



## RESEARCH PAPER

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# Ichthyodiversity and length-weight relationship of mori (*Cirrhinus mrigala*) in River Indus of D.I. Khan Region, Pakistan

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**Key words:** Ichthyodiversity, Length-Weight Relationship, Mori (*Cirrhinus mrigala*), River Indus, D.I. Khan Region, Pakistan.

<http://dx.doi.org/10.12692/ijb/14.2.305-310>

Article published on February 27, 2019

## Abstract

The current study was to investigate the fish biodiversity and length-weight relationship of Mori fish in river Indus of D.I. Khan. Total of 686 fishes of Mori fish collected from different sites like Gishkuri, 206 (30.02%), Mandhran, 257 (37.47%) and D.I. Khan City, 223 (32.51%) of D.I. Khan in three weeks of month. The mean values of sites like Gishkuri, Mandhran and D.I. Khan City were 29.42, 36.71 and 31.87 respectively. R value was greater than 0.5 so no significant correlations is found between length and weight if value less than 0.5 then some significant correlation are found between length and weight. It was concluded that the harsh rules regulations should be monitored for the conservation of fish biodiversity and control of aquatic pollutions like (pesticides, industrial chemicals etc) and fisheries worker should be active to bane the unlawful angling. Because fishes are responsible for the availability of proteins to the human population.

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## Introduction

Mori or Morakhi is the local name of *Cirrhinus mrigala*. Body is long with rounded belly. Head is small with rounded snout and mouth is sub terminal with thin jaws. The body is bright silvery, covered with cycloid scales and containing a small one pair of barbell. The behavior of food is as bottom feeder eating organic matter and rotten vegetables. In juvenile period totally depend on zooplankton and full size reached to 0 - 9m respectively (Memon, 2011). The different type of fish species existing in the specific water forms of the area called as ichthyodiversity (Shinde *et al.*, 2009). Fresh water fish biodiversity is greatly changed from the fish biodiversity of warm water in the Indus plain of Pakistan (Rafique, 2000). Maximum biodiversity of fresh water fish have exact joint dispersal (Rosenfeld, 2002; Magurran, 2009).

The ecosystem of Pakistani Indus River has been troubled by strong human actions. Due to treating of human actions resulting in territory damage and deterioration. Most of the ichthyodiversity of fresh water has been become in danger of extinction. Population subtleties alter the vigorous charges of a population finished time, where ichthyodiversity are the main pointer of environmental health. Therefore, richness and fitness of fish indicates the fitness of water forms (Hamzah, 2007). Deterioration of fishes and fisheries impact the financial and population development (Limburg *et al.*, 2011).

The carps are the significant water diet article, where main carps are the profitable fish kind of Pakistan. These carps are namely, Mori (*Cirrhinus mrigala*), Rohu (*Labeo rohita*) and Thaila (*Catla catla*) are measured as main basis of protein from Pakistani waters bodies. Due to their great profitable prices, all of these fish kinds are cultivated in significance base. Inappropriately, normal standard of these great profitable valued fish has been deteriorated. Therefore, seeing the rank of these profitable species, current study was showed. Some examination on the rank of such significant species also has been showed from other regions of Pakistan, like Hub reservoir and

Gomal river (Mirza *et al.*, 1995, Abeda and Afsheen, 2014). The population subtleties have a change in fish communal morphology that carried by several influences like ecological influences, species connections, obtainability of food and fish migration (Taylor *et al.*, 2006). Zone of Pakistan that establishes a temporary zone which qualities the excessive effect and difference in ichthyodiversity (Mirza, 1994).

The purpose of current study was to determine the ichthyodiversity and length-weight relationship of Mori (*Cirrhinus mrigala*) in river Indus of D.I. Khan region Pakistan.

## Materials and methods

### Study area

The river Indus originates in North of Pakistan, flow in the southern direction and directly entered into the Arabian Sea at Karachi. The total length of river Indus is 3180 km (1976 miles). The estimated annual flow is 207km<sup>3</sup>. The total length of river Indus in D.I. Khan side is 180km respectively. The river entered into D.I. Khan at Chasma side and ended at Ramak (tehsil of D.I. Khan).

### Collection, preservation and identification

Fishes were collected from three main sites like Gishkuri, Mandhran and D.I. Khan City. For the capturing of fishes used different sources like angling and nets. The survey was completed in three weeks of the month and fishes were brought to the Zoology department Govt. College No.1 D.I. Khan. Small fishes were conserved directly in 10% formalin solution in bottle, while large fishes were cut their abdomen and preserved and identified up to species level according to related literature and key (Talwar and Jhingran, 1991) available. Total length of each fish was measured from snout to caudal fins using measuring rod. Body weight was measured by using digital balance.

### Statistical analysis

To determine the actual relationship between length and weight we applied the following cube law (Yem, 2007).

$$W=aL^b$$

Where a=constant (initial growth index)

b=equilibrium constant

w=weight of fish

L=length of fish

Taking log on both side the of the following equation

$$\text{LOGW}=\text{Loga}+\text{blogL}$$

First of all we will find "a" value by formula

$$a = \frac{\sum \text{Logw} \cdot 2(\sum \text{logL}) - \sum \text{LogL} \cdot \sum (\text{LogL} \times \text{Logw})}{N \sum \text{Log}^2 - (\sum \text{LogL})^2}$$

b value us determine by using below formula

$$b = \frac{\sum \text{Logw} - (N \text{Loga})}{\sum \text{LogL}}$$

## Results

The mean values of sites like Gishkuri, Mandhran and D.I. Khan City were 29.42, 36.71 and 31.87 respectively (Table 1& Fig. 1).

The higher and lower values of length was documented with range of 47 cm and 20.5 cm, while the 29000gram and 13000 gram were recorded higher and lower values of weight respectively (Table 2). Therefore, all part of the body will grow at the same rate. Data was arranged in table form. Log L value for each fish was determined and at last all the LogL value was sum up. Log w value for each fish was determined and at last all the Logw value was sum up logL multiplied with Logw to find out  $\sum \text{LogL} \times \text{Logw}$ .

**Table 1.** Ichthyodiversity of Mori (*Cirrhinus mrigala*) in river Indus of D.I. Khan Region.

Days	Gishkuri		Mandhran		D.I. Khan City	
	No of fish	Percentage	No of fish	Percentage	No of fish	Percentage
01	23	11.17	53	20.62	36	16.14
02	35	16.99	43	16.74	27	12.11
03	18	8.73	34	13.23	38	17.04
04	28	13.59	41	15.95	21	9.42
05	42	20.38	27	10.50	43	19.28
06	26	12.63	32	12.46	24	10.76
07	34	16.51	27	10.50	34	15.25
Total	206	100	257	100	223	100
Mean	29.42		36.71		31.87	

The higher value of length was 50 cm, while lower value was 33.5 cm respectively. Similarly higher and lower values of weight were 49000 gram and 29000 gram respectively (Table 3).

The higher value of length was recorded as 46.5 cm, while lower was 23 cm. Similarly the higher and lower values of weight were 37000 gram and 19000 gram respectively (Table 4).

The higher values of weight and length were 37 and 47, while lower values were documented with range of 13 and 20.5 respectively. These values were recorded in seven days of the month.

The higher and lower values of weight were recorded with range of 49 kg and 29 kg, while higher and lower

values of average length were documented with 50 cm and 33.5 cm respectively. The higher and lower values of weight in kg were recorded with 37 kg and 19 kg, while higher and lower values of average length were 46.5 cm and 23 cm respectively.

## Discussion

In the present study total of 686 fishes of Mori collected from different sites like Gishkuri, 206 (30.02%), Mandhran, 257 (37.47%) and D.I. Khan City, 223 (32.51%) of D.I. Khan region in three weeks of month. The mean values of sites like Gishkuri, Mandhran and D.I. Khan City were 29.42, 36.71 and 31.87 respectively. R value was greater than 0.5, so no significant correlations is found between length and weight if value less than 0.5 then some significant correlation are found between length and weight.

**Table 2.** Correlation between length and weight of *Cirrhinus mrigala* at Gishkurisite.

S. No	Length (cm)	Weight (gram)	Log l	Log w	Log l *Log w
1	30.5	15000	1.48	4.17	6.17
2	31	29000	1.49	4.46	6.64
3	47	13000	1.67	4.11	6.86
4	20.5	21000	1.31	4.32	5.65
5	39.5	27000	1.59	4.43	7.04
6	37.5	20000	1.43	4.34	6.14
7	40	26000	1.6	4.31	4.14
Total	236	151000	10.57	30.14	42.64

The k value like 4.3 documented for fresh water *Tilapia zillii* was higher and recommends that the fish was in better situation by Anene, 2005. Imam *et al.*, 2010 documented that the ranged from 2.63 to 3.4 respectively in drought and damp period. Similarly the values ranged in between the 1.6603 to 2.0190 and 1.6354 to 2.134 respectively documented by the Mahomoud *et al.*, 2011. Negative allometric development for brackish water *T. zillii* with a, b values were 2.9 and 2.92 respectively. Changes between the values are due to presence of salinity and

other environmental circumstances Mossad, 1990; Ibrahim *et al.*, 2008. A study was conducted by the Mary *et al.*, 2016 reported the length weight relationship for 1050 specimens of *Tilapia mossambica*. The length weight relationship was recorded with range of 0.50 to 150 cm and 3.00 to 350 g respectively. Coefficient correlation for length weight relationship was recorded with range of 0.60 and 0.98 respectively and indicates the significant correlation between length and weight.

**Table 3.** Correlation between length and weight of *Cirrhinus mrigala* at Mandhran site.

S. No	Length (cm)	Weight (gram)	Log l	Log w	Log l *Log w
1	39.5	49000	1.59	4.69	7.45
2	50	41000	1.69	4.61	7.79
3	37	40000	1.56	4.6	7.17
4	41.5	38000	1.61	4.57	7.35
5	39	31000	1.59	4.49	7.13
6	33.5	29000	1.52	4.46	6.77
7	41.5	39000	1.61	4.59	7.38
Total	282	267000	11.17	32.01	51.04

It shows positive allometric development from the specimen of *T. mossambica*. Similarly the mean value for all specimens of *T. mossambica* was 0.79 and suggested that the better health situation of the specimens. Adaka *et al.*, 2016 documented the length weight relationship of some fish species collected from Oramiri-Ukwa river of south east Nigeria. The b value was recorded from nine fish species with range of 1.830 to 5.670 respectively and most of the fishes show the negative allometric development pattern,

while few fish species show positive isometric development pattern with 3.04 value. Similarly some fish species indicated the greater degree of positive correlation at ( $P > 0.05$ ) and did not indicate the positive correlation. Although, various factors like illness, sex, age, level of puberty, level and size of stomach, sampling methods, size and ecological circumstance influence fish situation and factors of length weight relations in fish by the Ama-Abasi, 2007; Yem *et al.*, 2007; Adeyemi *et al.*, 2009.

**Table 4.** Correlation between length and weight of *Cirrhinus mrigala* at D.I. Khan City site.

S. No	Length (cm)	Weight (gram)	Log l	Log w	Log l *Log w
1	35	29000	1.54	4.46	6.48
2	30	19000	1.47	4.27	6.27
3	46.5	27000	1.66	4.43	7.35
4	39.5	26000	1.59	4.41	7.01
5	29.5	37000	1.46	4.56	5.65
6	34.5	32000	1.53	4.5	6.88
7	23	26000	1.36	4.41	5.99
Total	238	267000	10.61	31.04	45.63

### Conclusion

From the current study it was concluded that the biodiversity is rich and length weight relationship of Mori (*Cirrhinus mrigala*) in river Indus of D.I. Khan give help to fisheries taxonomist in further studies. Seminars should also be decided for alertness and training of scholars, professor, employees of fishery department and overall public etc. Harsh rules regulations should be monitored for the conservation of fish biodiversity and control of aquatic pollutions like (pesticides, industrial chemicals etc) and fisheries worker should be active to bane the unlawful angling. Because fish is the indication to provide proteins for human population.

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