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Length-weight relationships of native Indian major carps from anthropogenically affected segment of the Ravi, Pakistan

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ABSTRACT

Introduction: River Ravi is a wetland of Punjab, Pakistan; becoming polluted and fishes facing threats due to industrial waste, agriculture intensification, urbanization, industrialization and global warming. Therefore this study was designed to know the anthropogenic impact on the body weight and length of the carps.

Materials and Methods: The present study was carried out from 2011 to 2013 during dawn (6:00 am to 11:00 am). The data were collected from different sites of the river Ravi i.e., Ravi Siphon, Shahdara, Shahpur, Chung, Sundar and Baloki Headwork. Morphometeric characteristics were studied e.g. length and weight.

Results: During the study found that mean body weight of *Labeo rohita* (1222±339g), *Catla catla* (1194.74±660g) and *Cirrhinus mrigala* (1323±1032g) was recorded; while mean total length measured as; 23.28±1.81cm, 22.19±3.29cm and 24.19±3.3.

Conclusion: The morphometric results showed that fishes are impacted by human activities.

Key words: Length, Pollution, Species, River, Morphometeric, Chung.

INTRODUCTION

Asiatic region provides huge area for nesting and growth of various fish species (Kottelat and Whitten, 1996; Dudgeon, 2002); having high diversity of marine fishes (22907 species) and freshwater fishes (10036 species) by Froese and Pauly (2017); out of these, Peter (1999) reported 186 species of freshwater and Froese and Pauly (2017) recorded 719 species of marine water fishes in Pakistan. While out of these species, native carps (*Labeo rohita*, *Catla catla* and *Cirrhinus mrigala*) having great commercial importance (Hussain *et al.*, 2015) and anthropogenic impact creates negative impact on the richness and abundance of the carps of Punjab, Pakistan (Roessig *et al.*, 2004; Popper and Hastings, 2009; Altaf *et al.*, 2011; Altaf *et al.*, 2015).

The length and weight relationship study is much important to evaluate the growth of fish in various landscape (Le Cren, 1951; Kalaycı *et al.*, 2007). This association is valid in defining diversity. Length of fish is calculated average weight is allocated to all type of fish in a given length group. This is more convenient and faster than weighing all fishes, particularly when huge quantity of fish is sampled. Length and weight relationship is usually used for abundance evaluations (Steeby *et al.*, 1991; Wootton, 1998; Ali *et al.*, 2000). Many ichthyologists have explained the significance of length and weight relationship for all types of fishes (Shakir *et al.*, 2008; Hussain *et al.*, 2009).

Very less data are present on length and weight relationship of native major carps in Pakistan; due to importance of fishes, there is a need to study its biological activity in water bodies of the Pakistan. This study was designed to evaluate length and weight relationship in the study area.

MATERIALS AND METHODS

Study area: This research was carried out from 2011-2013 during dawn (6:00 to 11:00). The data were collected from different sites of the river Ravi i.e., Ravi Siphon, Shahdara, Shahpur, Chung, Sundar and Balloki Headworks. The well known sites of this pollution affected segment are Ravi Siphon and Balloki Headworks and the remaining four sites are in between these two major sites (Figure 1 and Table 1).

Table 1: Coordinates of sub-areas of the river Ravi.

Sub-Areas	Coordinate		Elevation (ft)
Ravi Siphon	74 ° 27'57E	31°24'09N	698
Shahdra	74 ° 16'55E	31 ° 37'23N	692
Shahpur	74 ° 10'35E	31 ° 28'60N	654
Chung	74 ° 08'44E	31 ° 26'07N	651
Sundar	74 ° 03'12E	31 ° 23'24N	635
Head Balloki	73 ° 51'31E	31 ° 13'08N	614

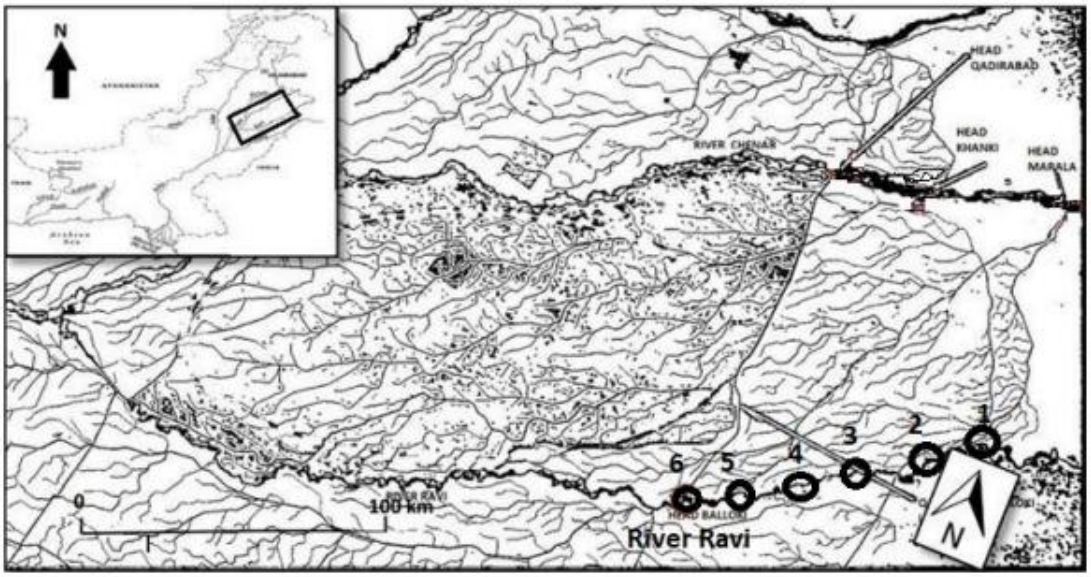

Figure 1: Map of the study area along with selected sites of river Ravi.

Study of Morphometeric characteristics: Morphometeric characteristics were studied e.g. length and weight.

RESULTS AND DISCUSSION

Labeo rohita mean total wet body-weight was noted as 1222±339g; whereas mean total length of 255 sampled of *Labeo rohita* calculated as 23.28±1.81cm. Mean total wet body weight of *Catla catla* was noted as 1194.74±660g. Similarly mean total length of 38 sampled calculated as 22.19±3.29. *Cirrhinus mrigala* Mean total wet body weight was noted as 1323±1032g. While mean total length of the 15 sampled specimens measured as 24.19±3.3 (Table 2). Shakir *et al.* (2010) recorded that *Labeo rohita* wet body weight was recorded as 633±182.01g, whereas mean total length of sampled of *Labeo rohita* measured as 37.49±3.62cm; *Catla catla* mean total wet body weight was recorded as 624±167.23g; mean total length of the sampled calculated as 37.01±3.19 cm; mean total wet body weight of *Cirrhinus mrigala* was recorded as 624±167.23g; and mean total length of 15 sampled calculated as 39.92±3.66cm in semi-intensive system. Khan and Nilla (2012) documented that 13-14cm total length and total weight was 7.12-36.41g in *L. rohita* from Noakhali, Bangladesh.

Table 2: Mean total body length and weight of native major carps of river Ravi.

Carps	Total Length (cm)	Total Weight (g)	R^2 Value/ Regression coefficient
Labeo rohita	23.28±1.81	1222±339	0.649
Catla catla	22.19±3.29	1194.74±660	0.344
Cirrhinus mrigala	24.19±3.3	1323±1032	0.217

Regression co-efficient recorded as 0.649 in *Labeo rohita,* 0.344 in *Catla catla* and 0.217 in *Cirrhinus mrigala;* while Shakir *et al.* (2010) recorded as 0.9606 in *L. rohita,* 0.9559 in *C. catla* and 0.915 in *Cirrhinus mrigala* from the semi-intensive fish farms of the Punjab University, Lahore.

Conclusion: The morphometric results showed that anthropogenic impacts are noted weight-length size of carps.

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Availability of data: We have included all relevant data in the manuscript that were collected during the field survey.

Authors' contributions: Hussain and Hassan designed this study and also performed the research; Khan helped in data write up; Ali and Qazi critically analysis article and approved as final manuscript.

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