

Length-weight relationship and condition factor in *puntius conchoni* (Hamilton, 1822) from Dal Lake, Kashmir

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Abstract- The length-weight relationship and condition factor K in *Puntius conchoni* were investigated on samples collected from Dal Lake, Kashmir. The analysis of this fish species was based on 150 specimens ranging in size from 38mm to 84mm and in weight from 1.42g to 10.712g. The regression values obtained for male, female and for pooled sexes (2.97, 2.93 and 2.94). The regression coefficient was found to depart significantly from the cubic value. The computed value of correlation coefficient (r) for males, females and pooled ones were as $r = 9.22$, $r = 9.36$ and $r = 9.35$ respectively, which were closer to 1 indicating that there is high positive correlation between the two variables i.e. length and weight.

The paper also throws light on the changes in the ponderal index (month-wise and length-wise). The index exhibits seasonal variations in close association with the feeding intensity and gonadal development in the fish. It recorded least values during winter month especially in January and from summer season in the month of July in both the sexes as well as in combined ones, which can be attributed to low feeding intensity and spawning stress in the fish.

Index Terms- *Puntius conchoni*, Dal Lake, length-weight relationship, condition factor

I. INTRODUCTION

The *Puntius conchoni* which is locally known as "bloz." It is a deep bodied cyprinid fish species. It is characterized by the presence of dark black rounded spot at the base of the caudal peduncle. It is widely distributed in lakes and small streams in the Kashmir valley. *Cyprinus carpio* was introduced in Kashmir around 1955-1956, and it is likely that *puntius conchoni* were introduced at the same time.

The Dal Lake is situated between $34^{\circ} 5'$ and $34^{\circ} 6'N$ latitude and $74^{\circ} 8'$ and $74^{\circ} 12' E$ longitude at an altitude of 1584m above sea level. It has been an important fishery resource to the people of the valley, especially to Srinagar since ancient times. It is a shallow open drainage type water body spread over an area of 11.4km², divided into five basins viz. Hazratbal, Nishat, Gagribal, Nigeen and Brarainumbal.

No scientific study of the Kashmir fish fauna seems to have been undertaken till early nineteenth century. It was Mr. Von Hugel, a visitor to Kashmir during 1830-1832 who found the fish of the valley somewhat different from those of the plains of India as well as Europe, and collected samples of different fish and handed them over to Mr. J.J. Heckel in Germany for

identification. Heckel studied the samples thoroughly and on the basis of taxonomic features described sixteen species of fishes for the first time from the valley, all new to science (Heckel, 1838). Based on origin, the ichthyofauna of Kashmir has been categorized into three groups, viz., species of central Asiatic origin, those of Indian origin and exotic species introduced in recent past (Das & Subla, 1963).

II. MATERIALS AND METHODS

(a) Study sites

During the present study, eight sites were selected for collection of fish in four different basins of the Lake, one peripheral and one central site from each basin.

Site-I and II: The site-II was located near Dhobi-ghat area and the -site II near the Sona-lank island in the Hazratbal basin.

Site-III and IV: Site-III was located near the (Nishat garden), while the Site-IV was located opposite the Ropa-lank island in the Lokut Dal basin

Site-V and VI: The site-V was located near the Boulevard area of the Gagribal basin, while site VI was located in the central region of this basin.

Site-VII and VIII: The site VII was situated in the Nageen basin along the peripheral areas near Ashaibagh Bridge and site VIII was located in the central part of this basin.

(b) Collection of Fish

The fisherman used traditional cast net with different mesh sizes. The cast net, locally known as "Shahat-jall" has been used which is locally known as "Guran-jall". It has a mesh size of 5mm to 9mm and a length of 7 metres. It is used to catch small sized fishes like *Crossocheillus diplochilus* and *puntius conchoni*.

(c) Identification

Identification of fishes was done with the help of standard taxonomic works (Day, 1878; Hora, 1936; Mukerji, 1936; Kullander *et al.*, 1999).

(d) Length Weight Relationship

The determination of length weight relationship was made by applying the log transformation equation $w = aL^b$ to the data (Hile, 1936). Where,

- W = Total weight of the fish in grams.
- L = Total length of the fish in millimeters.
- a = Initial growth constant and.
- b = Regression co-efficient.

The ponderal index or condition factor for each fish was evaluated by Fultons formula i.e.
 Where,

$$\text{Ponderal index } K = \frac{W \times 10^5}{(L)^3}$$

- W = Total weight of fish in grams.
- L = Total length in millimeters.
- 10^5 = It has been introduced to bring the value of ponderal index near the unity.

OBSERVATIONS:

The regression equation computed from data for males, females and pooled or combined ones is presented as:

- Male: $\text{Log } w = -4.72 + 2.97 \text{ Log } L$ ($r = 0.922$)
- Female: $\text{Log } w = -4.60 + 2.93 \text{ Log } L$ ($r = 0.936$)
- Combined: $\text{Log } w = -4.63 + 2.94 \text{ Log } L$ ($r = 0.935$)

The above equations clearly indicated that the two sexes (male and female) exhibited difference in the value of exponent 'b'. The weight gain is slightly more in case of males, whereas the weight gain was less than cube of the length in all the three cases.

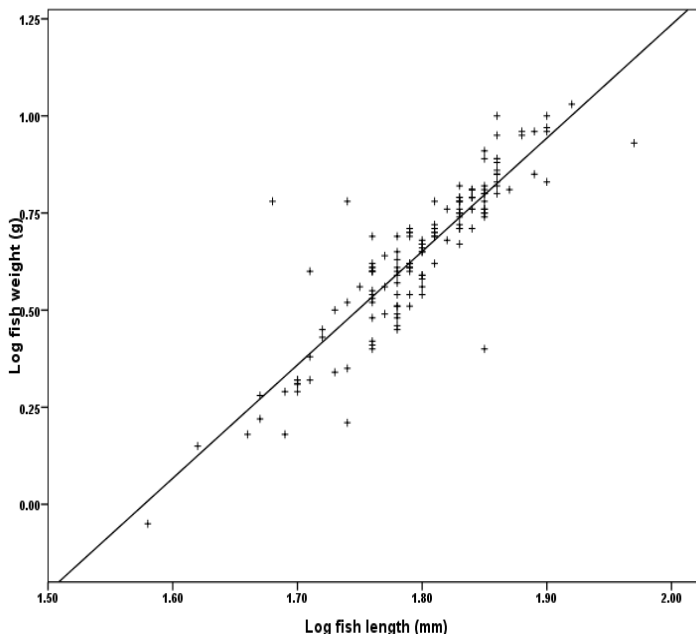


Figure 1: Length Weight relationship of *P. conchoniuis*

PONDERAL INDEX:

The Ponderal index recorded variations throughout the year (Table: 1). It recorded a minimum of 1.49 during January, whereas the maximum K was noticed during December (1.96). The males recorded high K. value in September (1.89) whileas, females were found in better condition in month of July (2.04). With regard to various length groups, the length group I recorded the minimum of 1.74, however the length group III recorded a highest K-value of 2.10 (Table: 2).

Table: 1 Monthly fluctuation in various indices in *P. conchoniuis*.

Type of sex	Months											
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug	Sep.	Oct.	Nov.	Dec.
K												
Male	1.42	1.76	1.46	1.71	1.71	1.82	1.68	1.77	1.89	1.85	1.59	1.86
Female	1.57	1.91	1.76	1.61	1.84	1.99	2.0	1.79	1.94	1.70	1.63	2.06
Comb.	1.49	1.83	1.61	1.66	1.77	1.91	1.86	1.78	1.91	1.77	1.61	1.96

K=Condition factor

Table 2: Fluctuations in various indices in length groups of *P. conchoni*

Type of index	I	II	III	IV
Length groups	38-49	50-61	62-73	74-84
Condition factor	1.74	1.75	2.10	1.81

III. DISCUSSION

The study of length-weight relationship is of paramount importance in fishery science, as it assists in understanding the general well being and growth patterns in a fish population. Basheer *et al.* (1993) opined that length- weight relationship of fish varies depending upon the condition of life in aquatic environment.

Ideally, the regression coefficient 'b' of a fish should be very close to 3.0 (Allen, 1938), however the cube law does not hold good throughout the life period and the weight gain in a fish may not be always cube of its length gain (Rounsefell and Everhart 1953. Hile (1936) and Martin (1949) opined that the value of 'b' may range between 2.5 and 4.0. Antony Raja (1967) recorded the value of 'b' within a range of 2.0 to 5.4. LeCren (1951) pointed out that the variation in 'b' value is due to environmental factors, season, food availability, sex, life stage and other physiological factors.

The males and females revealed significant differences in the value of 'b'. In *P. conchoni* males recorded higher exponential value. High 'b' values in case of males were also reported by Sunder *et al.* (1984), Yousuf *et al.* (2001). Hatikakota and Biswas (2004) and Rao and Sreeramullu (2006) reported higher values of 'b' in females, while higher values of 'b' in females were also observed by Sunder (1985), Kulshrestha *et al.* (1993). The present work revealed that studied fish species did not followed the cube law completely. Similar departure from cube law has been observed by Subla and Sunder (1981), Sunder *et al.* (1984), Torres (1991), Raizada *et al.* (2005) and Mandal *et al.* (2008).

According to LeCren (1951) and George *et al.* (1985) the relative condition factor K_n is an indicator of general well-being of the fish. K_n greater than one (1) is indicative of the general well being of fish, whereas its value less than one (1) indicates that fish is not in a good condition. Salam *et al.* (2005) pointed out that 'K' remained constant with increase in length and weight of fish.

The condition factor of fishes has been reported to be influenced by a number of factors such as the onset of maturity (Hoda, 1987), Spawning (De-Silva and Silva, 1979; Al-Dham and Wahab, 1991), sex and maturity (Gowda *et al.*, 1987; Doddamani and Shanboug 2001) and Pollution (Bakhoum, 1999 and Devi *et al.*, 2008). During the present study also the monthly fluctuations in condition factor in all the six species seemed to be influenced by gonadal development, availability of food and gastral activity. A perusal of present data revealed that in case of *C. P. conchoni* condition factor recorded its peak values during December highest K-factor was attributable to gonadal development. Mahapatra and Datta (2004) attributed low mean K_n values in *Aristichthys nobilis* to spawning strain, spent condition and low feeding rate. Likewise, Hatikakoty and Biswas

(2004) suggested increase in the weight of body due to weight of mature gonads.

As a consequence the studied fish species revealed low feeding intensity during winter. Kashmir waters experience significant variations in temperature with near freezing condition during winter, the feeding activity of the fish gets appreciably decreased. This is also supported by the work of Penttinen and Holopainen (1992).

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