners. A total of 15 gear owners were interviewed, out of those, 14 were males and 1 was a widow. Furthermore, all the fishing gear owners were married and had children.

In terms of education, 12 fishing gear owners; equivalent to 80 percent had attained primary education. Those that had attained secondary education represented 13.3 percent; with only 6.7 percent representing those attained adult education.

The kind of fishing technology that prevailed was either catamaran or trimaran. Catamaran involved two big fishing canoes that were tied together and were engine powered, while trimaran involved three fishing canoes that were also engine powered. In either case, fishing nets and lumps were required. Trimarans were commonly used during high catch season.

3.2 Institutional Setup in the Landing Sites

The study has come up with mixed findings on the fisheries activities in the two beaches that were surveyed. In Katonga landing site 18 fishers and 10 fishing gear owners were interviewed and in Kibirizi landing site 15 fishers and 5 gear owners were also interviewed. Each fisher that was interviewed was selected randomly out of four fishers that formed a fishing team. To this end, each fisher selected for interview represented four fishers that formed a fishing team. Incomes that were generated by fishers and fishing gear owners are indicated in Tables 3 and 4.

Table 2. Characteristics of fishing gear owners

Variable	Number/Frequency	Percent
Sex		
Male	14	93.3
Female	1	6.7
Total	15	100.0
Age groups		
18 – 30 years	0	0.0
31 – 40	6	40.0
41 – 50	7	46.7
Above 50 years	2	13.3
Total	15	100.0
Marital status		
Married	14	93.3
Single	0	0.0
Divorced	0	0.0
Widowed	1	6.7
Total	15	100.0
Level of Education		
Primary Education	12	80.0
Secondary Education	2	13.3
Adult Education	1	6.7
Total	15	100.0

Sour: Field Survey 2011

The institutional setting in the two landing site was similar. The fisher community both in Katonga and Kibirizi had one organization called Kigoma Fishermen Association (KFA). It coordinated all fishing activities in the two beaches. Leaders of the association were directly answerable to fishers. Within each landing site, there was a local leadership with institutions that were charged with various responsibilities. There were institutions that were charged with overseeing security, cleanliness and environment. Furthermore, there was also another institution that was charged with the responsibility of delivering information on various issues such as meetings and death incidents.

On the issue of governance, each fishing camp had its own governance. However, the owner of the fishing gear had a more say on how the fishing camp was to be governed. The camp governance was mainstreamed in the overall beach/landing site governance. For example, a fisher was supposed to show respect to his gear owner and abide by the rules and regulations of the fishing camp.

Fishers in the two landing sites were permanent workers, although they had no formal contracts with the fishing gear owners. In fact, circumstances enabled a fisher to be a permanent worker since, in most cases, he found himself in a situation with debts that were not recovered. The debts were accumulated in low catch season and were supposed to be paid to the gear owner. At this juncture, it should be understood that variable costs (food, petrol, and kerosene), were entirely the responsibility of fishers. Fishing gear owners paid for the variable costs at the beginning of the dark-moon phase and they were supposed to be recovered by fishers at the end of each dark-moon phase when sharing money generated. In most case fishers were unable to recover all the debts and were forced to continue working with view to recovering all the debts.

3.3 Monthly Income Accrued to Fishers and Gear Owners

Table 4 indicates net monthly income accrued to fishers and fishing gear owners during high catch season (October-March). Gear owners took the lion's share of the net income that was generated, but still fishers also netted relatively higher incomes during high catch season. The net income that was generated was either divided into three or two parts. For fishers in the three category case, the owner of the gear took two thirds and one third was shared equally by the four fishers that formed the fishing team. Under such scenario a fisher could hardly emancipate himself from becoming a fisher to fishing gear owner. That is why it was very difficult for a fisher to own fishing gears; the distribution of the income that was generated did not favour fishers but instead favoured the fishing gear owners who did not participate in the actual fishing work. With the fifty-fifty percent case, the owner of the gears took half (fifty percent) of the net income that was generated and the other half was divided equally among the four fishers.

Fishers spend the whole night fishing, however, upon landing the negotiations of price for the catch was done by the gear owner. In most cases, the catch was bought by the gear owner who then sold it to other businessmen, and in so doing the gear owner made double profit: Profit from the catch upon landing from fishing and profit realised from selling the catch to other business people.

Net monthly was calculated by subtracting total monthly production costs from total monthly revenues (sales). Production costs included mainly food that was eaten by fishers, petrol (for powering engine to and from fishing) and kerosene that was used as a source of energy for lighting fishing lamps during dark-night while fishing. In fact, kerosene took largest share of the total fishers' production costs in the sense that fishing gear owners bought the energy at market price and sold it to fishers at a price above the market price. In way a fishing gear owner realised profit even before the actual fishing took place.

During high catch season, a fisher that earned highest monthly income netted Tshs. 5.5 million and that with lowest netted Tshs. 0.96 million. Generally, 15 fishers each netted monthly income that ranged between Tshs. 1 million and Tshs. 3 million. Other 17 fishers each netted monthly income that ranged between Tshs. 3.01 million and Tshs. 6 million. Of the 33 fishers that were covered by this study, it is only 1 fisher who earned monthly income that was below 1 million Tanzania shilling.

With respect to gear owners, the highest monthly income earner netted Tshs. 22.7 million and the lowest income earner netted Tshs. 2.4 million. Of the 15 gear owners, 11 each netted monthly income that ranged between Tshs. 3.1 million and Tshs. 12 million. It is only 3 gear owners that each earned monthly income that ranged between Tshs. 15 million and Tshs. 23 million. Generally speaking, the gap between income earned by fishers and gear owners was wide.

Table 3. Monthly variable costs that were incurred by fishers and fishing gear owners (in million Tanzania Shillings¹)

	1.0 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0	Total
Fishers	-	1	28	4	33
Gear owners	1	6	8	-	15
Total	1	7	36	4	48

Source: Field survey 2011

Variable costs, namely food, petrol and kerosene were relatively higher for fishers than for fishing gear owners. What took place on the ground was that fishing gear owners bought petrol and kerosene from oil companies in Kigoma at a market price and sold the energy at a higher price to fishers on credit, with view to raising the money at the end of fishing season, usually at the end of dark-moon phase. Fishing gear owners bought one litre of petrol at Tshs. 1850 and sold it to their fishers at Tshs. 2200.

Again, one litre of kerosene was bought at Tshs. 1250 but was sold to fishers at a price between Tshs. 1300 and Tshs. 1350. However, it should be noted that during data collection in the field, fishing gear owners reported market prices for both petrol and kerosene. This explains why fishers reported inflated variable costs in a month than their gear owners.

Table 4. Net monthly income accrued to fisher and gear owners in high catch season (in million Tanzanian Shillings)

	Below 1	1 - 3	3.1 - 6	6.1 - 9	9.1 - 12	12.1 - 15	15.1 - 18	18.1 - 21	21.1 - 24	Total
Fisher	1	15	17	-	-	-	-	-	-	33
Gear owner	-	1	4	3	4	-	1	-	2	15
Total	1	16	21	3	4	-	1	-	2	48

Source: Field survey 2011

Table 5 shows net monthly income accrued to both fishers and gear owners during low catch season (April-September). Generally, the incomes were far below not only for fishers but also for the fishing gear owners. Of course, fishing gear owners were relatively far better than their fishers in terms of the monthly incomes. Of the 33 fishers, 5 fishers each operated at a loss and 27 fishers each earned income that was less than 1 million. It is only 1 fisher that generated more than 1 million; in fact this fisher netted 1.04 million.

Table 5. Net Monthly income accrued to fisher and fishing gear owners in low catch season (in million Tanzanian Shillings)

	-1-0	0.1-1	1.1-3	3.1-5	5.1-7	7.1-9	9.1-11	Above 15	Total
Fisher	5	27	1	-	-	-	-	-	33
Gear owner	4	2	3	2	1	-	1	2	15
Total	9	29	4	2	1	-	1	2	48

Source: Field survey 2011

¹The exchange rate of 1 US Dollar to Tanzanian Shillings when this study was done was 1\$:1580 Tanzania Shillings.

On the side of fishing gear owners, as shown in Table 5, only 4 fishing gear owners operated at a loss. 2 gear owners each earned monthly income that was less or equal to Tshs. 1 million. 6 more fishing gear owners each netted income that ranged between Tshs. 1.01 and Tshs. 6 million. It is only 2 fishing gear owners that each netted monthly income that was above Tshs. 15 million. In fact, one gear owner generated Tshs. 19.6 million and the other one netted Tshs. 28.2 million, which was over and above the highest income that was generated during high catch season.

One of the explanations to this paradox could be that fishing gear owners might have obtained good/high prices for the catch upon landing from fishing. The income that was generated was not necessarily reflected in the quantity of fish that was caught but rather the prices that prevailed during the time of scarcity.

To this end, one may be tempted to conclude that fishers and fishing gear owners create wealth during high catch season. However, due to losses that are incurred during low catch season, the impact of such created wealth is diluted. In the first place fishers accumulate huge debts in low catch seasons; the fishing gear owner has no any other option of recovering his money spent on variable costs except waiting for good/high catch season to come. It is during high catch season a fishing gear owner can recover accumulated debts.

To this effect, the losses that are incurred by fishing gear owners will always be recovered at certain point in time. The losses are just temporary debts that are meant to be recovered when good/high catch season comes. What this implies is that all losses that are incurred in the course of fishing are debts to fishers that will have to be recovered by fishers during high catch season. Losses that fishing gear owners could not recover emanated from piracy incidents that took place in Lake Tanganyika. There were fishing gear owners who had been rendered to bankruptcy because their fishing gears were seized by pirates from the war-torn country of Democratic Republic of Congo (DRC).

Thus, the higher net monthly income generated by the fisher during high catch season does not necessarily reflect what he actually receives. The fisher is supposed to remit the accumulated debts to his gear owner and the money that is left goes into the pocket of the fisher. Furthermore, it should also be noted that the higher incomes experienced during high catch season are not experienced all along the period of high catch season. Within the high catch season there are some variations in the level of catches.

Generally, household incomes for fishers were very low particularly during low catch season. Since fisheries activities had spill-over effects in the communities around the landing sites, their incomes followed a similar pattern of the two catching seasons. That is during high catch season the nearby communities engaged in trading of fish and other agricultural products such as vegetables, tomatoes, cassava and palm oil. Trading of such goods generated money for communities around the two landing sites. However, during low catch season trading was not as effective as it was supposed to be in high catch season and the incomes of the communities in the neighbourhood of the two landing sites were far below.

3.4 The Implication of the Incomes that Were Generated from Fishery

The implication of the incomes that were generated has to do with incomes that were generated by both fishers and fishing gear owners. During high catch season, fishers generated high incomes and the money they received (net income) was equally high.

However, during low catch season the situation was reversed; very little money was netted. In fact, some of the fishers operated at very huge loss.

Since both high and low catch seasons had an equal duration period for fishing i.e. each season has six months. Incomes were higher only in one half of a year and the other half incomes were very low. Money generated by fishers during high catch season compensated for low incomes in low season. Since part of the money generated by fishers during high season was used to pay for the accumulated debts in low catch season; it was obvious that the disposable income for a fisher household was reduced. This scenario tries to explain the vicious circle of poverty in the fishing communities. Fishers are poor because they are fishers; they can hardly get out of the vicious circle of poverty. They are perpetually working for the fishing gear owners. Under such circumstances it is equally difficult for fishers to save part of the generated incomes since what could be saved was spent on paying the accumulated debts. To this end, the contribution of the incomes that were generated by fishers could hardly reduce poverty due to unequal distribution of incomes between fishers and fishing gear owners.

Generally, gear owners were earning higher incomes. Even during low catch season, except for 4 gear owners, that encountered losses, the other 11 gear owners, each generated money that could cater for both consumption (household needs) and investments. After all the losses that were encountered by fishing gear owners were just debts that meant to be recovered in the next good season/high catch season.

At this juncture, it may be concluded that there was uneven distribution of incomes that were generated between fishers and fishing gear owners. This confirms the hypothesis of the study that postulated that incomes generated from Lake Tanganyika fisheries are unevenly distributed between fishers and fishing gear owners.

3.5 Expenditure Pattern of the Incomes

Fishers spent their incomes from fisheries mostly on food, medication and house construction. Half of the fishers reported to have spent their incomes generated on house construction both for residential. It should be noted at this juncture that the kind of houses referred to are simple houses, sometimes with raised up with trees and roofed with grasses. All fishers admitted that the lion's share of the income generated was spent on food for their households. This is a reality because fishers have large families. Furthermore, medication did also take large share of the income that was generated by a fisher. Of the 33 fishers, 30 of them reported to have been spending part of the incomes generated on treating household members. Although fishers had large families, they did not indicate that they were paying school fees and other associated costs for their children in schools. This indicates that fishing communities did not give education for children a priority. This remains a big challenge for fisher communities with regard to sending children to schools and in particular secondary schools.

As to whether the incomes from fisheries had impact on poverty alleviation, all fishers admitted somewhat that incomes from fisheries were helping them to reduce poverty. Although in a real sense fishers and their families remained poor. However, it was a different scenario for fishing gear owners; for them they were creating wealth particularly during high catch season. But again, those fishing gear owners, whose fishing gears were seized by pirates, were of the different views. In fact, there were fishing gear owners who once were

doing well in the fisheries businesses; but were rendered helpless simply because their fishing gears were seized by pirates.

Unusual phenomenon with fishers in the two landing sites that were surveyed was that; of the 33 fishers none took alcohol. They all reported to have not been taking alcohol; it was difficult for this study to establish the truth as to whether they were not taking alcohol or otherwise.

3.6 Challenges Facing Lake Tanganyika Fisheries

Both fishers and gear owners raised challenges that compromised fisheries in Lake Tanganyika. These challenges, among others, included:

Piracy: fishing gear owners and fishers had serious concerns that the rate of piracy incidents were increasing at an alarming rate and felt that the government was doing very little to protect them while fishing. Fishers were the hardest hit since they risked their lives once a fishing boat was seized. Pirates came from the neighbouring country of DRC and had rendered many fishing gear owners property less. Pirates went away with all the fishing gears, once they seized the fishing boat.

Inflated prices of petrol and kerosene: fishers were of the view that gear owners were not doing a fair deal with them. They bought petrol and kerosene at a market rate price but sold the energy to them at inflated prices.

Unequal income distribution: the mechanism that was used to distribute the income generated between fishers and fishing gear owners needed mitigation measures. Fishers were primarily the producers of the income but ended up getting very little of what they produced.

4. CONCLUSION

This study went a long way in showing what fisheries is all about in the Lake Tanganyika with specific reference to the two landing sites found in Kigoma urban. Incomes for both fishers and fishing gear owners varied substantially, the fishers who did the actual fishing work ended up getting less than what the fishing gear owners netted. This was true for both high and low catch seasons, although during high catch season both fishers and fishing gear owners experienced higher incomes than in low catch season. Again, there was no fair deal in distributing incomes that were generated between fishers and fishing gear owners. Fishers ended up getting very little of what they generated and could hardly reduced poverty in their families. Fishing gear owners took the lion's share of the incomes that were generated due to unequal distribution of those incomes. Thus, fishing gear owners were relatively far better than fishers in fighting against poverty.

On account of the mixed results that this study has come up with, mitigating measures in terms of policy formulation were highly needed. Policy implications on Lake Tanganyika fisheries should address the following:

Government curbing piracy incidents: Fishers and gear owners had all along cited pirates to have affected their efforts of expanding their fisheries businesses. They all reported pirates

in Lake Tanganyika to have rendered many gear owners in Kigoma into poverty. They appealed to the government to take deliberate efforts to stop pirates.

A balanced win-win fisheries business: There was a need for a local government in Kigoma to intervene on the issue of inflated prices of petrol and kerosene. Fishers were forced by their gear owners to buy petrol and kerosene at inflated rates. Fishing gear owners bought the two items at market rates from oil dealers and sold to their fishers on credit at higher prices. Fishers were not happy at all, the local government needed to intervene with view to balancing the situation.

Along with the *balanced win-win business*, there was the whole issue of granting subsidies to the fisheries sector. Fishing gears were very expensive; the government could grant subsidies to fishers to enable them start their own fishing businesses.

Equal distribution of net incomes that were generated: Since there was unequal distribution of incomes generated between fishers and fishing gear owners, there was a need to mitigate the situation with view to attaining an equal income distribution. After all, fishers were supposed to be remunerated accordingly because they did the actual fishing task. Under such a scenario, the government should intervene in order to help fishers get the dues they deserve.

COMPETING INTERESTS

The author has declared that he has no competing interests.

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