



Assessment of Current Practices, Major Challenges and Opportunities of the Fishery of Lake Hawassa, Southern Ethiopia

Gemechis Tesgera and Kibruyesfa Bayou*

School of Veterinary Medicine, Wollega University, P.O. Box: 395, Nekemte, Ethiopia

***Corresponding Author:** Kibruyesfa Bayou, e-mail: kibruyesfab@gmail.com

Abstract

Assessment of current practices, challenges and opportunities of the fishery of Lake Hawassa of Ethiopia was conducted from November, 2018 to May, 2019. Structured questionnaires were used for generating the data. Purposively, 50 fishermen, 30 restaurants and 3 fishery experts were included in the study. The data that were collected were recorded using Microsoft Excel software and descriptive data analysis was made using SPSS software version 20. From the 50 fishermen, 45(90%) and 5(10%) of them were male and female, respectively. The age distribution of the fishermen was found to be in the range of 18-40 years old and 18-30 years category was the most frequent one having 24(48%). Regarding educational background of the fishermen, 37(74%) illiterate, 8(16%) secondary school and 5(10%) of them were found to have primary school education. Only 5(10%) fishermen had a fishing license and 7(14%) of the fishermen were engaged in the fishing activity as members of fishing associations or co-operatives. It was found that all the fishermen did not get any training and financial support from any organization and they started fishing because of poverty and unemployment, and they were found to be full-time fishermen. From the 50 fishermen, 45(90%) and 5(10%) of the fishermen were found to use longline and gillnet to harvest fish, respectively. From the fish species, Nile tilapia was found to be the most preferred and harvested fish type and fish were found to be sold directly in the local market with different prices based on fish type and fish size. Finally, lack of support/attention from the government and job opportunity were found to be the most frequently mentioned or indicated constraint and opportunity of the fishery activity of Lake Hawassa. Therefore, for sustainable fish production and conservation of the resource the fishing activities should be controlled and managed by the concerned authorities.

Keywords: Challenges and opportunities, Fishermen, Fish production, Lake Hawassa.

Introduction

Ethiopia is a land-locked country which has approximately 7400 Km² surface area of major lakes and 7185 Km long river network (Dejene and Mintesnote, 2012). The aquatic ecosystem includes major rivers and lakes that are of great national and international importance. There are about 30 major lakes located in different ecological zones ranging from about 150 meters below sea level up to 4,000 meters above sea level. The country has a number of international rivers, beautiful lakes and reservoirs which have political, ecological and economic importance. So far, there are 180 different species of fish in Ethiopia and over 30 species are endemic to the country. The total annual fish potential production of the country's major inland water bodies is estimated to be 51,481 metric tons per year on a maximum sustainable yield basis (Anteneh, 2013).

However, only 20-30% of this resource is utilized (Senbete, 2008). The percapita fish production is less than 240gm per annum, but if population as a factor is taken into account the total annual fish demand is more than 65,344 tons per year, which is approximately equivalent to 1 kg/person per annum. The national demand for fish is continuously increasing; it is currently estimated at 85,000 tons per year. Despite its potential, the subsector is still underdeveloped and its contribution to the economy is negligible. The total production in 2011 was 24,041tons, which is 40 percent of the estimated exploitable potential (51,481tones/year) mentioned above. Moreover, for the year 2012 the country's import and export was 2,138 and 477 tons respectively. Furthermore, lack of recognition and trained personnel, poor coordination among stakeholders, poor enforcement of decrees, high turnover of the fishery staffs into other sectors, and weak extension services and linkage are the major problems affecting fish production at national level (EFASA, 2012).

Likewise, in Lake Hawassa the production of fish is constrained by a lack of fingerlings (small fish), storage facilities, pollution from waste disposal increasing pressure on the fisheries sector and livelihoods of fishermen. The fish breeding sites are being destroyed by the removal of macrophytes shores and river mouths along the lake. Destructive fishing gears threaten some species for instance *Labeobarbus* having caused a 75 % stock decline in the 1990s (FAO, 2012).

Fisheries production is also under-exploited while current demand exceeds supply by about four-fold. One of the big and immediate challenges of our country is addressing the problems of food security and poverty. Currently, about 45% of the total population is living under poverty and the level of impoverishment is worse in rural areas, where 85% of the total inhabitants dwell (Sileshi, 2013).

The lakes in the Ethiopian rift valley contribute much of the fish supply in the country. The general view seems to be that most of Ethiopian lakes are also heavily exploited. Among the ten most fished lakes in Ethiopia, the harvest exceeds the potential in nine of them and this includes Lake Hawassa. In the past few years, Lake Hawassa has been clearly over fished. Production peaked between 1992 and 1994 at around 900 tons per year. However, after a decade it is only just over half that figure while the effort has not declined by nearly as much (LFDP, 1997). This proves that the lake was over fished in the past years. Lake Hawassa is in critical condition compared to the other Ethiopian lakes. The impact of this alarming rate of fishing pressure is further worsened because of the disproportionate exploitation of the fish species in the lake (Yosef *et al.*, 2017).

Generally, in order to protect the fish resource from damage and for a rational use of the resource, conducting continuous assessment work is mandatory for proper management of the lake. Therefore, based on the above facts the objectives of this study were to assess the current practices of fish production of Lake Hawassa and to identify the current major challenges and opportunities of the fishery activity of the lake.

Materials and Methods

Study Area: Lake Hawassa is the smallest of the seven natural lakes in the rift valley of Ethiopia (Figure 1). It is located in southern Ethiopia bordering the eastern side of Hawassa city, which is located 275 Km south of Addis Ababa. Geographically, the lake lies between 6033'–7033' N and 38022'–38029' E at an altitude of 1680 m above sea level. The lake has a surface area of 90 Km², a mean depth of 11 m, a volume of 1.036x10⁹ m³ and a drainage area of 1,250 Km². It is a terminal lake with no surface out flow and receives surface inflow through Tikur-Wuha River (LFDP, 1997). Lake Hawassa is productive and one of the most fished lake in the country. There are six fish species in the lake, of which the Nile tilapia (*Oreochromis niloticus*) is commercially the most important as it contributes about 90 % of the annual catch. There are also some populations of the African catfish (*Clarias gariepinus*) and the African big barb (*Labeobarbus intermedius*), which contribute about 7% and 2-3%, respectively, of the total annual catch (Reyntjens and Tesfaye, 1998).

Methodology: Three types of structured questionnaires were prepared and used to generate both qualitative and quantitative data to assess the current practices, the major challenges and opportunities of the fishery of Lake Hawassa. For this study, 50 fishermen of the lake were selected purposively and interviewed using a structured questionnaire. As stakeholder, 30 restaurants in Hawassa town which prepare fish dishes were also selected purposively and their respective managers were interviewed using a structured questionnaire. In addition, 3 professionals (fishery experts) were also included in the interview activity using a structured questionnaire. During the questionnaires' interviews, data related to personal information, fishing practices/activities, fish consumption and demand, fish marketing, and major constraints and opportunities of the fishery of the lake were collected and recorded properly. Moreover, personal observation was also made at the fishing site.

Data analysis: The data of the questionnaires' interviews were coded and entered into a database system using Microsoft Excel software and descriptive data analysis (mean, minimum, maximum, frequency and percentage) was made using SPSS software version 20.

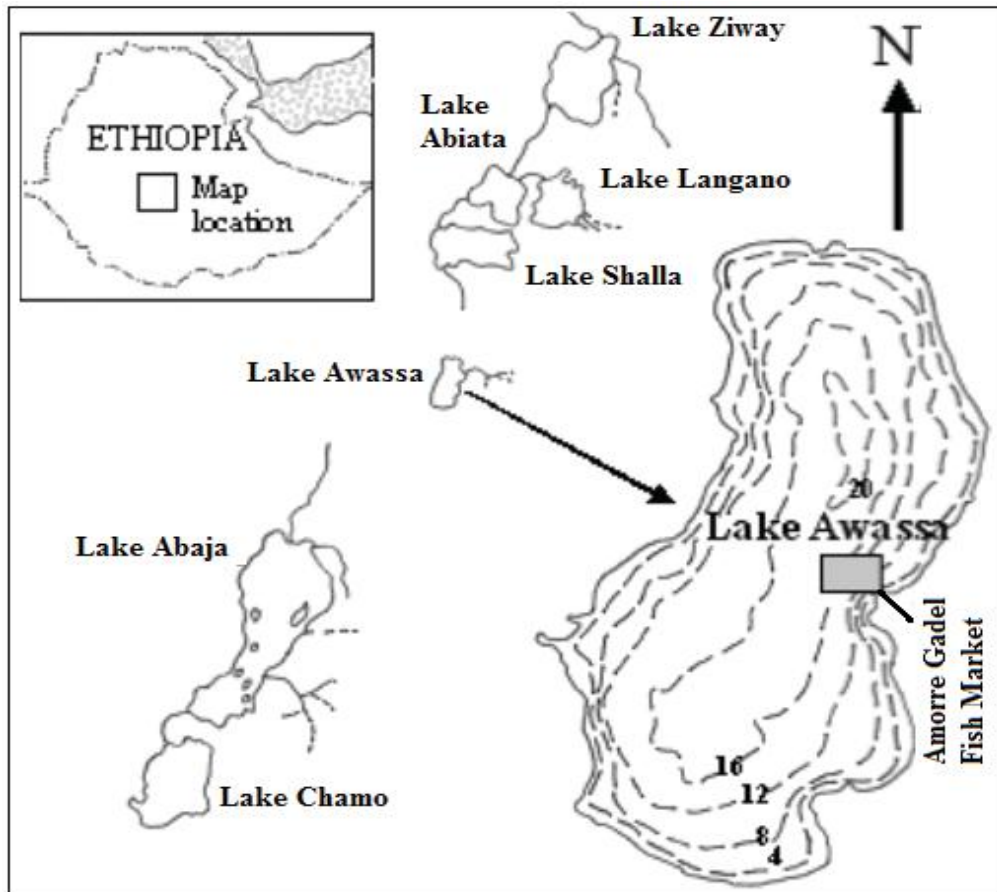


Figure 1: Location of Lake Hawassa in Ethiopia (Elizabeth, 1996).

Results

Socio-Demographic Characteristics: A total of 50 fishermen of Lake Hawassa were contacted for face to face interview. Table 1 shows the

demographic information: gender, age, marital status and educational background of the fishermen. The average family size of those fishermen was found to be 2.5.

Table 1: Socio-Demographic Characteristics of the fishermen of Lake Hawassa (N=50).

Respondents Structure	Frequency	Percentage
Gender		
Male	45	90
Female	5	10
Total	50	100
Age		
Less than 18 years	18	36
18-30 years	24	48
31-40 years	8	16
Greater than 40 years	0	0
Total	50	100
Marital status		
Married	20	40
Single	30	60
Total	50	100
Educational background		
Illiterate	37	74
Primary school	5	10
Secondary school	8	16
Higher education	0	0
Total	50	100

Fishermen Categories and Fish Composition of Lake Hawassa:

All fishermen that were considered in this study were full-time fishermen; it was found that their income for living was totally depends on their fishing activity. From the 50 fishermen, only 5(10%) of them had a fishing license and 7(14%) of the fishermen were engaged in the fishing activity as

members of fishing associations (co-operatives), the rest were engaged in the activity independently (Table 2). Based on personal observation and from the responses of the fishermen, it was found that Nile tilapia (*Oreochromis niloticus*), Cat fish (*Clarias gariepinus*) and Barbus (*Labeobarbus intermedius*) were the three economically important types of fish that were commonly harvested from the lake (Table 3 and Figure 2).

Table 2: Category, membership and fishing license status of the fishermen during the study period (N=50).

Description	Frequency	Percentage
Category of fishermen		
Full time fishermen	50	100
Contractual	0	0
Total	50	100
Membership status for fishing		
In associations (co-operatives)	7	14
Independent (individually)	43	86
Total	50	100
Fishing license		
Yes (legal)	5	10
No (illegal)	45	90
Total	50	100

Table 3: Economically important fish species that were commonly harvested from Lake Hawassa during the study period.

Common name of fish	Scientific name of fish	Local name of fish
Nile tilapia	<i>Oreochromis niloticus</i>	Koroso
Cat fish	<i>Clarias gariepinus</i>	Toke
Barbus	<i>Labeobarbus intermedius</i>	Kerkero



Figure 2: Commonly harvested fish types from Lake Hawassa during the study period, Tilapia (left) and Cat fish (right).

Fishing Practice and Fish Production Potential:

According to the response of the fishermen, it was found that all of them started fishing activity because of poverty and being unemployed previously and they practice both subsistence and commercial type of fish farming. They harvest fish for more than 250 days per a year. It was also revealed that they did not get any technical training and financial support from any agent or organization during their fishing activity. Based on the information that was obtained from the town’s fishery experts and personal observation, there was a high number of fishermen who were engaged in illegal fishing activity using non-standard or inappropriate/inefficient fishing materials and methods.

In this study, 45(90%) and 5(10%) of the fishermen were found to use longline and gillnet to harvest fish, respectively. During the study all fishermen responded that because of lack of appropriate fishing materials and other reasons, the fish amount that they harvest from the lake

has been decreasing from time to time. They indicated also that relatively seasons/months from September to December and from May to August are the seasons or months of high and low fish production, respectively.

Fish Demand, Consumption and Marketing:

It was found that all of the fishermen 50(100%) sell the fish that they harvest every period directly to the local market with different ranges of prices based on the fish size/amount and fish species (Table 4). The range of the amount of the monthly income of the fishermen in this study was found to be 2000-2500 Ethiopian birr. According to the responses of the 30 restaurant managers of Hawassa town in this study, it was also revealed that they prepare fish dishes throughout a year for their customers but the highest demand for fish dishes is during the two fasting months of the Orthodox Christians. According to the managers, the get or purchase fish from suppliers or directly from the fishermen to prepare different types of fish dishes in their restaurants (Table 5).

Table 4: Average prices of fish in Lake Hawassa during the study period.

Fish species in filleted form	Average price in Ethiopian birr
Tilapia	20
Cat fish	30
Barbus	20

Table 5: Average prices of local types of fish dishes in the different restaurants of Hawassa town during the study period.

Local types of fish dishes	Average price in Ethiopian birr
<i>Tibs</i>	70
<i>Shorba</i>	50
<i>Kotelet</i>	80

Major Challenges and Opportunities of the Fishery of Lake Hawassa: The majority, 45(90%) of the fishermen in this study indicated

and agreed with that the ones which are listed in table 6 were the major challenges and opportunities of fishery of the lake.

Table 6: Major constraints and opportunities of fishery of Lake Hawassa during the study period.

Rank	Major Constraints	Major Opportunities
1	Lack of support/attention from the government	Job opportunity
2	Over exploitation/over fishing	Source of income
3	Lack of modern fishing materials	Food source
4	Wastage/pollution	Recreation/tourism
5	Lack of awareness and training	Research and training

Discussion

In the current study, from the total 50 fishermen, 45(90%) of the fishermen were males, whereas 5(10%) of them were females. This almost agrees with the finding of Abdoulie (2010), that 96% of the fish farmers in Ashanti region were males with only 4% being females. It was revealed that all the fishermen in this study had been engaged in the fishing activity because of poverty and unemployment. More importantly, they indicated that the whole source of income for living was depend on their fishing activity. This contradicts with the finding of Assefa (2013), who showed that fishermen of Lake Ardibo and Logo get their living income only 35% and 44.4% from fishery, respectively.

In this study, the majority, 24(48%) of the fishermen were in the age range of 18-30 years. This also disagrees with the finding of Ali *et al.* (2008), who revealed that the age range from 20-30 years was found to be the least frequent age category with 14%. Similarly, according to Assefa (2014), the average age of the fisherman of Lake Ardibo and Logo 33.7+2 and 26.57+0.75,

respectively. Based on different literatures, this could be because of the reason that in Ethiopia the young people has the highest portion from the general population size and also unemployment is increasing in this age group now a days. The education level of the majority 37 (74%) of the fishermen in this study was found to be illiterate. To the contrary, based on Assefa (2013), 50% of the fishermen in Lake Ardibo completed primary education and according to Abdoulie (2010), the educational levels of the fish farmers were tertiary and secondary education with 44% and 52%, respectively.

According to Tefera *et al.* (2009), there are four categories of fishermen involved in Lake Tana and rivers around Lake Tana, these are full-time fishermen, seasonal fishermen, contractual fishermen and part-time fishermen. Fishermen of Lake Hawassa in this study were full-time fishermen since they were not involved in other extra job activity for additional income. According to Tujuba *et al.* (2017), the local people living near water bodies such as lakes and rivers in other parts of Ethiopia have awareness about the economic and nutritional value of fishes. Fishes caught by the people are mainly used for house hold consumption and for sale on individual basis. Similarly, all fishermen in this study were found that they harvest fish for subsistence and commercial purpose.

Most rift valley lakes and the river Awash are poor in fish species. Their fauna is dominated by the Nile tilapia (*Oreochromis niloticus*), the African catfish (*Clarias gariepinus*) and a few cyprinids mostly *Barbus* species. The two southern most lakes (Abaya and Chamo) and the major rivers, such as the Blue Nile and the Omo, have a much more diversified fauna reminiscent of that found in the Nile and the rivers and lakes of East Africa (FAO, 2014). It could be because of the above facts that in the current study, Nile tilapia (*Oreochromis niloticus*), the African catfish (*Clarias gariepinus*) and cyprinids mostly *Barbus* species are the ones which were commonly harvested by the fisherman of Lake Hawassa during the study period.

According to Hussen *et al.* (2010), fishing activity is common in most water bodies of Ethiopia with different fishing gears. For instance, in the rift valley lakes of Ethiopia such as Lake Hawassa, Langano, Chamo, and Abaya fishing activity is carried out with gears ranging from hand hooks to motorized fisheries association. In Baro Akobo basins especially in the water bodies (rivers, lakes and floodplains) of Gambella region, fishery support the livelihood of many people and fishermen use more than 15 types of gears which are diversified in season. Based on Tujuba *et al.* (2017), fishing is commonly carried out mostly at the end of rainy season (starting from October) and continues to the beginning of the rainy season (April). Similarly, in the current study, the fishermen were found to use longline and gillnet and regarding seasonal variation for fish production, from September to December and from May to August were found to be the seasons or months of high and low fish production, respectively.

Ethiopians do not consume large quantities of fish, although there is no religious prohibition for the Christian and Muslim populations. Rather, this is a country with a strong tradition of livestock rearing and meat consumption. The Ethiopian Orthodox Church observes several fasting periods as well as fasting days every week, when meat is not consumed. Most Christians consider fish acceptable during those periods, though some strict followers will not eat any animal products (Brook, 2008). Similarly, this study also revealed that there was high fish demand and consumption during the fasting months of the Orthodox Christians. In agreement with the finding of Assefa (2013), among the fish species Nile tilapia was the most preferred by the consumers and the fish collected by the fishermen was found to be sold directly in the local market.

The fishermen were interviewed about the existing production constraints and they generally responded and ranked them according to their importance: Accordingly, lack of support/attention from the government was ranked as the first most important constraint while lack of awareness and training was ranked as the least observed constraint in Lake Hawassa. This is in line with the finding of Hussien *et al.* (2010) and Assefa (2013), in which lack of government support, transportation facilities, proper fishing gears, over fishing and lack of awareness are the main fish production constraints in Afar region and in South Wollo, respectively. In this study, job opportunity is the most frequently mentioned advantage for the fishermen of Lake Hawassa. This is in line with the finding of Wubeshet (2016), in which Lake Ziway creates job opportunity for the surrounding community and for the majority of the fishers (77.2%), fishing is the only income source for their livelihood.

Conclusion and Recommendations

In conclusion, fishery activity of Lake Hawassa was dominated by males and majority of the fishermen were in the age range of 18-30. These young people were engaged in this sector because they were economically poor and they did not have alternative means of livelihood. Their education background was very low and they did not have any access for training, material and financial support from any organization. Majority of them were full-time fishermen without having fishing license and they use longline and gillnet as fishing gears. They did sell or supply the harvested fish to the local market. Tilapia, Cat fish and Barbus were the most important fish types that were frequently harvested from the lake. Lack of support from the government, over exploitation (over fishing), lack of modern fishing materials, wastage/pollution and lack of awareness were the major constraints of fish production of the lake. Therefore, based on the above conclusion the following recommendations are forwarded.

- For sustainable fish production and conservation of the resource the fishing activities should be controlled and managed by the concerned authorities.
- In order to eliminate illegal or inconsiderate activities and practices threatening livelihoods and resource sustainability, participatory stewardship regimes involving small-scale fishing communities should be promoted.
- Since the fishers had poor background in terms of knowledge and finance, there should be continuous support and follow up until they could do things by their own self.
- Well-organized further studies should be conducted on the fish production and fishery management of the lake in order to identify the specific challenges and opportunities of the sector and to take appropriate measures by the concerned bodies.

Acknowledgments

Our special acknowledgments go to Wollega University and to the respondents (interviewees) who participated in the study by giving responses for our questions/interviews.

References

- Anteneh, A. 2013. Management and Livelihood Opportunity of Lake Tana Fishery, Ethiopia: The need for co-management. University of Tromso.
- Assefa, M.J. 2013. Assessment of fish products demand in some water bodies of Oromia, Ethiopia: *Int. J. Agric. Sci.*, 628-632.
- Assefa, M.J. 2014. Fish Production, Consumption and Management in Ethiopia: *Int. J. Econ. and Manage.*, 3: 3.
- Abdoulie, B.M. 2010. Opportunities and Constraints of Fish farming in Ghana (A case study of Ashanti Region). Thesis submitted for the degree of Master of Philosophy in Aquaculture Management, Kwame Nkrumah University of Science and Technology.
- Ali, M.H., Hossain, M.D., Hasan, A.N.G.M. and Bashar, M.A. 2008. Assessment of the livelihood status of the fish farmers in some selected areas of Bagmara upazilla under Rajshahi district, *J. Bangladesh Agril. Univ.*, 6(2): 367–374.
- Brook, L. 2008. Introduction to Lake Ecology, Aquaculture and Fisheries in Ethiopia, AAU printing press.
- Dejene, E. and Mintesnot, Z. 2012. A generic GIS based site suitability analysis for pond production of Nile Tilapia (*Oreochromis niloticus*) in Ethiopia. In The Fourth Annual Conference of the Ethiopian Fisheries and Aquatic Sciences Association. Addis Ababa, Ethiopia: EFASA.
- Elizabeth, K. 1996. Phytoplankton in a salinity-Alkalinity series of lakes in the Ethiopian rift valley. Ph. D. thesis, Uppsala University, Uppsala, Sweden.
- EFASA. 2012. A generic GIS based site suitability analysis for pond production of Nile Tilapia (*Oreochromis niloticus*) in Ethiopia. In Addis Ababa.
- FAO. 2012. Fishery and Aquaculture Country Profiles-Ethiopia. Fisheries and Aquaculture Department. Available in <http://www.fao.org/fishery/en>.
- FAO. 2014. Fishery and Aquaculture Country Profiles-Ethiopia. Fisheries and Aquaculture Department. Available in <http://www.fao.org/fishery/en>.
- Hussien, A., Gashaw, T. and Abebe, C. 2010. Fishery Development Program: Riverine Fishery Assessment in Gambella Peoples' Regional State, Ethiopia.
- LFDP. 1997. Lake management plans. Lake Fisheries Development Project, Phase II, Working Paper 23. 2nd ed. Ministry of Agriculture, Addis Ababa.
- Reyntjens, D. and Tesfaye, W. 1998. Fisheries management – a review of the current status and research needs in Ethiopia. *SINET: Ethiopian Journal of Science*, 21(2): 231-266.
- Senbete, G. 2008. Participatory Evaluation of Gillnet and Long Line on Lake Beseka, Ethiopia. In Commercialization of Livestock Agriculture in Ethiopia. Proceedings of the 16th annual conference of the Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia.
- Sileshi, A. 2013. Managing water for livestock and fisheries development in some lakes in Ethiopia. Ph.D thesis, Addis Ababa University, Ethiopia, 115p.
- Tefera, B., Tessema, A. and Dejen, E. 2009. Dried fish market assessment from Lake Tana to Metema. Amhara Regional Agricultural Research Institute in Collaboration with IPMS (Improving Productivity and Marketing Success), Bahir Dar.

- Tujuba, A.T., Simagegnaw, M. and Tsegaye, D. 2017. Assessing Fishing activity, Fish Production and demand outlook in Ilu Abba Bora Zone, Oromia Regional State, South West Ethiopia. ISSN: 2276-7770; ICV: 6.15 Vol. 7(1), pp. 009-018.
- Wubeshet, B. 2016. Determinants of Fish Production in Lake Ziway, Ethiopia. Addis Ababa University, Addis Ababa, Ethiopia, p.101.
- Yosef, T., Alemken, B. and Elias, D. 2017. Assessment of Sustainable Yield and Optimum Fishing Effort for the Tilapia (*Oreochromis niloticus* L. 1758) Stock of Lake Hawassa, Ethiopia. *Momona Ethiopian Journal of Science (MEJS)*, 9(1): 1-21.

Access this Article in Online	
	Website: www.ijarbs.com
	Subject: Veterinary Medicine
Quick Response Code	
DOI: 10.22192/ijarbs.2021.08.02.004	

How to cite this article:

Gemechis Tesgera and Kibruyesfa Bayou. (2021). Assessment of Current Practices, Major Challenges and Opportunities of the Fishery of Lake Hawassa, Southern Ethiopia. *Int. J. Adv. Res. Biol. Sci.* 8(2): 26-39.

DOI: <http://dx.doi.org/10.22192/ijarbs.2021.08.02.004>