

The role of fishery livelihood security of fishing communities around lake Ziway, Eastern Showa Zone, Oromia Regional State, Ethiopia

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Abstract

This study assesses the role of fishery in livelihood security of fishing communities in and around Lake Ziway. It is based on a sample of 125 households randomly selected from seven landing sites of the Lake. Focus group discussions, key informant interviews and personal observations were used to collect data for the study. The study results show that fishing technology on Lake Ziway is artisanal in nature and makes use of traditional rafts and wooden manual boats. The majority of the fishermen are part-time who are also engaged in multiple activities such as cereal production and livestock rearing to sustain their livelihoods. The study also shows that fish contribute to livelihood security by both serving as a major food item and by providing cash income ultimately used for the purchase of a variety of goods and services. Major challenges that impinge on the activity include backward and antiquated fishing equipment, reduced catch of targeted species, increased distance to fishing sites, limited access to credit, and lack of developed processing technology among others. Thus, if some or all of the challenges are tackled, fishing can become an economic pillar of livelihood security in the study area

Keywords: livelihoods security, livelihood assets, artisanal, fishing communities, Lake Ziway, Ethiopia.

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Introduction

Fishing is an important source of subsistence and income and thus significantly contributes to livelihood security for a large number of households in Africa (Tvedten and Hersoug, 1992; Bene, 2006). According to Ellis (2000) livelihoods comprise the capacities, assets (natural, physical, human, financial and social capitals) and the access to these mediated by institutions and social relations that together determine the living gained by the individual or households. They are considered sustainable when they can continuously withstand and overcome constraints and shocks, and maintain or strengthen capacities and assets without undermining the natural resource base.

Livelihood security on the other hand refers to adequate and sustainable access to income and other resources to enable households to meet basic needs (Frankberger, 1996). This includes adequate access to socioeconomic infrastructure and time for community participation. The risk of livelihood failure determines the level of vulnerability of a household to income, food and nutritional insecurity. Livelihoods are secured when households have secure ownership of, or access to, resources and income earning activities, including reserves and assets, to off-set risks, ease shocks and meet contingencies (ibid).

In Ethiopia, fishing is carried out on almost all water bodies, with commercial production concentrated in the Rift Valley Lakes of Chamo, Ziway and Tana. According to FAO (2008), the total number of fishermen is estimated at 15,000 of which about 5,000 are active and the remaining being part-time or occasional fishermen. In addition to this, 20,000 people are estimated to be engaged in ancillary activities related to fishing.

The Ethiopian Government enacted fishery regulation in 2003 under the proclamation No.315/2003 on the sustainable utilization and development of the sector (Negarit Gazeta, 2003). The objectives of this proclamation are:

- To conserve fish biodiversity and its environment as well as to prevent and control over exploitation of the fisheries resource;
- To increase the supply of safe and good quality fish and to ensure a sustainable contribution of the fisheries towards food security and
- To expand aquaculture development.

Although there are a considerable number of studies that have been done on fisheries in Ethiopia, it seems the majority of them tend to focus on the biological aspects of the resource (Zenebe, 1998; Getachew, 1993) while others relate to management of fishery resources (Felegeselam, 2003; Gordon et al., 2007). There is a dearth of studies that specifically link fisheries with livelihoods security (EARO, 2006). This is the gap that this study attempts to fill.

The study utilizes the case study approach to assess the role played by Lake Ziway in sustaining the livelihood of fishing communities in the surrounding area. Lake Ziway, is one of the most northern parts of Rift Valley Lakes and is located in Oromia Regional State of Ethiopia. It is situated about 160 km south of Addis Ababa. The Lake has a surface area of 434 square kilometers with a maximum extension of 20 by 25 kilometers. It has a mean depth of 2.5meters with some areas (especially near the islands) showing deeper gorges of up to 8meters (Siraj, 1998). The Lake has five islands but fishing is carried out on *Tulu Guddo*, *Tsedecha* and *Funduro* islands. The remaining two islands, *Debresina* and *Gelila*, are not inhabited and are more important nesting and sanctuary areas for a variety of bird

species. The Lake is surrounded by farming communities and small and medium scale irrigation farms which utilize water from the Lake (ibid).

The Lake is selected for study because it is one of the most commercialized lakes of the country and has the largest number of fishermen. The Lake fisheries have also benefited from Phase I (1981-84) and Phase II (1991-88) of the fishery development projects assisted by European Development Fund. Thus it is the most developed with maximum contribution of the all lakes in the Oromia Region (FAO, 2008).

The study adopts the livelihoods framework to guide its assessment of the role played by fishery in the attainment of livelihood security by fishing communities that live around Lake Ziway. The livelihood framework is selected because it brings together assets and activities and also shows what regulates and constrains households secure their livelihood from a given activity in this case, fishing activity (Ellis, 2000; Allison and Horemans 2006).

Within this context, the specific objectives of this study are to:

- Describe the household livelihood assets of the study area;
- Determine the nature of fishing and other activities;
- Assess the contribution of fishing to livelihood security;
- Identify challenges of the activity in achieving livelihood security and suggest ways to enhance it.

This study is significant in that the sector has been identified by the government as one of the areas that can contribute to the reduction of food insecurity by the country (Negarit Gazeta, 2003). Thus, the results of the study will provide feedback to policy makers on the contribution of fishing

to livelihood security with the hope that it can guide policy in this area. To the academicians, the study, by providing some insights into the role fisheries play in livelihood security, adds useful knowledge to the current running livelihoods and food security dialogues.

Methodology

This case study is mainly based on primary data gathered through a cross-sectional survey of sample households to assess the livelihoods and food security roles of fisheries in the area under investigation. The target population of this study are fishing communities around Lake Ziway and the subjects of the study are fishing household heads selected from three *weredas* (districts) bordering the Lake: Adami Tulu Jido-Kombolcha, Ziway Dugda, and Dugda Bora. Eight landing sites were purposively selected based on their accessibility. Then, a total of 125 fishermen were randomly selected from these landing sites. The selected fishermen are full-time, part-time, or occasional ones.

Primary data are generated from survey questionnaires, focus group discussions, key informant interviews and personal observations. The secondary data are sourced from government publications, local authority reports and records, and other related study documentations.

The survey questionnaire solicited information on household characteristics, the household livelihood assets of the study area, the nature of fishing on the lake, the contribution of the activity to livelihood security, and challenges faced by the fishing communities in the attainment of livelihood security. It was pre-tested before it was administered to the respondents and the questionnaire administrators underwent an induction exercise to ensure that they clearly understood the questionnaire.

Key informant interviews were held with knowledgeable individuals on the activities of the study area. These were drawn from Development Agents of the respective *Weredas*, experts from Ziway Fishery Center, *Wereda* Agricultural Office experts and Fishery Cooperative heads in the study area. The interviews mainly focused on the resource status of the Lake, benefits of fishing to the society and challenges faced by the sector as a whole.

Two focus groups, one with legal fishermen and the other with illegal fishermen each consisting of 6 people were formed to get views on different issues as they have different legal rights in accessing the resource. A checklist was prepared and triangulated some of the major aspects covered in both the questionnaire and key informant checklist so as to get people's views on the issues.

Personal observations also facilitated the triangulation of information obtained through the other instruments. They provided a life experience of the fishing activity and hence greatly facilitated in the interpretation of both primary and secondary data.

Quantitative data collected from the household survey were analyzed using SPSS version 15. Descriptive statistics such as percentages, frequencies and mean were used in the analysis of the data. As for the qualitative data, these were analyzed thematically.

Results and discussions

The general objective this study is to assess the role of fishery in the attainment of livelihood security of fishing communities in and around Lake Ziway. This section discusses the findings of the study.

Characteristics of the respondents

The survey results show that all the 125 sample study respondents are males. This is due to the fact that fishing is male gender activity in the area and female are engaged only in post-harvest activities. The most predominant ethnic group is Oromo accounting for 50.4 % followed by Zay who were the first inhabitants of islands on the Lake accounting for 44.8 % .Amhara, Guraghe and other ethnic groups account for two % each.

The area is dominated by Orthodox Christian religion followers who constitute about 90% of the respondents, whereas, the remaining 8 and 1.6 % are Muslims and Protestants respectively. The predominance of Orthodox religion in the area can have a significant implication to the seasonality of fish demand in the area as Orthodox religion followers consume more fish during fasting months of March and April.

Regarding the age of sample respondents, 117 (93.6%) are in the active working age group (18-64), while the remaining 8 (6.4%) are in the dependent age group of above 64 years - showing that there is ample labor force for the fishing activity.

As for educational attainment of the sample respondents, survey results indicate that 21 (16.8%) are illiterate; 79 (63.2%) attained elementary level (grades 1-8) while the remaining 25 (20%) attained high school (grades 9-

12). None achieved post high school level of education an indication that the education level among the fishing community is relatively low which can explain why they are engaged in the activity.

The study also looked at the school attendance of respondent households' children who are above seven years of age. Survey results show that 19 (15.2%) of total sample respondents had children above seven years old who did not go to school. Financial constraints were the major militating factor for not to send children to school. The two focus group discussions (both legal and illegal fishermen) also highlighted the escalating costs of hiring cattle minders as one of the reasons why some children did not attend school as they will be looking after cattle.

The family sizes are generally large. Survey results show that 40.8 % of the respondents have 7 or more members; 30.4 % have 3 to 6 members; and 28.8 % have less than 3 members. This has an implication on the food requirements of the households as they have more mouths to feed, thus having a bearing on livelihoods security. On the other hand, having larger households may mean more labor force to work on the farmlands and also engage in fishing activities, and thus enhancing livelihoods security.

Household livelihood assets

To recap, this study utilizes the livelihoods framework to assess the role of fishery in the attainment of livelihood security of fishing communities in and around Lake Ziway. Thus, elements of the framework which include assets - natural, physical, human, financial and social capital - and their access as mediated by institutions and social relations that together determine the living gained by the individual or households are analyzed in this section of the study (Frankberger, 1996). While human capital related

aspects of the study area have already been discussed in the previous section, the remaining elements will be dealt with in the subsequent sections.

Natural / physical capital

Natural capital refers to possession of or access to natural resources such as land and water while on the other hand, physical assets comprise capital that is created by economic production processes. In this study, such physical assets include, among other things, boats and fishing gear. The possession of the relevant natural and physical capitals determines the livelihood activities, enhances productivity of individuals and reduces their vulnerability to shocks (Ellis, 2000).

Farmland possession is an important attribute in rural areas as it is a basic natural asset that sustains rural livelihoods especially in agrarian dependent economies like Ethiopia. Respondents were asked about their possession and size of their farmlands. Survey results show that not all respondents have access to land. While the majority, 99 (79.2%) of the respondents, have farmland of various sizes (Table 1), the remaining 26 (19.8%) do not have any farmland. The landholding sizes are small ranging from 0.1 to 2.4 with the majority (85.9%) of these being one hectare and below. These are small compared to the Region's average of 1.2 hectares (CSA, 2009).

Table 1. Farmland holdings sizes

Farmland size in hectare	Frequency	Percent	Cumulative percent
< .5	58	58.6	58.6
0.5-1.0	27	27.3	85.9
1.1-1.5	5	5.1	90.9
>1.5	9	9.1	100
Total	99	100	

Source: own survey

According to key informants and focus group discussions, the shortage of farmland and availability of fish in Lake Ziway are some of the major reasons contributing to the predominance of fishing in the study area. Thus, fishing is the major occupation on both the landless and those engaged in farming activities as well.

Small holder mixed farming is undertaken by those who possess land. Major crops grown in the watershed areas are maize, *teff*, haricot bean while the vegetables include onions, potatoes, tomatoes and watermelon in small backyard gardens. These indeed are grown on a very small scale. A few are engaged in irrigated agriculture using water from the Lake. Only one respondent reported engaging in a small irrigation activity indicating the rarity of the activity.

The possession of livestock, particularly in rural areas plays an important role in helping households sustain their livelihood. Livestock serve four important roles of production, consumption, source of income and means of transportation. Oxen are predominantly used for tilling land and cows are also of important for household's supply of dairy products. Horses, donkeys and mules are essential means of transportation.

Survey results indicate that the cattle, sheep, goats, horses, donkeys, mules and chicken are kept by the majority of the respondents. The mean number of cattle, small-ruminants and poultry is around 3 except for the large non-ruminant which is only about 0.3 per household indicating that the activity is done on a small scale, though practiced by most people who have access to land. This lives fishing, which is the focus of this study in the spotlight.

Nature of fishing in the area

According to focus group discussions and personal observations, fishing on Lake Ziway is predominantly artisanal and the fishermen use non-motorized traditional boats and simple nets. With this in mind, the nature of fishing is examined from the occupational status, objectives, technology used and challenges encountered among others.

Regarding the occupational status of fishermen, they are categorized into three groups - full-time, part-time and occasional ones. The survey results revealed that of the total 125 sample respondents, 24.8 percent are full-time, 70.4 percent are part-time and the remaining 4.8 percent are occasional ones who go for fishing mainly during fasting seasons. This shows that most of the fishermen engage in diversified livelihood portfolio with only a small proportion that live solely on fishing.

With regard to the major objective of fishing, survey results indicate that for about 60.8 percent of the total sample respondents, the primary objective of fishing is to feed their households. The other 36.8 percent stated that they engage in fishing as a source of income. The remaining 2.4 percent do it in order to accumulate household assets.

Information obtained from Ziway Fishery Research Center revealed that there are five common species of fish found in the Lake: *barbus* sp; African catfish (*clarias gariepinus*); golden cap (*carassius auratus*); common carp (*cyprinus carpio*) and tilapia (*oreochromis niloticus*). These different fish species have unique physical as well as biological characteristics. However according to key informants, it was revealed that most fishermen hunt the tilapia fish species because of its high market demand and partly because of historical adaptation to the species by the local people. This targeted fishing

coupled with the recently introduced African catfish which feeds on tilapia has endangered the stock of the species.

As for the equipment used for fishing, both key informants and personal observations revealed that traditional, locally assembled, antiquated bamboo rafts and manual wooden boats that do not have protective devices in case storms occur are used. These require a lot of effort to travel between places hence require able bodied persons to operate them which seems plentiful in the area.

Survey results show that bamboo raft (*'Bofofe'* or *'Yebela'*) is commonly used by sample respondents (50.4%). This is followed by manual wooden boats locally known as *Ziway* boat used by 48.4 percent of sample respondents. On the other hand, only one sample respondent did not have any type of boat. Key informants noted that this backward fishing technology requires much labor energy to catch fish. The problem is compounded by the increased distance to fishing sites as there has been a reduction of fish stock at the edges of the Lake and have concentrated in the deeper and central areas of the Lake. Focus group discussants further revealed that older people have stopped fishing because of their inability to travel long distances with the manually operated, energy demanding boats. Thus, increased distance is causing a serious challenge to livelihood security of fishers in the area.

Key informants further revealed that there are about 10 motorized boats plying the Lake, but none of them is used for catching fishing. These are used to ferry people between the island and inland and for trading fish.

Regarding fishing gear used, survey results indicate that the majority (40.8%) use long lines. Beach seine and gillnet use constitute about 29.6 and

28.9 percent of the gear use. Long lines are used mainly to catch cat fish while beach seine, gillnets and hook and lines are mainly used for tilapia fish which is the common species caught from the Lake. However it was revealed by key informants that some fishermen were using destructive fishing gear of small mesh sized beach seine. Personal observations also corroborated this. Some fishermen were observed using 4 centimeters stretched mesh size although the recommended stretched mesh size for the Lake is 8 centimeters. The small mesh size indiscriminately catches both the immature and matured fish species. This indiscriminate immature fish catch endangers the reproductive capacity of the stock of the resource.

Respondents were also asked the frequency they engage in fishing in a week. Survey results indicate that the majority (56 %) go fishing 5 to 7 days a week; about 31.2 % fish 3 to 5 days while the rest (13.8%) do it for less than 3 days a week. The mean weekly working days of the sample respondents is 5.5 days. Focus group discussions reiterated that fishermen work for long hours - more than 8 hours a day - but most of the time is spent travelling to distant fishing sites as stocks on the edge of the Lake have now been depleted.

The amount of fish caught is generally low. Initial processing of the catch is normally done on the Lake shows immediately after landing (Figure 1).

Figure 1: Post- harvest processing on Lake Ziway



Source: picture taken from field

This is of a rudimentary nature negatively impacting on the price of the product. Personal observations revealed that the post-harvest processing is unhygienic. The filleting and temporary storage of fish is done on bare muddy ground hence threatening the health of consumers.

Survey results further reveal that the type of boat used in the fishing also has an effect on the catch (Table 3).

Table 3. Proportion of fish caught by boat type.

Average number of fish catch per day	Type of boat used by respondents			Total
	Bamboo(reed) raft	Wooden boat (Ziway boat)	No boat	
<20	26.4%	3.2%	0.8%	30.4%
20-40	20%	17.6%		37.6%
41-60	4%	16.8%		20.8%
>60		11.2%		11.2%
Total	50.4%	48.8%	0.8%	100%

Source: own survey

Table 3 shows that 68 percent of the average catches per day is caught using the bamboo raft while the Ziway boat is attributed for larger catches. This emphasizes that the nature of type of the boat used matters: the bamboo rafts are small and single person operated hence the type the small catch of fish per day. The majority of the fish caught are sold to traders usually on landing sites of the Lake.

Fish marketing is a critical stage as it tends to be greatly affected by preservation technology. Survey results revealed that the majority (92.9%) of the fish catch is sold whole fresh partly due to lack of fish preservation equipment. Focus group discussions revealed that the lack of refrigerated facilities has been a great impediment as fishermen are forced to sale their fish as soon as they land for fear that they will go bad.

Access to adequate and sustainable infrastructure facilities is one of the most essential factors affecting livelihood security of fishers. In the study area, lack of electricity and inadequate transport system were identified by both key informants and focus group discussions as major serious

infrastructural challenges faced by sample households. Except in some villages, which are near to *Ziway* and *Meki* towns or those towns/villages which are on the main road of Addis Ababa to *Ziway*, there is no electricity facility in many rural areas around the Lake. Inadequate transportation is also particularly a serious challenge to the islanders who sometimes use their manual boats to market their product in *Ziway* and *Meki* towns. The existing motorized boats are inadequate to market fish and other products of the islanders.

Another aspect which tends to impinge on the activity highlighted during focus group discussions was the seasonality of the activity as detected by demand. On Lake *Ziway*, the largest amount of fish landing occurs between January and March while the minimum is during the summer season (June to September). The highest fish harvest season coincides with the highest demand period which happens to be the fasting season of Ethiopian Orthodox religion followers who consume mostly fish meals. It was further revealed that some of the sample households go for fishing only during these fasting months. This seasonality of harvest and demand creates challenges to secure their livelihoods from the resource.

The role of fishery in livelihoods security

Fishing has both a direct and indirect contribution to household livelihoods. The direct contribution is that, fish can be consumed at household or can serve as a source of income to purchase food. Respondents were asked whether they had adequate food during the previous year. The majority (53.6%) indicated that they were food insecure; while the rest (46.4%) indicated that they were food secured.

In an attempt to establish the contribution of fishery to food security among respondents, the frequency of fish meals in a household was examined. Survey results show that 66.4percentof the sample respondents consume fish almost every day; 25.6percent consume once in two days, while the remaining 8 percent consume infrequently. Hence, it can be concluded that fish constitute an important part of the diet of the majority of the sample respondents and thus contributes to livelihoods security.

Respondents were further asked to rank the contribution to household food security of major different livelihood activities. Table 4 summarizes the responses.

Table 4. Rank of contribution of major livelihood activities

Activities	Rank in contribution to households livelihood security					
	First rank		Second rank		Third rank	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Cereal production	52	41.6	54	45.8	2	2.8
Fishing	71	56.8	43	36.4	7	6.6
Livestock	2	1.6	15	12.8	85	80.2
Petty trade	-	-	3	2.5	3	2.8
Others	-	-	3	2.5	8	7.6

Source: own survey

Regarding livelihood security role of fishing, the majority (56.8%) of the survey respondents ranked fishing as first while 36.4percentranked it second, and only 6.6percent ranked it third. Cereal production, livestock rearing, petty trade and others follow indicating the importance of fishing to livelihood security in these fishing communities.

The survey also revealed that respondent households have different mechanisms to cope with livelihoods insecurity. Of the 67 food insecure households, 20.9percent cope by selling livestock; 58.2% by more fishing in times of food crisis; 13.4percent by borrowing money or food items, while the remaining 7.5 percent indicated that they are at times bailed out of this predicament through assistance received from local and international Non-Governmental Organizations (NGOs).

To enhance their livelihood security, households engage in various activities to hedge against shocks. Diversification of livelihoods security activities is common in fishing communities owing to the seasonality of the activity. From the survey results, it was found that about 76.2 percent of sample respondents were engaged in various activities in addition to fishing. Table 5 summarizes the sample respondents' engagement in other activities in addition to fishing.

Table 5. Sample respondents' engagement in other livelihood security activities

Activities	Responses		Percent of Cases
	Number	Percent	
Farming	93	49.5	74.4
Looking after cattle	79	42.0	63.2
Schooling	5	2.7	4
Trading	11	5.9	8.8
Total	188	100	150.4

Source: own survey

The above Table shows that the majority (74.4%) of the total respondents work on farming activities besides fishing; 63.2 percent in livestock rearing;

while 4 and 8.8 percent of total sample households are engaged in attending school and trading respectively. Thus, it can be concluded that the majority of sample households in the study area are mainly engaged in agricultural activities to complement fishing activities in an effort to achieve their household's livelihood security.

Survey respondents were asked to indicate the contribution the major livelihood activities to the household income. Table 6 provides the annual incomes obtained from the various activities engaged by the household in the previous year.

Table 6. Incomes of sample households from the various activities (in Birr)

Household's Source of Income	Minimum	Maximum	Mean
Farming	800.00	15500.00	5518.93
Fishing	300.00	40000.00	5940.83
Livestock and livestock products	150.00	11020.00	3199.80
petty trading	1000.00	4800.00	2180.00
chicken keeping	30.00	1200.00	294.80
Services (wage, Salary etc.)	500.00	8400.00	2342.85

Source: own survey

(Exchange rate: US\$1 equivalent to about Ethiopian Birr (ETB) 117.00 in 2011)

The survey results show that fishing is an important source of income for the sample households with an average annual income of 5940.8 ETB. This is followed by farming with a mean income of 5518.9 ETB, and livestock

and livestock products with mean income of 3199.8 ETB. Services, chicken keeping and petty trading also play an important role in contributing to the respondent sample households' income in their order of importance. Thus, one can safely say that fishing plays an important role in the attainment of livelihood security of households of the study area.

Financial capital

In this study, financial capital refers to savings and access to credit facilities. It is clear that, the more you save, the less you are vulnerable to shocks. Access to credit also determines the adoption of existing technology as many rural farmers do not accumulate enough funds to purchase better fishing equipment. With this in mind, the study looks at the saving practice of the sample respondents and their access to credit facilities.

Respondents were asked whether they practice saving or not. Of the 125 survey respondents, 59 (47.2%) indicated that they save some of the income they earn from fishing and other activities while the remaining 66 (52.8%) do not. The average yearly saving of the 59 respondents is 2,483 ETB. One can say that the saving practice of fishing households is appreciable and the income from fishing undoubtedly helps in the development of financial security of the sample households.

The second aspect of financial capital dealt with is credit. Of the total 125 sample respondents, survey results show that 80.8 percent reported that they need credit for fishing related activities. The majority of the sample respondents (56 percent) did not have access to formal credit at all in the past year. According to focus group discussion held with legal fishermen, the credit facility provided to legal fishermen by government through Agricultural and Rural Development Office hence since been discontinued.

Thus, fishermen no longer have another source to access credit to replace their fishing gear which wears out after every two to three years of service. They highlighted that it is difficult to obtain loans from formal financial services, like banks because of lack of collateral. The scenario is worse for the informal fishermen because of their status: they are illegal hence cannot access loans from formal financial services.

Social capital

In this study, social capital includes participation in social organizations like *Ekub*¹, *Edir*² Cooperatives, *Maheber*³, *Senbete*⁴ and *debo*⁵. From the Ethiopian context also, participation in social affairs like *Edir*, for instance, results in reduction of household vulnerability to shocks in case death occurs in a participating household. In addition to this, the establishment of cooperatives like fishing cooperatives serves as a mechanism by which the non-members can be excluded from benefiting the fish resource of the lake.

¹*Ekub*: A form of rotating saving in which members come together for the purpose of saving. In this case members contribute weekly or monthly and lots are drawn each month.

²*Edir*: A type of traditional organization whose aim is to provide assistance at times of mourning.

³*Maheber*: Orthodox religion followers association of people held every month.

⁴*Senbete*: Religious based association of Orthodox religion followers held every weekends usually at Church sites.

⁵*Debo*: Mass cooperation in undertaking different activities as a form of mutual support.

Table 7. Social participation of sample respondents

Participation issue	Participation before fishing			Participation after fishing		
	N	Percent	Percent of cases	N	Percent	Percent of cases
<i>Ekub</i>	7	3.7	6.5	42	8.6	33.6
<i>Edir</i>	30	15.9	28.0	122	24.9	97.6
Cooperative	2	1.1	1.9	94	19.2	75.2
<i>Maheber</i>	23	12.2	21.5	68	13.6	54.4
<i>Senbete</i>	28	14.8	26.2	49	10.0	39.2
<i>Debo</i>	99	52.4	92.5	115	23.5	92.0
Total	189	100	176.6	490	100	392.0

Source: own survey

Table 7 shows that the overall social participation is by far greater in after fishing period than they were before fishing. Participation in *Ekub* by the sample respondents for instance increased from 3.7 percent before fishing to 8.6 percent after fishing; for *Edir* and *Maheber* increased from 15.9 to 24.9 percent and from 12.2 to 13.9 respectively; and participation in cooperatives increased to 19.2 percent compared to the 1.1 percent before fishing.

On the other hand, participation after fishing for *Senbete* and *debode* creased after fishing from 26.6 to 10.0 and 52.4 to 23.5 percent respectively partly because of the busyness of the fishermen and partly due to the inconvenience of the time of these occasions with fishing activity. Thus, it can be argued that participation in social capital plays a paramount role in reducing vulnerability and enhancing livelihood security of judging from the increased participation in the activities by the respondents.

Summary, conclusion and recommendations

Rift Valley Lakes in general and Ziway Lake in particular, support a wide variety of aquatic life playing a significant role in helping the surrounding fishing communities sustain their livelihoods.

Fishing plays a paramount role in the development of livelihood assets in the area under investigation. The remuneration from the activity has helped the development of human capital in supporting education of fishing households. The income earned from the activity also plays important role for the development of financial capital through enhancing savings. In addition to these, the earnings from the activity have enhanced the social capital basis of the fishing households by increasing their participation in *edir*, *ekub*, cooperatives and *maheber*. Fishing activity also plays crucial role in building up physical capital in the area under investigation.

Fishing technology on Lake Ziway is artisanal in its nature which makes use of traditional boats of rafts and wooden manual boat. Long lines, beach seining and gillnets are predominant fishing gears on the lake. The majority of the fishermen are part-time ones being engaged in multiple activities for their livelihood sustenance. The fishermen also work long hours a day which is particularly caused by increased distance to harvest.

Fishing plays important role in the livelihood security of the community through both direct consumption and income generation. The greatest part of the fish harvest is commercialized and part of the harvest is used for household consumption. Fish function as a source of household food consumption and hence significantly contributing to food security. It does

this in two ways, one fish serves as a major food item to the beneficiaries and secondly it provides cash income which is ultimately used for purchase of variety of food items. In addition to fishing, cereal production and livestock rearing play an important role in helping livelihood security.

In the study area, fishing livelihood is constrained by several challenges which include backward and antiquated fishing equipment, reduced catch, increased distance to catch fish, seasonality of the activity, limited access to credit, and lack of developed processing technology among others. Thus, if some or all of the challenges are tackled, fishing can be a pillar of economic activity in the study area.

What should be done?

Based on the information gathered from household survey, key informants, focus group discussions and personal observations, the following alternative or additional measures can be instituted to enhance livelihood security in the study area.

- ***Fishing Technology***: fishing on Lake Ziway is artisanal, using backward and risky fishing boats. Thus, the government or the concerned institutional body should avail accessible improved technology with safety valves to complement the antiquated fishing equipment.
- ***Sustainability of the resource***: high dependence on fishing activity has posed a serious threat to the stock of the fish resource. Reduced fish harvest from the lake is mainly attributed to the weak institutional policy of fishery management of the lake. Thus, management tools like closed seasons, catch quota restriction, mesh

size regulations, gear restrictions, limits on the number of fishers and/or boats, taxes on effort and licensing of the activity has to be put in place to keep the stock of the resource sustainable. Besides, alternative income generating opportunities have to be expanded to reduce pressure on the resource

- ***Biodiversity conservation:*** Targeted fishing of tilapia species may result in biodiversity loss. Hence, targeted fishing of such species should be controlled by the concerned body to keep the stock of such species sustainable.
- ***Infrastructure:*** Developing adequate basic infrastructures like roads and water transportation, electricity and storage facilities should be prioritized by both the Federal and Regional governments so as to enhance the development of fishery sector.
- ***Finance:*** Promotion of credit arrangements should be given due attention to help fishermen access modern fishing equipment, purchase and maintain their fishing gear. Such credit can also be extended to complementary livelihood activities such as agriculture.
- ***Training:*** It is advisable if fishers get training on harvesting and post harvesting to keep the fish stock sustainable and maximize their benefit from the activity by the potential international or local bodies.

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