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# Length – Weight Relationship of Hill Stream Fishes *i.e. Chela bacaila* and *Puntius sophore* in Selected Stream of Southern Rajasthan-India

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**Abstract:** ***During present investigation two fish species namely Chela bacaila and Puntius sophore were selected for the study of length-weight relationship. The sexes were differentiated by surgical observation of the gonads. The observed lengths and weights were transformed into logarithmic values and equations were calculated by least square method. The values of regression coefficient (b) computed were 2.743 (female), 2.950 (male), and 2.887 (sexes combined) and 3.289 (female), 3.350(male) and 3.315(Sexes combined) for Chela bacaila and Puntius sophore respectively.***

**Keywords:** Length-Weight relationship, Regression equation, *Chela bacaila* and *Puntius sophore*

## 1. Introduction

The Study of length- weight relationship of fishes has considerable importance in fishery because it shows relevance to fish population dynamics and pattern of growth on fish stocks. The general length-weight relation equation provides a mathematical relationship between the two variables, length and weight, so that the unknown variable can be easily calculated from the known variable. A true relationship exists between the length and weight of fishes. These two categories of growth are highly correlated.

The length-weight relationship of cyprinids from India has been studied by several workers [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12]

During present study, the fish species namely *Chela bacaila* and *Puntius sophore* were taken into account to find out the length-weight relationship.

## 2. Materials and Methods

The samples were collected at monthly intervals from the selected streams of Aravalli hills of Southen Rajasthan. Soon after collection, the specimens were wiped out with a blotting paper and weighted in an electric balance.The sexes were differentiated by surgical observation of the gonads. The observed lengths and weights were transformed into logarithmic values and equations were calculated by using parabolic equation [13]. $\mathbf{W = a\ L^b}$ where, W = weight of the fish in gms, L = Total length of fish in cms and ‚a" is the initial growth index and ‚b" is the equilibrium constant.

The general equation $W = a\ L^b$ can be written as Log W = Log a + b Log L i.e. Y = a + bX Where ‚b" represents the slope of the line and ‚log a" is a constant.

## 3. Results and Discussion

**1. *Chela bacaila* (Hamilton):**

The data of statistical analysis of length -weight relationship of ***Chela bacaila*** are presented in Table-1.

Values of correlation coefficient (r) indicate a high degree of correlation between length and weight. The observed length and weight were delineated in scatter diagrams (Figure1- 3) for female, male and combined sex respectively. The values of regression coefficient (b) computed were 2.743 (female), 2.950 (male), and 2.887 (sexes combined). During present investigation the ‚b" values were found to be lower than the isometric value 3 which indicates that the *Chela bacaila* becomes more slender as the length increases. The ‚b" value of males was slightly higher than females in this case.

**2. *Puntius sophore* (Hamilton)**

The regression equation computed from data for females, males and combined ones is presented in Table 2.The logarithmic values for lengths and weights when plotted gave straight-line relationship (Figure 4-6).

The above equations clearly indicated that the two sexes (male and female) exhibited slight difference in the value of exponent ‚b". In *P. sophore* males recorded higher exponential value than the females. It indicates that the weight gain is slightly more in case of males than females.

## 4. Conclusion

The value of ‚b" generally lies between 2.5-4.0 [14, 15] or 3 [16]. For an ideal fish, which maintains isometric growth, the value of ‚b" should be 3. In majority of cases where length-weight relationship has been calculated, it has been observed that the cube law is not obeyed. Further, most fishes do change their shapes as they grow [15],

hence a cube relationship between length-weight relationship could hardly be expected. The variation in "b" value is due to environmental factors, season, food availability, sex, life stage and other physiological factors [13].

The present work intends to find out some baseline information (LWR) regarding these two fish species from the Aravalli hill streams of Southern Rajasthan and will add to understand their growth, well being and stock assessments for the betterment of fisheries management.

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**Table 1:** Statistical analysis of length-weight relationship of *Chela bacaila*

| Sex | No. of fishes | intercept (a) | Regression coefficient (b) | Regression equation | correlation coefficient (r) | coefficient of determination (R2) |
|---|---|---|---|---|---|---|
| Female | 84 | -1.858 | 2.743 | Log W = - 1.858+ 2.743 Log L | 0.902 | 0.814 |
| Male | 98 | - 2.079 | 2.950 | Log W = - 2.079 + 2.950 Log L | 0.904 | 0.818 |
| Sexes combined | 182 | - 2.017 | 2.887 | Log W = - 2.017+ 2.887 Log L | 0.900 | 0.810 |

**Table 2:** Statistical analysis of length-weight relationship of *Puntius sophore*

| Sex | No. of fishes | intercept (a) | Regression coefficient (b) | Regression equation | correlation coefficient (r) | coefficient of determination ($R^2$) |
|---|---|---|---|---|---|---|
| Female | 124 | -2.221 | 3.289 | Log W = - 2.221+ 3.289 Log L | 0.966 | 0.938 |
| Male | 94 | - 2.273 | 3.350 | Log W = - 2.273 + 3.350 Log L | 0.950 | 0.903 |
| Sexes combined | 218 | - 2.241 | 3.315 | Log W = - 2.241+ 3.315 Log L | 0.943 | 0.890 |

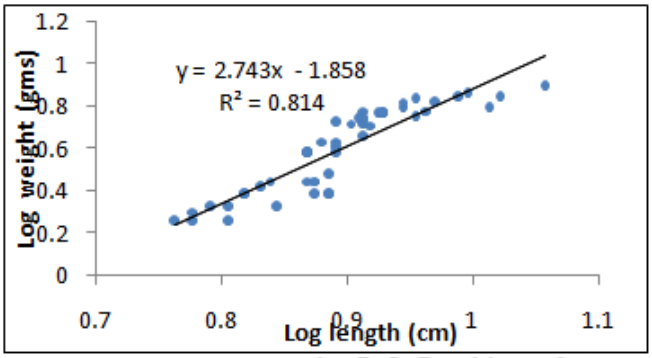


**Figure 1:** Length-weight relationship of female ***Chela bacaila***

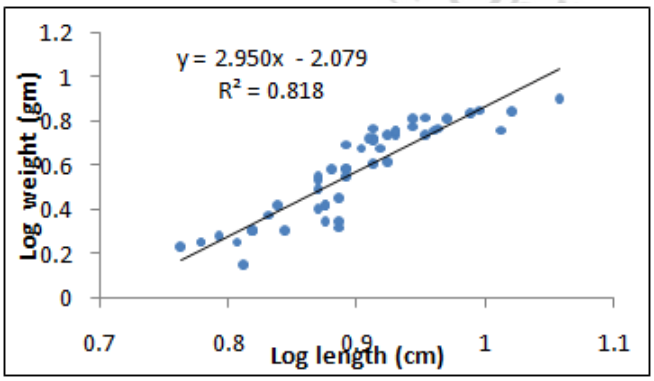


**Figure 2:** Length-weight relationship of male ***Chela bacaila***

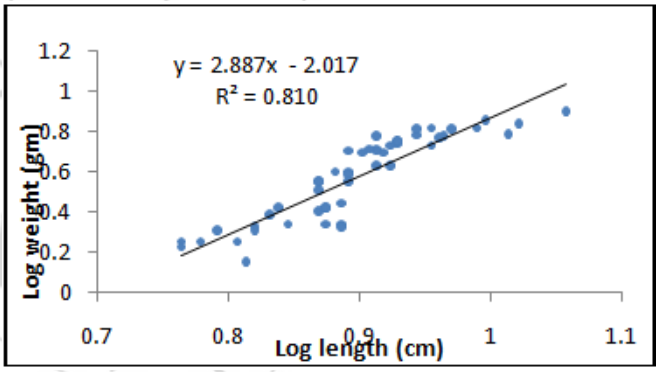


**Figure 3:** Length-weight relationship of combined sex ***Chela bacaila***

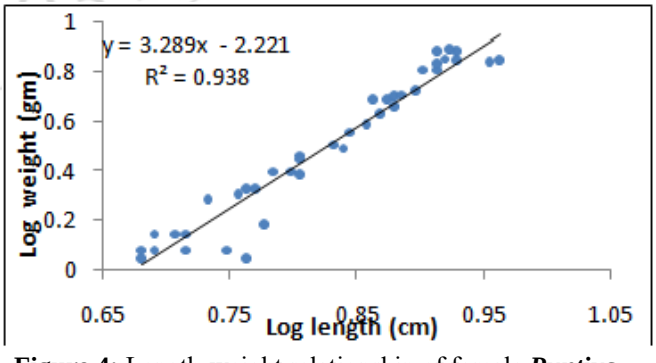


**Figure 4:** Length-weight relationship of female ***Puntius sophore***

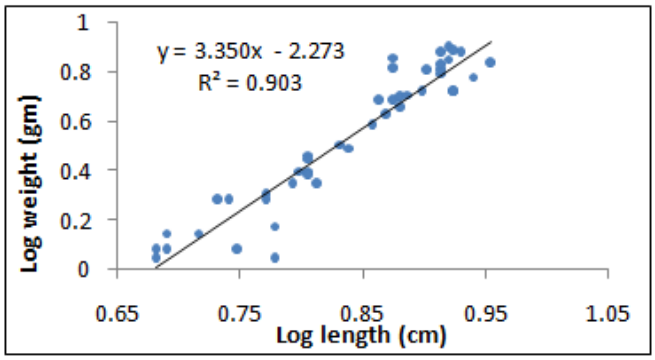


**Figure 5:** Length-weight relationship of male ***Puntius sophore***

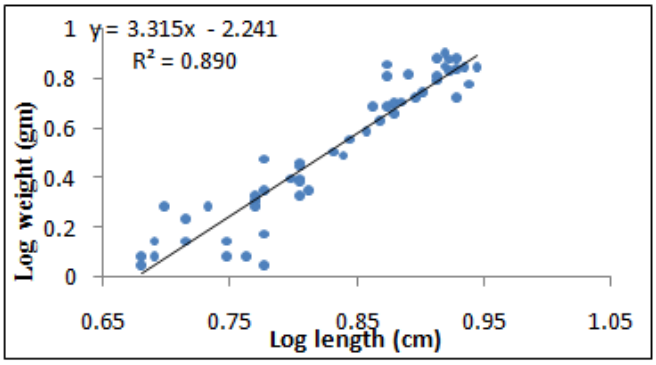


**Figure 6:** Length-weight relationship of combined sex ***Puntius sophore***

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