

Survey of Fish Fauna from Five Stations in Duhok Province, Kurdistan Region, Iraq

Firas A. Mizory

Department of Dental Basic Sciences, College of Dentistry, University of Duhok, Duhok,
Iraq

Corresponding author: firmas.abdulmalek@uod.ac

Abstract: A survey of fish species was carried out from five stations in Duhok province during the period from August 2016 to September 2017. A total of 517 freshwater fishes, belong to 19 species, namely: *Acanthobrama marmid*, *Arabibarbus grypus*, *Capoeta damascina*, *C. trutta*, *Carasobarbus luteus*, *Carassius carassius*, *Chondrostoma regium*, *Cyprinion kais*, *C. macrostomum*, *Cyprinus carpio*, *Garra rufa*, *Leuciscus vorax*, *Luciobarbus barbulus*, *L. esocinus*, *L. xanthopterus*, *Mastacembelus mastacembelus*, *Mesopotamichthys sharpeyi*, *Planiliza abu* and *Silurus triostegus* were recorded. The survey showed that the abundant fish at all five stations was *C. carassius* which is one of the nuisance fish species while the little abundance was recorded for *C. luteus*.

Keywords: Fish population, Duhok province, Biodiversity

Introduction

Kurdistan region is located in the north of Iraq. It is very rich in freshwater bodies, including many lakes, rivers, streams and springs, such as Dokan lake, Darbandikhan lake, Dohuk lake, Bawaswar lake, the Greater Zab river, the Lesser Zab river and the Sirwan river. These water bodies are good for many aquatic organisms, usually ichthyofauna. Unfortunately, the study of these faunae in water bodies was very limited (Abdullah et al., 2007).

The Tigris river is the eastern member of the two great rivers that define Mesopotamia, the other one being the Euphrates. This river flows south from the mountains of southeastern Turkey through Iraq and empties itself into the Arab Gulf. The Tigris is 1,850 km long, rising in the Taurus mountains of eastern Turkey, about 25 km southeast of the city of Elazig and about 30 km from the headwaters of the Euphrates. The river then flows for 400 km through Turkish territory before becoming the border between Syria and Turkey. This stretch of 44 km is the only part of the river that is located in Syria (Mustafa, 2017).

Biodiversity is affected by challenges and threats distinguished in two categories: indirect and direct changes. Some factors, such as overpopulation and

lifestyle, can directly affect ecosystems, such as fishing with fertilizers to increase production. These ecosystem changes can also change the services provided by ecosystems, which can adversely affect human health and well-being. Many of the threats and challenges mentioned above are not limited to a single region or local area, but affect in varying degrees all of Iraq. These include legal fishing and hunting practices (Hassan, 2010; Shekha, 2016).

Mosul dam, is one of the largest dams in Iraq. It is located on the western of Duhok province and in the western province of Ninawa, upstream of the city of Mosul. At its full capacity, the hydroelectric dam holds about 11.1 cubic kilometers of water and provides electricity for 1.7 million residents of Duhok province (Mustafa, 2017).

Some factors, such as overpopulation, technology, and lifestyle, can directly affect ecosystems, such as fishing with fertilizers to increase production. These ecosystem changes can also change the services provided by ecosystems, which can adversely affect human health and well-being. Many of the threats and challenges mentioned above are not limited to a single region or local area, but affect in varying degrees all areas of Iraq. These include legal fishing and hunting practices (Khaefi et al., 2017). There is an urgent need to conduct a survey of most of the water bodies of the Kurdistan region to follow the spread of some nuisance fishes and to get more information about fish biodiversity at Duhok (Mizory & Abdulrahman, 2019). The aim of the study was to observe the biodiversity of fishes in five stations in Duhok province through the seasons.

Materials and Methods

Fish samples were collected from early morning to afternoon to recording all information for each species by using a fishing boat supplemented by trawl net. Also, fish samples were collected from commercial fisheries, through coordination and cooperation with fishermen of the Duhok city, which used different fishing nets, benthic trawl nets, fixed gill nets and floating gill nets. The collecting sites fall into five regions: Zakho, Jambour, Semel, Duhok dam and Deralok as shown in Figure 1.

Fish survey in Duhok were made as in the followings:

- 1- Collecting random number, species and ages of fishes.
- 2- Choosing five sites (as mentioned above) and comparing fish distribution from each station.
- 3- Collecting data depending on special fish data sheets which included the following parameters: Station area, fish name, fish length, fish weight, maturity, sex and feeding habits (Tables 1-6).
- 4- For fish scientific names and families, Fricke et al. (2020) was followed.

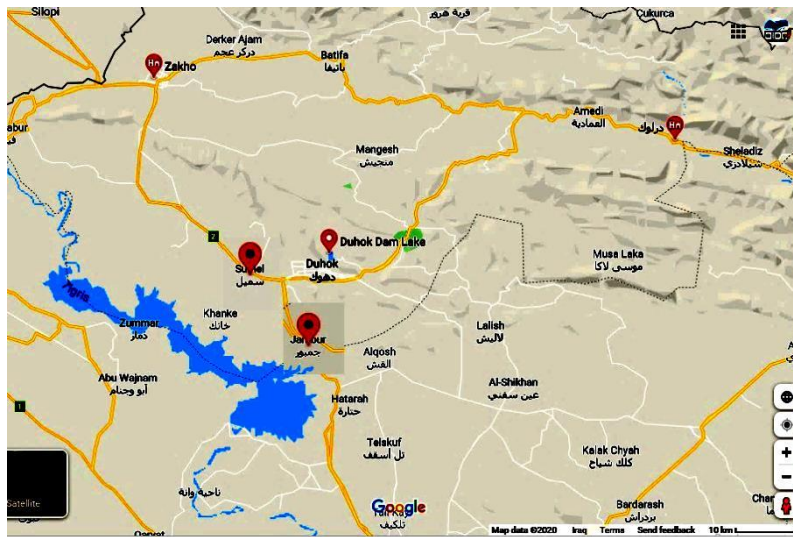


Figure 1: Five stations of Duhok province where fishes were taken (Google map, 2020).

Results and Discussion

A total of 517 fish specimens, belong to 19 species and five families: Cyprinidae, Leuciscidae, Mastacembelidae, Mugilidae and Siluridae, were collected from Duhok five stations during the period from August 2016 to September 2017. These species (alphabetically arranged) included: *Acanthobrama marmid*, *Arabibarbus grypus*, *Capoeta damascina*, *C. trutta*, *Carasobarbus luteus*, *Carassius carassius*, *Chondrostoma regium*, *Cyprinion kais*, *C. macrostomum*, *Cyprinus carpio*, *Garra rufa*, *Leuciscus vorax*, *Luciobarbus barbulus*, *L. esocinus*, *L. xanthopterus*, *Mastacembelus mastacembelus*, *Mesopotamichthys sharpeyi*, *Planiliza abu* and *Silurus triostegus*. At the first station (Zakho), a total of 102 individuals belonging to nine species were recorded as shown in Table 1 with their numbers.

Table 1: Length, weight, sex, maturity and feeding habits of fishes at Zakho station.

No.	Fish name	No. fishes	M	F	Length (cm)	Weight (gm)	Maturity	Feeding habits	Economic importance
1	<i>A. grypus</i>	2	1	1	21	320	A	O	E
2	<i>C. carassius</i>	35	15	20	15	180	A	C	Ne
3	<i>C. carpio</i>	21	12	9	56	3750	A	O	Ne
4	<i>C. luteus</i>	4	3	1	20	220	J	O	E
5	<i>G. rufa</i>	2	1	1	15	75	J	H	Me
6	<i>L. barbulus</i>	5	2	3	24	150	J	O	E
7	<i>L. esocinus</i>	11	6	5	64	5300	A	O	E
8	<i>L. xanthopterus</i>	13	5	8	30	150	A	O	E
9	<i>S. triostegus</i>	9	3	6	35	2700	A	O	E
Total		102	48	54			102		

M= Male, F= Female, J= Juvenile, A= Adult, H= Herbivore, C= Carnivore, O= Omnivore, E= Economic, NE= Not Economic, ME= Middle Economic.

At the second station (Jambour), a total of 126 individuals belonging to 13 species were recorded as shown in Table 2 with their numbers.

Table 2: Length, weight, sex, maturity and feeding habits of fishes at Jambour station.

No.	Fish name	No. fishes	M	F	Length (cm)	Weight (gm)	Maturity	Feeding habits	Economic importance
1	<i>A. grypus</i>	1	1	0	18	200	J	O	E
2	<i>A. marmid</i>	7	5	2	15	200	J	O	E
3	<i>C. carassius</i>	45	30	15	13	175	J & A	C	Me
4	<i>C. carpio</i>	17	7	10	54	2750	A	O	E
5	<i>C. kais</i>	2	1	1	19	95	J	H	Ne
6	<i>C. trutta</i>	2	1	1	27	300	J & A	O	Me
7	<i>L. barbulus</i>	3	2	1	24	170	J	H	E
8	<i>L. esocinus</i>	10	4	6	45	3500	J & A	H	E
9	<i>L. vorax</i>	5	2	3	22	750	A	H	E
10	<i>L. xanthopterus</i>	12	5	7	32	180	J	O	E
11	<i>M. sharpeyi</i>	16	10	6	21	205	J & A	O	E
12	<i>P. abu</i>	3	0	3	12	125	J	C	Ed
13	<i>S. triostegus</i>	3	1	2	43	3750	A	O	E
Total		126	69	57			126		

M= Male, F= Female, J= Juvenile, A= Adult, H= Herbivore, C= Carnivore, O= Omnivore, E= Economic, NE= Not economic, ME= Middle economic, ED= Economic for fish diets.

At the third station (Semel), a total of 106 individuals belongs to ten species were recorded as shown in Table 3 with their numbers.

Table 3: Length, weight, sex, maturity and feeding habits of fishes at Semel station.

No.	Fish name	No. fishes	M	F	Length (cm)	Weight (gm)	Maturity	Feeding habits	Economic importance
1	<i>A. grypus</i>	3	2	1	17	150	J	O	E
2	<i>C. carassius</i>	38	18	20	13	140	J & A	C	Me
3	<i>C. carpio</i>	14	10	4	45	1500	A	O	E
4	<i>C. macrostomum</i>	2	1	1	16	115	J & A	O	E
5	<i>C. trutta</i>	2	1	1	23	220	J	O	Me
6	<i>L. esocinus</i>	5	4	1	38	3250	A	H	E
7	<i>L. xanthopterus</i>	11	5	6	28	175	J	O	E
8	<i>L. vorax</i>	8	2	6	23	820	A	H	E
9	<i>M. sharpeyi</i>	17	8	9	20	190	J & A	O	E
10	<i>S. triostegus</i>	6	4	2	35	3000	A	O	E
Total		106	55	51			106		

M= Male, F= Female, J= Juvenile, A= Adult, H= Herbivore, C= Carnivore, O= Omnivore, E= Economic, ME= Middle economic.

At the fourth station (Duhok dam), a total of 101 individuals belongs to 15 species were recorded as shown in Table 4 with their numbers.

Table 4: Length, weight, sex, maturity and feeding habits of fishes at Duhok dam station.

No.	Fish name	No. fishes	M	F	Length (cm)	Weight (gm)	Maturity	Feeding habits	Economic importance
1	<i>A. grypus</i>	1	0	1	16	130	J	O	E
2	<i>A. marmid</i>	6	4	2	16	205	J	O	E
3	<i>C. carassius</i>	30	16	14	14	170	J & A	C	Me
4	<i>C. carpio</i>	11	5	6	60	3000	A	O	E
5	<i>C. kais</i>	2	1	1	19	95	J & A	H	Ne
6	<i>C. luteus</i>	4	2	2	19	215	J	O	E
7	<i>C. macrostomum</i>	3	1	2	18	130	J & A	O	E
8	<i>C. trutta</i>	2	1	1	26	275	J	O	Me
9	<i>L. barbulus</i>	1	1	0	23	130	J	H	E
10	<i>L. esocinus</i>	6	2	4	52	4700	A	H	E
11	<i>L. vorax</i>	4	1	3	22	800	A	H	E
12	<i>L. xanthopterus</i>	2	1	1	33	200	J	O	E
13	<i>M. sharpeyi</i>	22	13	9	19	220	J & A	O	E
14	<i>P. abu</i>	2	0	2	14	150	J	C	Ed
15	<i>S. triostegus</i>	5	2	3	40	3200	A	O	E
Total		101	50	51	101				

M=Male, F=Female, J=Juvenile, A=Adult, H=Herbivore, C=Carnivore, O=Omnivore, E= Economic, ME= Middle economic, NE= Not economic, ED= Economic for fish diets.

At the fifth station (Deralok), a total of 82 individuals belongs to 11 species were recorded as shown in Table 5 with their numbers.

Table 5: Length, weight, sex, maturity and feeding habits of fishes at Deralok station.

No.	Fish name	No. fishes	M	F	Length (cm)	Weight (gm)	Maturity	Feeding habits	Economic importance
1	<i>A. grypus</i>	9	4	5	18	150	J	O	E
2	<i>C. carassius</i>	1	1	0	12	150	J	C	Me
3	<i>C. damascina</i>	14	8	6	30	210	J	H	Ne
4	<i>C. kais</i>	5	3	2	18	90	J	H	Ne
5	<i>C. regium</i>	13	4	9	22	80	J	O	Ne
6	<i>C. trutta</i>	8	6	2	24	250	J	O	Me
7	<i>G. rufa</i>	8	5	3	13	50	J	H	Me
8	<i>L. barbulus</i>	6	4	2	22	110	J	O	E
9	<i>L. xanthopterus</i>	13	5	8	25	120	J	O	E
10	<i>M. mastacembelus</i>	3	0	3	18	150	J	H	Ne
11	<i>P. abu</i>	2	0	2	11	110	J	C	Ed
Total		82	40	42	82				

M= Male, F= Female, J= Juvenile, H= Herbivore, C= Carnivore, O= Omnivore, E= Economic, ME= Middle economic, NE= Not economic, ED= Economic for fish diets.

The collected fish individuals from all stations were 517 which belonged to 19 species as shown in Table 6 with their numbers.

Table 6: The availability of fish species at the five stations.

No.	Fish species			Fish collection stations					Occurrence at stations	Native or Exotic
	Fish name	Family name	No. fishes	Zakho	Jambour	Semel	Duhok dam	Deralok		
1	<i>A. marmid</i>	Leuciscidae	13	-	+	-	+	-	2	N
2	<i>A. grypus</i>	Cyprinidae	19	+	+	+	+	+	5	N
3	<i>C. damascina</i>	Cyprinidae	14	-	-	-	-	+	1	N
4	<i>C. trutta</i>	Cyprinidae	8	-	+	+	+	+	4	N
5	<i>C. luteus</i>	Cyprinidae	8	+	-	-	+	-	2	N
6	<i>C. carassius</i>	Cyprinidae	149	+	+	+	+	+	5	E
7	<i>C. regium</i>	Leuciscidae	16	-	-	-	-	+	1	N
8	<i>C. kais</i>	Cyprinidae	9	-	+	-	+	+	3	N
9	<i>C. macrostomum</i>	Cyprinidae	5	-	-	+	+	-	2	N
10	<i>C. carpio</i>	Cyprinidae	63	+	+	+	+	-	4	E
11	<i>G. rufa</i>	Cyprinidae	10	+	-	-	-	+	3	N
12	<i>L. vorax</i>	Leuciscidae	17	-	+	+	+	-	3	N
13	<i>L. barbulus</i>	Cyprinidae	15	+	+	-	+	+	4	N
14	<i>L. esocinus</i>	Cyprinidae	32	+	+	+	+	-	4	N
15	<i>L. xanthopterus</i>	Cyprinidae	51	+	+	+	+	+	5	N
16	<i>M. mastacembelus</i>	Mastacembelidae	3	-	-	-	-	+	1	N
17	<i>M. sharpeyi</i>	Cyprinidae	55	-	+	+	+	-	3	N
18	<i>P. abu</i>	Mugilidae	7	-	+	-	+	+	3	N
19	<i>S. triostegus</i>	Siluridae	23	+	+	+	+	-	4	N
Total			517							

+= Available, -= Absent, N= Native, E= Exotic.

Table 7 shows the percentage of fish abundance of the collected individuals from all the five stations. The highest values (numbers and abundance) were recorded for *C. carassius* (149% and 28.9%), while the lowest values were for *M. mastacembelus* (3 and 0.58%).

The most recorded species by Ribeiro et al. (2015) in Iberian Peninsula were native species with the exception of two species (*C. auratus* and *C. gibelio*), while Fahd (2012) record *C. auratus gibelio* from Thi-Qar province, Southern Iraq. Abdullah (2002), in northern Iraq, recorded only one species of exotic fishes from Greater Zab river (*Heteropneustes fossilis*) and Abdullah (2013) in northern Iraq recorded three species of exotic fishes from Darbandikhan lake (*C. carpio*, *Hemiculter leucisculus* and *Hypophthalmichthys molitrix*). Abdullah (2002) recorded 25 species of fishes from Greater Zab river that included 19 species belonging to the family Cyprinidae, and he recorded 19 species of fishes from Lesser Zab river of which 15 species belonging to the family Cyprinidae. Abdullah (2006) recorded 23 species of fishes from Dokan lake, of which 18 species belonging to the family Cyprinidae while in the present study, 19 species belonging to five families: Cyprinidae, Leuciscidae, Mastacembelidae, Mugilidae and Siluridae were recorded. Coad (2010) indicated that there are 13 exotic fish species from Euphrates-Tigris basins, two species were also included in this study.

Table 7: Number and abundance of fish species at Duhok province.

No.	Fish species	No. fishes	% fish abundance
1	<i>A. grypus</i>	19	3.67
2	<i>A. marmid</i>	13	2.51
3	<i>C. carassius</i>	149	28.9
4	<i>C. carpio</i>	63	12.18
5	<i>C. damascina</i>	14	2.7
6	<i>C. kais</i>	9	1.74
7	<i>C. luteus</i>	8	1.55
8	<i>C. macrostomum</i>	5	0.96
9	<i>C. regium</i>	16	3.09
10	<i>C. trutta</i>	8	1.55
11	<i>G. rufa</i>	10	1.93
12	<i>L. barbulus</i>	15	2.9
13	<i>L. esocinus</i>	32	6.18
14	<i>L. vorax</i>	17	3.28
15	<i>L. xanthopterus</i>	51	9.86
16	<i>M. mastacembelus</i>	3	0.58
17	<i>M. sharpeyi</i>	55	10.63
18	<i>P. abu</i>	7	1.35
19	<i>S. triostegus</i>	23	4.44
Total		517	100

At another study in Sulaimani province, northern Iraq by Abdullah & Abdullah (2018), 255 freshwater fishes belong to 17 species, were recorded, namely: *Arabibarbus grypus*, *Luciobarbus barbulus*, *Capoeta trutta*, *C. umbla*, *Carasobarbus luteus*, *Carassius auratus*, *Cyprinion macrostomum*, *Cyprinus carpio*, *Garra rufa* and *Luciobarbus esocinus* (all within the family Cyprinidae), *Chondrostoma regium* and *Squalius lepidus* (Leuciscidae), *Hemiculter leucisculus* and *Hypophthalmichthys molitrix* (Xenocyprididae), *Mystus pelusius* (Bagridae), *Silurus triostegus* (Siluridae) and *Mastacembelus mastacembelus* (Mastacembelidae) which represented more than ten species recorded in comparison with the present study.

Mohamed et al. (2014) indicated that among the 17 fish species of the Iraqi southern marshes, the dominant species were *Planiliza abu* (14.6%), *C. auratus* (13.4%) and *Thryssa mystax* (11.2%). Ararat et al. (2008) referred that the dominant fish species in Kurdistan Iraq were *Cyprinus carpio* (16%), followed by *Acanthobrama marmid* (12%), *Luciobarbus xanthopterus* (12%), *Planiliza abu* (12%), *Varicorhinus* sp. (10%), *Luciobarbus esocinus* (8%), *Leuciscus vorax* (7%), *Carassius carassius* (7%), *Capoeta damascina* (6%), *Mastacembelus mastacembelus* (4%), *Silurus triostegus* (3%), and *Heteropneustes fossilis* (3%).

Conclusions and Recommendations

There is a beautiful variation of species and numbers of fishes at Duhok province. There is an urgent need to conduct a survey of most of the water bodies of all Kurdistan region including Duhok province to draw a clear picture of fish distribution and biodiversity.

Acknowledgment

The author is thankful to Dr. Bahar J. Selivany, Dean of College of Dentistry, University of Duhok for her constant encouragement and support.

References

- Abdullah, S.M.A. (2002). Ecology, taxonomy and biology of some parasites of fishes from Lesser Zab and Greater Zab rivers in north of Iraq. Ph. D. Thesis, Coll. Educ. (Ibn Al- Haitham), Univ. Baghdad: 153 pp. (In Arabic).
- Abdullah, S.M.A. (2006). The inhabitant fishes in Dukan lake in north of Iraq and methods for developing their culturing. 2nd Int. Sci. Cong. Environ, South Valley Univ, Qena, Egypt: 28-30 March 2006: 68-78.
- Abdullah, S.M.A.; Rahemo Z.I.F. & Shwani A.A. (2007). The inhabitant fishes in Darbandikhan lake in north of Iraq and methods for developing their culture. Egypt. J. Aquat. Biol. Fish. 11(3): 1-7.
- Abdullah, Y.S. (2013). Study on the parasites of some fishes from Darbandikhan lake in Kurdistan region, Iraq. M. Sc. Thesis, Fac. Sci. & Sci. Educ., Univ. Sulaimani: 116 pp.
- Abdullah, Y.S. & Abdullah, S.M.A. (2018). Ichthyofauna of Darbandikhan lake in Kurdistan region, Iraq. Zanco J. Pure Appl. Sci., 30(6): 130-134. DOI:10.21271/ZJPAS.30.6.12.
- Ararat, K.; Abid, I.M. & Abdul Rahman, S. (2008). Key biodiversity survey of Kurdistan, northern Iraq: Site review for birds, botany & fisheries. Winter & Summer 08 Survey, Publ. No. NI-1208-001: 120 pp.
- Coad, B.W. (2010). Freshwater fishes of Iraq. Pensoft Publ., Sofia: 274 pp. + 16 pls. www.briancoad.com.
- Fahd, K.K. (2012). Some aspects of ecological and biological in the prussian carp *Carassius auratus gibelio* in Al-Baddah dam, Thi-Qar, Iraq. Thi-Qar J. Agric. Res., 1(1): 259-269.
- Fricke, R.; Eschmeyer, W.N. and Van der Laan, R. (eds.) (2020). Eschmeyer's catalog of fishes: Genera, species, references. <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. (Updated 2 November 2020).
- Googlemap. (2020). <https://www.google.com/maps/search/Sumel,+Duhok,+Deralok,+Zakho,+Jambur/@36.9419176,42.9918188,10z/data=!3m1!4b1>
- Hassan, N.O. (2010). National Report on Biodiversity in Iraq. Ministry of Environment, Republic of Iraq: 153 pp.
- Khaefi, R.; Teimori, A. & Esmaeili, H.R. (2017). Phylogenetic relationships and taxonomy of *Luciobarbus barbulus* (Heckel, 1847) (Teleostei: Cyprinidae). J. Ichthyol., 57(6): 835-845.
- Mizory, F.A. & Abdulrahman, N.M. (2019). Survey and ichthyofauna of Great Zab river in Deralok hydropower plant. J. Univ. Duhok (JUD), 22(2): 69-79.
- Mohamed, A.R.M.; Hussein, S.A. & Mutlak, F.M. (2014). Composition of fish assemblage in the East Hammar marsh, southern Iraq. Baghdad J. Sci., 11(3): 1373-1381.

- Mustafa, S.O. (2017). This study investigated the effects of climate change on the fish species of river and dam of Duhok province – Kurdistan region of Iraq. *J. Aquac. Mar. Biol.*, 6(2): 00153. DOI:10.15406/jamb.2017.06.00153.
- Ribeiro, F.; Rylkova, K.; Valca´rcel, R.M.; Carrapato, C. & Kalous, L. (2015). Prussian carp *Carassius gibelio*: A silent invader arriving to the Iberian peninsula. *Aquat. Ecol.*, 49: 99-104. DOI:10.1007/s10452-015-9508-5.
- Shekha, Y.A. (2016). Evaluation of water quality for Greater Zab river by principal component analysis/factor analysis. *Iraqi J. Sci.*, 57(4B): 2650-2663.