Fisheries and Aquaculture Journal
ISSN: 2150-3508

Misganaw and Getu, Fish Aquac J 2016, 7:3
DOI:10.4172/2150-3508.1000174

Research Open Access

Marketing and Livelihood Contribution of Fishermen in Lake Tana, North Western Part of Ethiopia

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Received date: 18 March, 2016; **Accepted date:** 18 July, 2016; **Published date:** 25 July, 2016

Abstract

The study area was conducted in the North Western part of Lake Tana which are three commercially fish species are found (Tilapia, Catfish and Barbus species). The study was focused on fish production and marketing system. Three landing sites were selected purposively for the survey based on the experience of fishing practices. A total of 95 fishers were interviewed: from each landing site ("Delgie 27", "Goregora 35" and "Infranze 33."). The data collection was conducted from October 2012-June 2013. This consists of both form primary and secondary source. A simple random sampling technique was employed covering fishers. Descriptive and statistical package for social sciences (SPSS V-17) was used in analysing. From sample respondents, 100% were reed boat owners. All sampled fishers from the three fish landing sites were used to catch Nile tilapia (*Oreochromis niloticus*), African catfish (*Clarias gariepinus*) and large barbs (*Labeobarbus* spp.). Fishing, crop production, animal husbandry, petty trade and causal labourer contributed 60%, 21%, 12%, 2% and 5% of fisher's livelihood, respectively. Fisheries development interventions should be aimed at addressing both fish production and marketing problems. The study further suggested that fish quality, fish supply, education and training, licensing of the fishers and improving access to services should receive due attention to improve fish marketing and production system.

Keywords: Fish; Fishers; Lake Tana; Marketing; Production

Introduction

Fishery industry provides a vital source of food, employment, recreation, trade and economic well-being for people throughout the world. Fishery is the most important livelihood option for the inhabitants. It is threatened with problems of overexploitation, environmental degradation and consequently unrecovered resources resulting in loss of its potentials. These resources, although renewable, are not infinite and need to be properly managed, if their contribution to the nutritional, economic and social well-being of the growing world population is to be sustained [1]. Ethiopia depends on the inland waters for the supply of fish as a cheap source of animal protein. It has a number of lakes and rivers with substantial quantity of fish stocks. The total area of the lakes and reservoirs stands at about 7000 to 8000 km^2 and the important rivers stretch over 7000 km in the country [2,3].

Lake Tana contains 28 types of fish species, from this 21 are endemic [4-6] and it is the home of a variety Labeobarbus species [7,8]. But, still there are only three types of fish species that joined the market. These are the Nile tilapia, *Oreochromis niloticus*, the African catfish, *Clarias gariepinus* and *Labeobarbus* species. The other fish species, Beso (*Varicorhinus beso*) contribute very low percentage and mainly found in rivers [9]. The fishery of the Lake Tana expanded through the introduction of modern technology such as the modernized boats with 100 m gillnet. Traditional fishing activity is also growing as provision of modern gillnets is increasing for small-scale fisheries. Thus, fishing is becoming more important both economically and socially for the low-income rural population around the Lake.

At present, the Lake Tana fishery is open access in practice and it is with no well-developed of the fish market system. Besides, illegal trading, absence of clear market policies, fishing during peak spawning and breeding time, lack of standard and grades of fish and poor supply of export market are common problems in the region. Furthermore, weak legal systems, lack of institutions to plan, implement and evaluate fish market development, presence of too many intermediaries, lack of vertical and horizontal coordination on fish production and the market centres are some of the core problems to be mentioned. Despite the significance of fish in the livelihood of many fishers and income generation, fish in the study area has not been given due attention. In Ethiopia, the fishery research activities mainly focused on biological related studies and lesser extent to fishing technology and marketing issues [9]. Systematic and adequate information on the process of market competition and on market structure, conduct and performance was not well identified. Furthermore, fish marketing channels and their characteristics livelihood have not yet been studied. Hence, this study attempts to fill in these gaps. The objective of the study was fish production and marketing system in North Western part of Lake Tana.

Materials and Methods

Study site

The study site was conducted in three fishing landing sites along North Western part of Lake Tana. It is the Largest Lake in Ethiopia. The sites were Enferanz, Delgie and Goregora. The fish market was selected on the basis of the size of operation, number of forward and backward linkages and volume of daily trade on site selection criteria.

Data collection

The study was conducted from October 2012-June 2013. Both primary and secondary data sources were used. In this study, random sampling techniques were employed to select fishers. A total of 95 fishers were interviewed: from each landing site ('Infranze 33", "Delgie 27" and "Goregora 35").

Data analysis

In this study, both descriptive and econometric methods were used to analyse the data. To address the household level marketable supply determinants, a Regression Model was used. Linear Ordinary Least Squares (OLS) Regression has been fitted to analyse and estimate supply of fish in North Western gulf of Lake Tana. According to the model OLS regression [10] can be specified as in the following.

$$y_i = b_o + b_i x_i + u_i$$

where, y_i=Market supply of fish, b_o=Intercept, b_i=Coefficient of ith explanatory variables, x_i=A vector of explanatory variables and u_i =Disturbance term.

The hypothesized independent variables for supply function include:

Y=f (price, inputs, education level, fishing trip, gillnet number, family size, non-fishing income source, fishing ground distance, boat type, distance to market, age and credit services).

Results and Discussion

Demographic characteristics of sample fishers

Fishers were diversified in their demographic aspect (sex, age, marital status, education level and family size). All respondents were male and 81.1% were married and the rest 18.9% were not married. According to Demessie in Lake Tana fishery, fishing is observed totally as men's duty; while the post-harvest activity and marketing seem to be almost women [9]. Most of those married respondents bear responsibility to one or more dependants under them. The overall mean family size was 3.63 with a minimum of 1 and maximum of 8 (Table 1).

Variable	Enferanze		Delgie		Goregora		Total		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F-test
Age	35.56	4.04	33.56	10.09	32.56	7.2	33.9	7.11	1.233
Family size	3.9	1.54	3.43	2.54	3.5	2.1	3.63	2.06	0.571
Fishing experience	14.8	7.38	11.46	8.08	14.08	6.32	13.45	7.26	2.084

Table 1: Demographic characteristics of sample fishers (N=95). Source: Own survey result 2012/2013.

Education facilitates the person with ability to do basic communications for business purpose. Most of the respondents involved in this could at least read and write (Table 2). This indicates that the fishing activity is open not only for poor and illiterate communities but also for students and others to get job opportunity after completing secondary school. These groups could be able to interpret market and other information better than those who have less or no education.

Livelihood contribution of fishers

The majority of respondents in the three districts ranked fishing as first priority source of income for the family and followed by income generated from animals and animal products. Trading and labour although are less important as source of income, trading appears relatively important. Analysing the livelihood of the respondents gave an overview of the status and the relevance of fisheries in contributing to the livelihood of the fishers. Of the sampled fishers (Figure 1) 60%, 21%, 12%, 2% and 5% were engaged in fishing, animal husbandry, crop production, petty trade and causal labourer, respectively. Fishing is indicated as the first major source of livelihood for 60% of the fishers and Animal husbandry the second source of livelihood for 21% of the fishers and the third was crop production 6%. Fishing contributes 64.6% [9] and 70% [11] of income among the sampled respondents. This shows fishing involved around the Lake Tana to be one of the major livelihood contribution of among landing sites.

Fishing practices and fish production

All fishers from the three fish landing sites were used to catch tilapia, catfish and *labeobarbus* species. 100% fishers were associated with reed boats for fishing. From the total respondents, fishers working with the reed boats have full owner ship rights over both the small vessels and gears. Fishers who are working with reed boat were estimated to have average of 6.5 gillnet in all fishing landing sites i.e., mean of 6.6 Inferanze and 7.7 for Delgie and 5.3 for Goregora. It was found that fishers spend 18 to 25 days (22 days, on average) per month or 9.09 month per year on fishing (Table 3). According to Demessie fishing was about 257 and 300 days, but the survey result it was about 272.7 days per year for reed boats [9].

Fishers working with reed boat were estimated to produce tilapia, catfish and labeobarbus species rank first to third, respectively. The fish species composition of sample fishers supplied to market in North Western part of Lake Tana was 50%, 30% and 20% of Nile tilapia, *Labeobarbus* species and catfish respectively (Figure 2). According to Abebe Getahun and Tewabe the species composition of Lake Tana is found to be 64%, 21% and 15% for Nile tilapia, catfish and *Labeobarbus* species, respectively [12,13]. Both results indicates sharp decline of the endemic *Labeobarbus* species (reed boat fishers) which needs serious attention for the sustainable development of Lake Tana fishery.

Citation: Misganaw K, Getu A (2016) Marketing and Livelihood Contribution of Fishermen in Lake Tana, North Western Part of Ethiopia. Fish Aquac J 7: 174. doi:10.4172/2150-3508.1000174

		Sampled fishers				
		Enferanze	**Delgie**	**Goregora**	**Total**	**%**
Sex	Male	33	27	35	95	100
	Female	0	0	0	0	0
	Total	33	27	35	95	100
Education level	Illiterate	4	4	13	21	22.1
	Read and write	10	2	8	20	21.1
	Primary school education	14	18	10	42	44.2
	High school and preparatory	5	3	4	12	12.6
	Total	33	27	35	95	100
Marital status	Single	7	6	5	18	18.9
	Married	26	21	30	77	81.1
	Total	33	27	35	95	100

Table 2: Socio-economic characteristics of sample fishers.

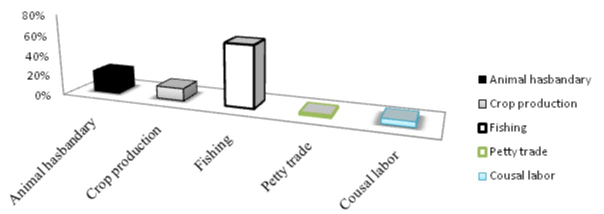

Figure 1: Major income sources for sampled fishers.

Fishery	**Name of landing site**			
	Inferanze	**Delgie**	**Goregora**	**Total**
Average monthly trip/year for reed boat	9.31	7.1	10.86	9.09
Reed boat average gillnet number/ fishers	6.6	7.7	5.3	6.5

Table 3: Average monthly fishing trip per year and average gillnet number/fishers in different landing sites.

Marketable supply of fish and its determinants

Among the 12 predictor variables, eight were found to significantly affect the fisher's level marketable supply (Table 4). Of the predictors variables; non-fishing activity sources (petty trade and casual labour), educational level, fishing trip per year, distance from fishing ground in hours, credit supply for fishing, average selling price of fish (tilapia, catfish and *Labeobarbus*) and number of gillnets were significant variables.

Distance from fishing ground (Fish-ground): A continuous variable that was found significant ($P<0.01$) is distance from fish landing site that came up with positive signs against the expectation. As distance from landing centre to fishing ground increased by 5.6 hours, fish production increased by 0.003 (or 0.3%) due to less gear competition in the fishing ground.

Age: Age of the fishers, a continuous variable showed no significance ($P>0.05$), was taken as one of the explanatory variables came up with positive signs against the expectation. As an individual stays long, he will have better knowledge and will decide to allocate more size mesh, produce good quality fish and supply more.

Education level (Edu-level): This variable that was found significant ($P<0.01$) measured using formal schooling of the fishers and predictors to affect marketable supply positively. This is due to the fact that fishers with good knowledge can adopt better practices than illiterates that would increase marketable supply. Holloway argued that education had positive significant effect on quantity of milk marketed in Ethiopian highlands [14].

Income from the non-fishing sources (Income-Source): It is continuous variable measured in percentage. Petty trade was one of the significant variables ($P<0.05$) but in contrary to the proposed direction of influence and causal labour was one of the significant variables ($P<0.01$) affect marketable supply positively.

Fishers own consumption (Consumed-year): A continuous variable that was found no significant ($P>0.05$) contrary to the proposed direction of influence. As fishers own consumption in kg per year increased by 0.042 kg the probability to participate in fish supply market decrease by 0.093 (9.3%).

Variable name	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Fishing-ground	5.7	1.9	0.2	3.0	0.003**
Age	0.3	0.3	0.1	1.3	0.209
Educational level	4.0	1.1	0.3	3.7	0.000***
Land-owned	9.2	5.7	0.1	1.6	0.108
Animal husbandry	0.2	0.3	0.1	0.8	0.432
Petty trade	-0.7	0.3	-0.2	-2.3	0.026*
Casual-labor	1.1	0.3	0.3	3.5	0.001**
Consumed –year	-0.04	0.0	-0.2	-1.7	0.093
Avg-selling price	-6.001	2.691	-0.237	-2.230	0.029*
Credit-supply	0.001	0.000	0.378	4.714	0.000***
Fishing – trip	-3.032	1.132	-0.221	-2.679	0.009**
Gillnet – No	1.494	0.299	0.628	5.002	0.000***
Constant	7.081	14.694		0.482	0.631
R2 /R Square/	0.664				
Adjusted R Square	0.611				
F Value	12.67				

Table 4: Determinants of fish marketed surplus (OLS result). Dependent Variable: Volume of fish production for market supply. **Note:** *** represents significance at 0.1%, ** at 1% and * at 5%.

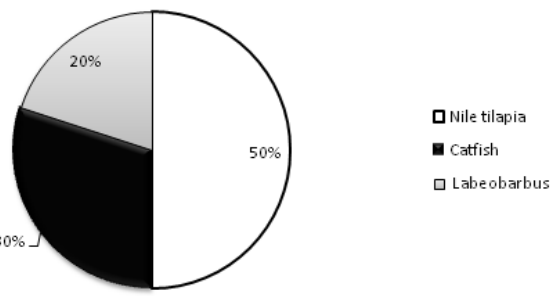

Figure 2: Fish species composition from the sampled reed boat fishers.

Average selling price of fish (Avg-sell): It is one of the continuous variables that was found to be significant (P<0.05). Tomek argued that the product price has direct relations with marketable supply and hence it was expected to affect the fisher's marketable supply of fish [15]. The average selling price decrease by 6 Birr fish production supply to the market decrease by 0.029 (2.9%).

Access to credit (Credit-Supp): Access to credit is measured as continuous significant variables (P<0.01) and is expected to influence the marketable supply of fish positively on the assumption that access to credit improves the financial capacity of fishers to buy more motorized and improved fishing gear, thereby increasing fish production. As the access to credit increased by one, fish supplied to market increased by one quintal.

Working month for fishing (fish-trip): Month for fishing was one of the significant variables (P<0.01) but in contrary to the proposed direction of influence. As can be understood from the results to participate in fish production increased by 0.009 (or 0.9%) when the working month for fishing decreased by three month. This indicates as fisher's increased working month due to traditional reed boat has less operational cost than commercial motorized boat. Fisher's tendency to use reed boat, resulted in less supply.

Number of Gillnet (Gillnet-No): Gillnet number was also another variable found highly significant (P<0.01) to influence the volume of fish supplied to market. It came up with positive sign and it was as expected. As the number of gillnet increased, fish supplied to market increased.

Conclusions

In the North Western part of Lake Tana significance of fish in the livelihood of many fishers and income generating fish in the study area. All sample fishers from the three fish landing sites are used to catch tilapia, catfish and *Labeobarbus* species. The fishers respondents used for fishing with 100% had been using the reed boats for fishing. Fishers said that fish production decrease from year to year due to the use of illegal fishing practice (catch undersized fish by using narrow mesh size), fishing during peak spawning and breeding season, deforestation of vegetation around the Lake and lack of attention. Policy implications are suggested so as to be considered in the future intervention strategies which are aimed at the promotion of fish production and marketing in the study area in particular and in the country in general.

Acknowledgement

The authors would like to thank the University of Gondar, Research and community core process for providing fund.

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