



## RESEARCH PAPER

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## Biodiversity and conservation of spiny eel (*Mastacemblus armatus*) in River Indus of district D.I. Khan Khyber Pakhtunkhwa (KP), Pakistan

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### Abstract

The purpose of current study was to investigate the biodiversity and conservation of Spiny Eel (*Mastacemblus armatus*) in river Indus of district D.I. Khan Khyber Pakhtunkhwa (KP), Pakistan. In this study, total of 204 fishes in seven days were collected. Among these 102 (32.35%) fishes from Ghafar Wali site, 55 (29.09%) from Dera Board site and 48 (37.5%) were from Allah Huu Mosque of D.I. Khan region. Correlation R value between weight and length for Spiny Eel was greater than 0.5, so no significant correlation is found between length and weight. From the current study it may be concluded that the biodiversity of Spiny Eel is rich because river Indus is a strong aquatic structure with huge fish fauna. A proper law and rules should be followed for the protection of fish population because it is the way to provide proteins to the human population.

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## Introduction

Spiny eel is the local name of *Mastacemblus armatus*. It is Present in Fresh and brackish waters of Pakistan, Nepal, Thailand, Bangladesh and India. This species reaches a length of 61 cm. It is documented to be a very good and delicious food fish. It is not trapped by profitable fisheries. This is also initiate usually at relatively tall altitudes in river Tawi of India and its streams (Jha *et al.*, 2006). Fish play a significant part in killing the dietary problems containing vitamins, fat and proteins. It also offers numerous by foods like fish meal, fish gum and fish oil, etc. (Shaikh *et al.*, 2011). The mutual dispersals of the fresh water fishes are very dissimilar from the fauna of mammals and birds (Rosenfeld, 2002). Fish biodiversity is the comparative richness of fish species in the selected area (Burton *et al.*, 1992). Several investigators have been worked on the variety of fish fauna present in diverse regions of the world. Moreover, certain work had also done their dispersal of fresh water fish fauna Pakistan. In Pakistan, greater than 186 freshwater fish species have been explained (Helfrich and Neves, 2009).

Therefore, a significant sum of result and literature was accessible about fish biodiversity of different areas of the Pakistan, like 62 species were reported from northern Waziristan agency (Butt and Nawaz, 1978) and had calculated the efficient and zoogeography of the freshwater fishes fauna of Azad Kashmir and Pakistan (Mirza, 1980). The ecology of Pakistani Indus River has been concerned by stout human activities. Due to wastage of human activities indicating the territory ruined and deterioration. Most of the fish biodiversity of fresh water has been become of extinction. Population intricacies modify the energetic responsibilities of a population over time, where the fish fauna are the chief stick of ecological health. Therefore, fullness and fitness of fish results the fitness of water systems (Hamzah, 2007). Worsening of fishes and fisheries impression the monetary and population growth (Limburg *et al.*, 2011). The population delicacies have an alteration in fish collective morphology that accepted by numerous effects like environmental effects, species contacts,

availability of food and fish migration (Taylor *et al.*, 2006). Region of Pakistan that creates a provisional region which qualities the extreme result and alteration in fish biodiversity (Mirza, 1994). The current study was aimed to investigate the biodiversity and conservation of Spiny Eel in river Indus of district D.I. Khan Khyber Pakhtunkhwa 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 207 km<sup>3</sup>. The total length of river Indus in D.I. Khan side is 180 km 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 Dera Board., Ghfar Wali and Allah Huu Mosque of D.I. Khan. 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 (Froese, 2006).

$$W = aL^b$$

Where a = constant (initial growth index)

b = equilibrium constant

w=weight of fish

L=length of fish

Furthermore, the data was analyzed by the correlation of the following formula

$$a = \frac{\sum \text{Log} w \cdot 2 (\sum \text{log} L) - \sum \text{Log} L \cdot \sum (\text{Log} L \times \text{Log} w)}{\div N \sum (\text{Log})^2 - (\sum \text{Log} L)^2}$$

$$b = \frac{\sum \text{Log} w - (N \text{Log} a)}{\div \sum \text{Log} L.} \text{ (Froese., 2006).}$$

**Results**

In the present study total of 204 fishes in seven days (Ghafar Wali, 102, Dera Board, 55 and Allah Huu Mosque, 48) were collected from river Indus of D.I. Khan region.

The higher percentile values were recorded 32.35%, 29.09% and 37.5% from Ghafar Wali, Dera Board and Allah Huu Mosque respectively (Table 1).

**Table 1.** Diversity and percentage value of Spiny Eel.

Days	Ghafar Wali		Dera Board		Allah Huu Mosque	
	No of fish	Percentage	No of fish	Percentage	No of fish	Percentage
01	21	20.59	04	7.27	04	8.33
02	03	2.94	06	10.91	06	12.5
03	33	32.35	15	27.27	04	8.33
04	02	1.96	05	9.09	02	4.16
05	11	10.78	08	14.55	18	37.5
06	02	1.96	01	1.82	09	18.76
07	30	29.42	16	29.09	05	10.42
Total	102.	100	55	100	48	100
Mean	14.42		7.85		6.85	
	Correlation (r)= 0.779		Correlation (r)= 0.58		Correlation (r)= 0.684	

Correlation r was determined for Spiny Eel, R value was greater than 0.5, so no significant correlation is found between length and weight, if value less than 0.5 then some significant correlation is found between length and weight of fish. The higher length and weight of Ghafar Wali site was recorded with range of 45 and 11000, while lower values were 29.5

and 750 respectively. In Dera Board site the higher values were 39 and 6500, while lower values were documented with range of 23 and 500 respectively.

In Allah Huu Mosque site the higher and lower values were 39, 6500 and 23, 1000 respectively (Table 2, 3&4).

**Table 2.** Correlation between length and weight of Spiny Eel at Ghafar Wali.

S. No	Length (cm)	Weight (gram)	Log l	Log w	Log l *Log w
1	30.5	6000	1.48	3.77	5.39
2	32.5	1000	1.51	3	4.53
3	37.5	11000	1.57	4.04	6.35
4	29.5	750	1.46	2.87	4.19
5	30.5	4000	1.48	3.6	5.32
6	30.5	1000	1.48	3	4.44
7	45	10000	1.65	4	6.6
Total	236	33750	10.63	24.48	36.82
a	3.45				
b	1.93				

The higher body weight and average length of fishes were 11 and 45, while the lower values were 0.75 and 29.5 respectively documented from the Ghafar Wali site of D. I. Khan. The higher body weight and average length of fishes were 6.5 and 39, while the lower values were 0.5 and 23 respectively documented from

the Dera Board site of D. I. Khan. The higher body weight and average length of fishes were 6 and 45, while the lower values were 1 and 26.5 respectively documented from the Allah Huu Mosque site of D. I. Khan (Figs 1, 2 & 3).

**Table 3.** Correlation between length and weight of Spiny Eel at Dera Board.

S. No	Length (cm)	Weight (gram)	Log l	Log w	Log l *Log w
1	23	3000	1.36	3.47	4.71
2	32.5	4000	1.51	3.6	5.43
3	39	6500	1.59	3.81	6.05
4	29	3000	1.46	3.47	5.06
5	27	2500	1.43	3.39	4.84
6	31	500	1.49	2.69	4
7	30.5	5000	1.48	3.69	5.46
Total	212	24500	10.32	24.12	35.55
a	3.44				
b	1.96				

### Discussion

In the present study total of 204 fishes in seven days were collected. Among these 102 (32.35%) fishes from Ghafar Wali site, 55 (29.09%) from Dera Board site and 48 (37.5%) were from Allah Huu Mosque of D.I. Khan region. Correlation R value between weight and

length for Spiny Eel was greater than 0.5, so no significant correlation is found between length and weight. Study was conducted by the Ahmed *et al.*, 2011 and reported that the *b* value greater than 3.0 (3.415) for Nile tilapia collected from the Atbara River and Khashm El-Girba reservoir.

**Table 4.** Correlation between length and weight of Spiny Eel at Allah Huu Mosque.

S. No	Length (cm)	Weight (gram)	Log l	Log w	Log l *Log w
1	28.5	1500	1.45	3.17	4.59
2	33	3000	1.51	3.47	5.23
3	28	2000	1.44	3.31	4.75
4	35.5	1000	1.55	3.01	4.65
5	45	6000	1.65	3.77	6.22
6	42	3000	1.62	3.47	5.62
7	36.5	2500	1.42	3.39	4.81
Total	238.5	19000	10.64	23.59	35.87
a	3.65				
b	1.84				

Fish are predictable to grow uniformly in all directions and alterations in fish weight are commonly higher than those of the fish length. In other findings, when the *b* value exceeds 3.0 and fish

develop heavier and when the *b* value decreases below 3.0 then the fish develop leaner. In this case the *b* value is the interval of 2.5 to 3.5 documented for many fish species by the Froese, 2006.

Aspects like food composition by Moraes *et al.*, 2009, stocking mass by Araujo *et al.*, 2010 and biochemical and physical factors of the water may influence the fish development. Although the greater weight increase of fish indicates that the fish were fed until superficial satiation. Feed intake is a chief feature for tilapia development by Tran-Duy *et al.*, 2012 and the fish favorite to be fed to superficial satiation because of the persistent and greater dissolved oxygen concentration during trial studies. Moreover, all the important amino acids were provided to meet the nutritional condition of Nile tilapia described by in the NRC, 2011 founded on the perfect protein concept and to enhance protein consumption for fish development and health by the Li *et al.*, 2009. Karakulak *et al.*, 2006; Fontoura *et al.*, 2010 reported that the development pattern of b value within the same species can be variable, dependent on the season, food obtainability, population, sex, ecological circumstances or physiology. Since each place has its ecological individuality and the consistent fauna, it is also highlights the status of magnifying the biological information of the species dispersal, improving protection activities and administration plans. Silva *et al.*, worked on total of 3000 juvenile Nile tilapia fish of the Brazil and reported that the b value which interrupt for the length-weight association were 3.0604 and 0.0203 respectively.

### Conclusion

The current study it was concluded that the biodiversity of Spiny Eel (*Mastacembelus armatus*) is in river Indus of D.I. Khan region. Because river Indus is a strong aquatic structure with respect to the biodiversity of fish and place of living of many species. A strict law or rules should be followed for fish catchment during spawning seasons. Irregular and electric angling should be strictly banned.

A supportive relationship should be maintained between public and employees of fisheries sector for the protection of fish population because it is the evidence to provide proteins to the human population.

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