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Yibeleal Aynalem Nurie

Woldia University, Department
of Animal Production, and
Technology, P.O.Box 400,
Woldia, Ethiopia

Riverine fishery, lakes, dams and fish diversity in water bodies in Amhara region: Review

Yibeleal Aynalem Nurie

Abstract

This review paper assesses riverine fishery, lakes, dams or reservoir, and fish diversity in water bodies in Amhara Region. Amhara National Regional State (ANRS) is one of the nine ethnic divisions of Ethiopia. It is located in the north western and north-central part of Ethiopia. Amhara region has a rich diversity of ichthyofauna in its lakes, rivers, dams and reservoirs, although they are poorly known in terms of potential and taxonomic characteristics. Amhara region has 9 lakes, 4 know dams or reservoirs, 497 annually flow rivers, 297 seasonal flowers and 2860 streams. So the region is the riches water resource in Ethiopia. It has native and exotic fish species in different water bodies. Lake tana is the biggest lakes in Ethiopia and it founds in amhara region. In this region there are three major water shade area which namely Abbay, Tekeze and Awash and they are rcich resource in riverine fishry. Tekeze, Koka and Rib dams or reservoir are an artificial lakes, covers a total area of 16000, 1800, and 20000 hectare lands respectively. Blue Nile and Tekeze rivers are more rich riverine fish diversity rather than other rivers. Common aquaculture fish species found in the region (*Oreochromis niloticus*, *Clarius gariepinus* and *C. carpio*).

Keywords: Amhara region, dams, riverine fish diversity, lakes and rivers

Introduction

Over the past 70 years, large-scale movements of fish, including a total of 1354 introductions of 237 species into 140 countries, have occurred ^[1]. It has been identified at least 134 fish species had been introduced or relocated within 29 European countries, especially Central and Eastern Europe ^[2] indicated that poor success was recorded for most as well as measurable ill-effects on native fish and their habitats. Generally rivers and lakes is done to enhance economically important ones or to occupy ecological niches in the fauna. Therefore, these water body systems need appropriate studies to determine the need and desirability for the introduction ^[3]. Ethiopia has 172 freshwater fish species ^[4]. The freshwater fish species comprises of 39 endemic and 11 introduced .Fish introduction activities started in the Ethiopian aquatic ecosystems during the Italian invasion. The introduction of Eastern mosquito fish /*Gambusia holbrooki* in Lake Tana for control of malaria and northern pike /*Esox lucius*/ for fishery enhancement is a typical example practiced during the Italian invasion. Exotic fish introduction and translocation of indigenous fish species for enhancing fisheries in lakes, reservoirs and small water bodies have been practiced broadly since 1975 through the Sebeta Fish Breeding and Research Centre, now a research wing of the Ethiopian Institute of Agricultural Research.

Ethiopia is uniquely rich in water resources. It has numerous water bodies including ponds, lakes, rivers, reservoirs and wetlands ^[5]. Although Ethiopian is a land locked country, it has a number of lakes and Rivers. The lakes cover a total area of about 7400 km² and the rivers cover a total length of about 7700 km ^[6]. Ethiopia has a rich diversity of Ichthyo-fauna in its lakes, rivers and reservoirs, although they are poorly known .Rivers have formed nuclei for human settlement from the origins of mankind. Many of the earliest civilizations emerged upon the fertile floodplains and since about 5000 b.p., when the earliest systematic colonization of the Nile, Mesopotamic, Indus and Chinese rivers occurred (Welcomme RL. River Fisheries)

Corresponding Author:

Yibeleal Aynalem Nurie
Woldia University, Department
of Animal Production, and
Technology, P.O.Box 400,
Woldia, Ethiopia

Amhara Region

Location, Demographics, Topography and Climate The Amhara National Regional State [ANRS] is one of the nine ethnic divisions of Ethiopia. It is located in the northwestern and north-central part of Ethiopia. The State shares common borders with the state of Tigray in the north, Afar in the east, Oromiya in the south, Benishangul-Gumuz in the south west, and the Republic of Sudan in the west. The capital city of the State of Amhara is Bahir Dar. The Amhara Region has a population of 20,660,826; urban inhabitants number 2,439,388 (11.8%) and rural 18,221,429 (88.2%) of the population [7]. With an estimated area of 159,173.66 square kilometers, this region has an estimated density of 108.2 people per square kilometer. For the entire Region 3, 983,768 households were counted which results in an average for the Region of 4.3 persons to a household, with urban households having on average 3.3 and rural households 4.5 people. The State of Amhara is topographically divided into two main parts, namely the highlands and lowlands. The highlands are above 1500 meters above sea level and comprise the largest part of the northern and eastern parts of the region. The highlands are also characterized by chains of mountains and plateaus. Ras Dejen (4620 m), the highest peak in the country, Guna (4236 m), Choke (4184m) and Abune-Yousef (4190m) are among the mountain peaks that are located in the highland parts of the Region.

The lowland part covers mainly the western and eastern parts with an altitude between 500-1500 meters above sea level. Areas beyond 2,300 meters above sea level fall within the

"Dega" climatic Zone, and areas between the 1,500-2,300 meter above sea level contour fall within the "Woina Dega" climatic zone; and areas below 1,500 contour fall within the "Kolla" or hot climatic zones. The Dega, Woina Dega and Kolla parts of the region constitute 25%, 44% and 31% of the total area of the region, respectively. The annual mean temperature for most parts of the region lies between 15 °C-21 °C. The State receives the highest percentage (80%) of the total rainfall in the country. The highest rainfall occurs during the summer season, which starts in mid June and ends in early September. Amhara region has a rich diversity of ichthyofauna in its lakes, rivers and reservoirs, although they are poorly known in terms of potential and taxonomic characteristics. Fishing is an age-old practice in these water bodies [8]. Amhara Region fish production potential above 40,000 tone fish meat [9]. Amhara region has 497 annually flow rivers, 297 seasonal flows and 2860 streams [10]

Lakes, Dams and Fish Diversity in Amhara Region

Lake Tana, found in Amhara Region, it has a surface area of 3600 with a maximum and mean depth of 14m and 8m. The Lake provides commercially important three delicious fish species; namely, African Cat fish (*Clarius gariepinus*) also locally called "Ambaza"1), Nile tilapia (*Oreochromis niloticus*, locally called "Kereso") and Labeobarbus spp. (locally called "Nech Asa"). They are consumed by larger part of the community, rural and urban, and traded widely in the region, the country and even to neighbouring nation, the Sudan [11]

Table 1: Riverine fish diversity in Amhara Region

River name	Families	Genera	Indigenous	Endemic	Introduced
Awash			10	3	
Abay (Blue-Nile)			45-46	3	1
Tekeze	9	22	32	3	1-2

Source [12]

Table 2: Fish species diversity in Lake Tana

<i>L. intermedius</i>	<i>L. intermedius</i>	<i>B. humilis</i>	<i>L. intermedius</i>	<i>L. intermedius</i>
<i>L. nedgia</i>	<i>L. nedgia</i>	<i>B. tanapelagis</i>		<i>L. nedgia</i>
<i>L. crassibarbis</i>	<i>L. crassibarbis</i>	<i>B. pleurgrama</i>	<i>L. crassibarbis</i>	<i>L. crassibarbis</i>
<i>L. surkis</i>	<i>L. surkis</i>	JuvenileLarge barbus		<i>L. surkis</i>
<i>L. longissimus</i>	<i>L. longissimus</i>		<i>L. longissimus</i>	-
<i>L. platdorsus</i>	<i>L. platydorsus</i>			-
<i>L. gorgorensis</i>	<i>L. gorgorensis</i>			-
<i>L. brevicephalus</i>	<i>L. brevicephalus</i>	<i>L. brevicephalus</i>	<i>L. brevicephalus</i>	<i>L. brevicephalus</i>
<i>L. tsanansis</i>	<i>L. tsanansis</i>		<i>L. nedgia</i>	<i>L. tsanansis</i>
<i>L. acutirostris</i>	<i>L. acutirostris</i>		<i>L. acutirostris</i>	<i>L. acutirostris</i>
<i>L. megastoma</i>	<i>L. megastoma</i>		<i>L. megastoma</i>	<i>L. megastoma</i>
<i>L. gorguir</i>	<i>L. gorguri</i>			-
<i>L. daineillii</i>	<i>L. daineillii</i>		<i>L. daineillii</i>	-
<i>L. macroptalmus</i>	<i>L. macroptalmus</i>		<i>L. macroptalmus</i>	<i>L. macroptalmus</i>
<i>L. triuttiformis</i>	<i>L. triuttiformis</i>		<i>G. dembecha</i>	<i>L. triuttiformis</i>
	<i>C. gariepinus</i>		<i>C. gariepinus</i>	<i>C. gariepinus</i>
	<i>V. beso</i>		<i>V. beso</i>	<i>V. beso</i>
	<i>O. niloticus</i>		<i>O. niloticus</i>	<i>O. niloticus</i>
	Small Barbus			-
	<i>Garra spp.</i>			-
				Current species

Sources: [13-16]

Dams/Lake Tekeze

Tekeze reservoir, an artificial lake, covers a total area of 16000 ha. Its location is characterized by an altitude of 1,145 m above sea level, a annual average rainfall of 150-700 mm

and temperature of 15-40 oc. It is bordered by three woredas namely Abergele, Ziqwala, Sahilaseyemt from Waghimra zone, Tselemt from North Gonder zone in Amhara region and Tsanqwa Abergele from Tigray region.

Table 3: Tekeze Dams/ Reservoirs Fish Species Diversity

Species name	Species name	Species name
<i>O. niloticus</i>	<i>M. electricus</i>	<i>L. niloticus</i>
<i>B. docmak</i>	<i>M.kannume</i>	<i>L. forskalii</i>
<i>B. bajad</i>	<i>H. forskhalii</i>	<i>L. bynni</i>
<i>C. gariepinus</i>	<i>V. beso</i>	<i>L. nedgia</i>
<i>H. longifilis</i>	<i>R. loati</i>	<i>L. crassibarbis</i>
<i>L. intermedius</i>	<i>G. dembensis</i>	Small <i>Barbus</i> species

Source [17]

Lake Hayq (also called Loggo) is a freshwater lake and located in northern Ethiopia, Amhara Regional State, and South Wollo Administrative Zone 433 km far from Addis Ababa the capital of Ethiopia. Lake Hayq is one of the highland lakes of Ethiopia at an altitude of 2,030 m. The lake lies between latitude of 11° 15' N and a longitude of 39° 57' E [18]. The surface area, mean and maximum depth of the lake

is 23 km², 37 m and 88.2 m, respectively and has a volume of 0.87 km³ [19]. The fish diversity known in Lake Hayq consists of only 4 species, Tilapia (*Oreochromis niloticus*) locally called “Kerosso”, Catfish (*Clarias gariepinus*) locally called “Ambaza”, Common carp (*Cyprinus carpio*) locally called “Dubae”, and Garra (*Garra dembecha*) locally called “Yewenz Assa” meaning river fish.

Tekeze Reservoir

Tekeze Reservoir, an artificial lake, covers a total area of 16000 ha. Its location is characterized by an altitude of 1,145 m above sea level, a annual average rainfall of 150-700 mm and temperature of 15-40 oc. It is bordered by three woredas namely Abergele, Ziqwala, Sahilaseyemt from Waghimra zone, Tselemt from North Gonder zone in Amhara region and Tsanqwa Abergele from Tigray region

Table 4: Fish species diversity small lakes, dams in Amhara region

Name of Lakes	Area in hectare	Fish diversity	Name of Lakes	Area in hectare	Fish diversity
Lego	2300	<i>O. niloticus</i>	Tirba	50	<i>Oreochromis niloticus</i>
		<i>T. zilli</i>			<i>Clarias Gariepinus</i>
		<i>C. carpio</i>			<i>T. zilli</i>
Ardibo	2100	<i>O. niloticus</i>	Bahir Giorgis	90	<i>C. carpio</i>
		<i>T. zilli</i>			<i>O. niloticus &</i>
		<i>C. carpio</i>			<i>T. zilli</i>
Golbbo	100	<i>O. niloticus</i>	Lai Bahir	8.3	<i>C. carpio</i>
Koga Dam		<i>Labeobarbus</i>			<i>O. niloticus</i>
		<i>Clarias gariepinus</i>			<i>T. zilli</i>
		<i>O. niloticus</i>	<i>C. caprio</i>		
Maibar	60	<i>O. niloticus</i>	Tach Bahir	5.12	<i>O. niloticus</i>
		<i>T. zilli</i>			<i>T. zilli</i>
		<i>C. carpio</i>			<i>C. caprio</i>
Zengana	50	<i>O. niloticus</i>	Ribe dams	1020	<i>Labeobarbus</i>
		<i>T. zilli</i>			<i>Clarias Gariepinus</i>
		<i>C. caprio</i>			<i>O. niloticus</i>
Geray reservoir	63.4 ha	<i>O. niloticus</i>	Ango-Mesk reservoir		<i>O. niloticus</i>
		<i>T. zilli</i>			<i>T. zilli</i>
		<i>C. caprio</i>			<i>C. caprio</i>
Washa reservoir		<i>C. carassius</i>			
		<i>O. niloticus</i>			
		<i>T. zilli</i>			
		<i>C. caprio</i>			

Source [20]

Riverin Fish Diversity in Amhara Region

Riverine ecosystems around the world are home to a rich array of biodiversity and play an important role in supporting

peoples’ livelihoods and traditions by providing them with numerous benefits

Table 5: Riverine fish species diversity northern amhara region

Gendwuha River	Guang River	Shinfa River	Ayima River	Angereb River	Sanja River	Zamra River
<i>Species name</i>	<i>L. niloticus</i>	<i>L. niloticus</i>	<i>H. niloticus</i>	<i>L. niloticus</i>	<i>Labeo niloticus</i>	<i>Bagrus bajad</i>
<i>C. gariepinus</i>	<i>S. schall</i>	<i>C. gariepinus</i>	<i>A. biscutatus</i>	<i>C. gariepinus</i>	<i>C. gariepinus B</i>	<i>Clarias gariepinus</i>
<i>S. schall</i>	<i>L. intermedius</i>	<i>S. schall</i>	<i>Labeo niloticus</i>	<i>L. intermedius</i>	<i>L. intermedius</i>	<i>Labeo niloticus</i>
<i>L. intermedius</i>	<i>H. longifilis</i>	<i>L. intermedius</i>	<i>C. gariepinus</i>	<i>V. beso</i>	<i>V. beso</i>	<i>Labeo forskalii</i>
<i>L. nedgia</i>	<i>L. nedgia</i>	<i>H. longifilis</i>	<i>S. schall</i>	<i>H. longifilis</i>	<i>H. longifilis</i>	<i>Labeobarbus nedgia</i>
<i>H. forskhalii</i>	<i>H. forskhalii</i>	<i>L. nedgia</i>	<i>Lates niloticus</i>	<i>L. nedgia</i>	<i>L. nedgia</i>	<i>Labeobarbus crassibarbis</i>
<i>L. bynni</i>	<i>L. bynni</i>	<i>A. baremoze</i>	<i>L. intermedius</i>	<i>B. docmak</i>	<i>B. docmak</i>	<i>Labeobarbus intermedius</i>
<i>S. serratus</i>	<i>S. serratus</i>	<i>H. forskhalii</i>	<i>H. longifilis</i>	<i>M. kannume</i>	<i>L. forskalii</i>	
<i>L. degeni</i>	<i>L. degeni</i>	<i>L. bynni</i>	<i>L. nedgia</i>	<i>L. forskalii</i>	<i>O. niloticus</i>	
<i>B. docmak</i>	<i>B. docmak</i>	<i>S. serratus</i>	<i>A. baremoze</i>	<i>O. niloticus</i>		
<i>B. bajad</i>	<i>B. bajad</i>	<i>L. degeni</i>	<i>H. forskhalii</i>			
<i>M. kannume</i>	<i>M. kannume</i>	<i>B. docmak</i>	<i>L. bynni</i>			
<i>L. forskalii</i>	<i>L. forskalii</i>	<i>B. bajad</i>	<i>S. serratus</i>			
<i>B. macrolepidotus</i>	<i>B. macrolepidotus</i>	<i>M. kannume</i>	<i>L. degeni</i>			

<i>L. crassibarbis</i>	<i>L. crassibarbis</i>	<i>L. forskalii</i>	<i>B. docmak</i>		
<i>O. niloticus</i>	<i>O. niloticus</i>	<i>S. intermedius</i>	<i>L. forskalii</i>		
<i>M. hasselquistii</i>	<i>M. hasselquistii</i>	<i>L. crassibarbis</i>	<i>B. macrolepidotus</i>		
		<i>O. niloticus</i>	<i>O. niloticus</i>		
		<i>M. caschive</i>	<i>B. nurse</i>		
		<i>B. nurse</i>			

Source [21- 22]

Table 6: Riverine fish species diversity central and east amhara region

Gilgel Abbay	Andassa	Jemma	Koga River	Blue Nile	Blue Nile
<i>L. intermedius</i>	<i>L. intermedius</i>	<i>L. intermedius</i>	<i>L. intermedius</i>	<i>Labeobarbus intermedius</i>	<i>M. kannume</i>
<i>V. beso</i>	<i>V. beso</i>	<i>V. beso</i>	<i>V. beso</i>	<i>L. brevicephalus</i>	<i>C. gariepinus</i>
<i>L. nedgia</i>	<i>L. nedgia</i>	<i>L. nedgia</i>	<i>L. nedgia</i>	<i>L. nedgia</i>	<i>Oreochromis niloticus</i>
<i>C. gariepinus</i>	<i>C. gariepinus</i>	<i>C. gariepinus</i>	<i>C. gariepinus</i>	<i>L. crassibarbis</i>	<i>Varicorhinus beso</i>
<i>L. brevicephalus</i>	<i>L. brevicephalus</i>	<i>L. brevicephalus</i>	<i>L. brevicephalus</i>	<i>L. surkis</i>	<i>Mormyrus kannume</i>
<i>L. acutrostris</i>	<i>L. megastoma</i>			<i>L. longissimus</i>	<i>Bagrus docmac</i>
<i>L. tsanesis</i>	<i>L. surkis</i>			<i>L. platydorsus</i>	<i>Hetrobranchus longifilis</i>
<i>L. macrophytalamus</i>				<i>L. gorgorensis</i>	
<i>L. trutiformis</i>				<i>L. tsanensis</i>	
<i>O. niloticus</i>				<i>L. acutirostris</i> ,	
				<i>L. megastoma</i>	
				<i>L. gorguri</i>	
				<i>L. daineillii</i>	
				<i>L. forskalii</i>	

Source [23-24]

Table 7: Riverine Fish diversity in east amhara

Mill River	Borkena River	Gerado River	Dirma River
<i>Clarias gariepinus</i>	<i>Clarias gariepinus</i>	<i>Clarias gariepinus</i>	<i>Clarias gariepinus</i>
<i>Gara debeca</i>	<i>Gara debeca</i>	<i>Garra dembecha</i>	<i>Garra dembecha</i>
<i>Labeobarbus</i>	<i>Labeobarbus</i>	<i>Labeoforskali</i>	<i>Labeobarbus intermedius</i>
<i>Intermedus</i>	<i>Intermedus</i>	<i>Labeobarbus intermedius</i>	<i>Labeobarbus nedgia</i>
<i>Labeobarbus negia</i>	<i>Labeobarbus negia</i>	<i>Labeobarbus nedgia</i>	<i>Varicorhinusbeso</i>
<i>Varicorinus beso</i>	<i>Varicorinus beso</i>	<i>Varicorhinusbeso</i>	<i>Ramius loti</i>
		<i>Oreochromis niloticus</i>	<i>Labeohorii</i>
		<i>Ramius loti</i>	
		<i>Labeohorii</i>	
		<i>Bagrusdockmac</i>	

Source [25]

Conclusion

The region has high water resource including lakes dams and rivers in Ethiopia compare with other regions. Amhara region has a rich diversity of Ichthyo-fauna in its. lakes, dams or reservoirs and rivers. Blue Nile and Tekeze riverine fishery are highly rich in the region. Common aquaculture fish species found in amara region

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