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THE LENGTH-WEIGHT RELATIONSHIP OF LABEO ROHITA (HAMILTON-BUCHANAN)

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Abstract: The length-weight relationship was calculated for 40 fish specimens caught from Borgaon reservoir of Sangli dist. The sampling was carried out from April 2014 to December 2015 by using cast net from fisherman. The sample length varies from 18.7 to 27.9 cm while weight varies from 83.85 to 178.64 gm. The length weight relationship in fishes is affected by a number of factors including season, habitat, gonad maturity, sex, diet health, preservation condition and annual differences in the environmental conditions. The aim of the present study was to contribute the length weight relationship of 40 fishes of Borgaon reservoir. The result shows that values of exponent b in regression region varied between 1.80 to 3.01. This relationship was first studied for this reservoir from this area. The present study shows weight in relation to total length in both sexes shows allometric growth pattern. The exponential value of fishes indicates allometric growth pattern in the natural habitat. The coefficient of correlation for male was r = 0.706 and for female r = 0.842 which shows the correlation factor revealed positive correlation between length and weight.

Keywords: length-weight relationships, Borgaon reservoir, condition factor.

Introduction:

The fishes found in tropical and subtropical water, their growth fluctuations is affected by blood composition, environmental variables and spawning period. This relationship can be used to access the influence of these factors on fish. Length and weight measurement can give information on the stock composition, life span, maturity, growth and production. (Erkoyuncu (1995), Moutopoulos and Stergiou (2000)). This fish is widely distributed in streams, rivers, pools and reservoirs of India. It is a popular food fish for economical weak communities because of its low values residing in that area. It was observed that in natural habitat when length of fishes increases, weight of fish also increases in proportion there by showing the weight of fish is function of length weight of fish is a function of length and since length is linear measure and weight a measure of volume. Length-weight relationship studied has been for no. of fishes in different water bodies. Kulbicki (1993) on Nigerian fresh water fishes, Fafioye and Oluaja (2005) on five fishes species in Epe Lagon Niageria . Laleye (2006) on Oreochromis niloticus in Oeume river in Benin. Length-weight relationship (LWR) of fisheries are important in fishes and fish biology because they allow the estimation of average weight of fish of a given length group by establishing a mathematical relation between them. (Haimovici and Velasco (2000), Mercy et al., (2002), Sarkar et al., (2008), Mir et al., (2012)) The present investigation has been undertaken to assess the length - weight relationship in both male and female of *Labeo rohita* from the Borgaon reservoir of Dist Sangli, The reservoir lies at geographical coordination Longitude 73^0 97' and Latitude 17^0 94' Sangli dist. The total 40 fish species of different size groups were collected from reservoir during the study period. The length and weight of the fishes were measured in fresh condition. To the best of our knowledge, no previous reports on length-weight relationship on this fish species from Borgaon reservoir is available. Therefore this study provides a baseline data on this food fish, which maybe important basic tool for management and conservation practices of this species. (Ricker 1968, Anderson & Gutreater, S., 1983)

Materials and Methods:

The study was carried out from Borgaon reservoir of Sangli dist (co-ordinates between Longitude 73^0 97' and Latitude 17^0 94') . The cast net was used to capture the fish specimens from reservoir. The only fresh material is used and before measuring the weight of fish moisture on each fish was

removed. Total length of the fish was measured from the snout to the tip of the tail and weighed in single pan electronic balance. The standard length and weight relationship were taken in male and female *Labeo-rohita* has been determined using the fish size.

Total length of all specimens was used in order to calculate the length weight relationship (LWR) which was calculated by log transformed data log : W= log a+b log L, here W= weight expressed in grams.

The regression coefficient b in the algometric formula W = aLb may vary for fish form different localities; of different sexed and so this difference may or may not be statistically significant. On the account of this data the Length weight relationship of *Labeo-rohita* were analyzed separately for males and females. The length weight relationship between the length and weight was calculated by applying the formula as suggested by (Le Cren, 1951) W = aLb

Where,

W =Total weight of fish.

L = Total length of fish

b = is the regression coefficient (slope).

The general parabolic equation W = aLb can be written as LogW = Log a + b Log L

Study area:

Figure-1

Map of India showing location of Maharashtra State

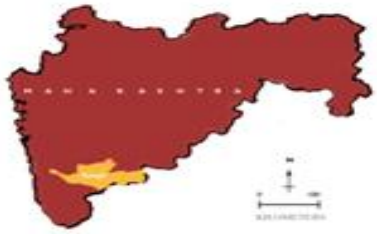


Figure-2

Map of India showing location of Maharashtra State

Figure-3

Map of Sangli District

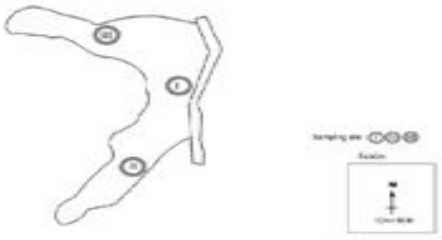


Figure-4

Submergence Area of Borgaon Reservoir

Result and discussion:

In this research study fish samples were caught and examined. The fig.1 shows length weight relationship and length characteristics for 40 species of Labeo rohita.

The exponent b often has a value close to 3 but varies between 2 and 4 (*Tesh 1971*). According to fig.1 the value of b ranged from 2.664 for female to 2.695 for male. The length- weight relationship in fishes is affected by a number of factors including season, habitat, gonad maturity, sex, diet, stomach fullness, health, preservation conditions and annual difference in environmental conditions 7c *(Bagenal and Tesch (1978a) and Froese 2006*). Even though the change of b values depends primarily on the shape and fatness of the

species, various factors may be responsible for the differences in parameters of the length-weight relationships among seasons and years, such as temperature, salinity, food (quantity, quality and size), sex and time of year and stage of maturity (Ricker,1973, Pauly, 1984, Sparre, 1992).

Depending on the deviation and b values from 3 fishes can be classified into 3 groups-

1. b=3, where the body form of fish remains constant at different length isometric growth pattern.
2. b< 3 when fish becomes more slender as the length increases, + ve allometric growth pattern
3. b > 3 when fish grows more stouter with increase in length, - ve allometric growth pattern.

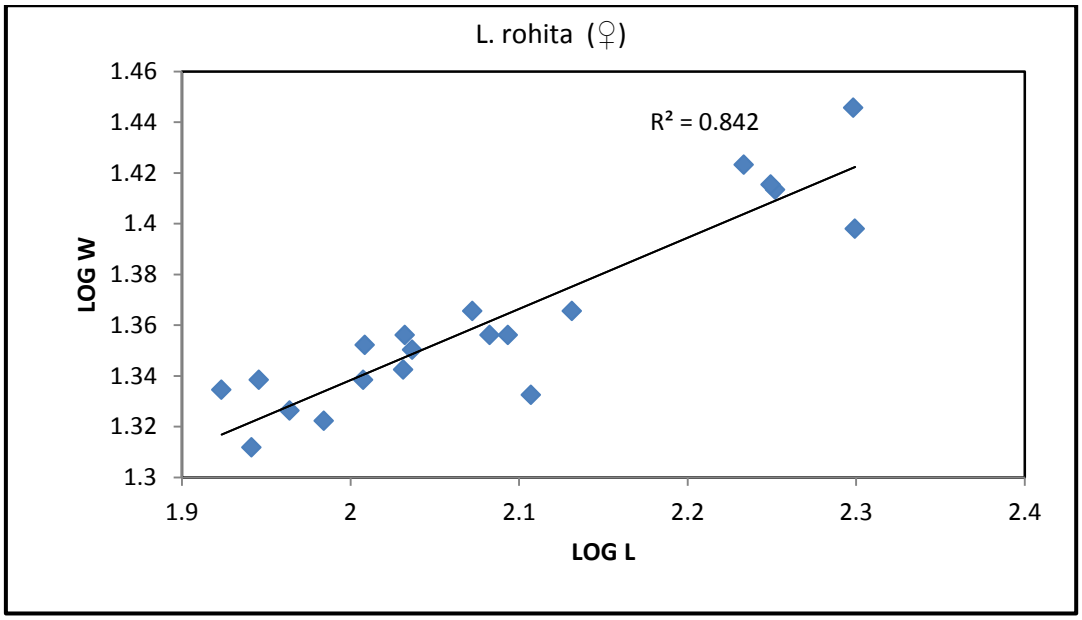
According to Goncalves et al., (1997) and Ozaydin et al., (2007) the parameter b may vary seasonally, even daily and between the habitats, degree of stomach fullness, gonadial maturity and number of specimens examined. The current study also shows regression values are more significant with coefficient of determination in the range of 0.80 to 0.98 which is similar with the findings of study of Isa et al., (2010) in seven cat fishes. Similar results were obtained by King (1996) for Clarias gariepinus, Bangenal and Tesch (1978 b) for mature fresh water fishes. In the present study the coefficient of correlation (r) between length and weight measured and value obtained from statistical analysis of the correlation for female is r = 0. 842 and for Male is r = 0. 706 in both case the correlation found to be higher than 0.5, showing the length weight relationship is positively correlated and vice-versa. The highest correlation in the present study shows that regression values were highly significant. The length weight were calculated as

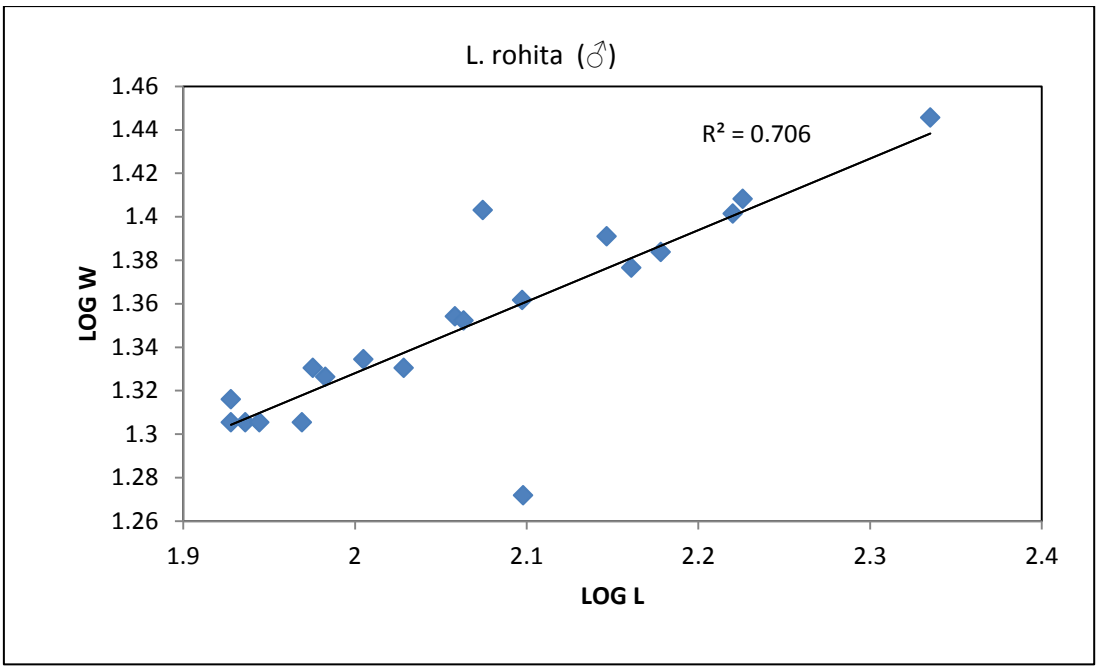
Log W= 3.4026+2.6647LogL r = 0.842 (Female)

Log W= 3.3695+2.6952 LogL r = 0.706 (Male)

But the value of b usually remains between 2.5 and 4.0 (Hile 1936, Martin 1969). The present value of b ranged between 2.664 for female to 2.695 for male. Thus in the present study, weight in relation to total length in both sexes of Labeo- rohita follow allometric growth pattern.

Fig.-1Length-weight relationship in Labeo-rohita





Conclusion:

In the present study the length weight relationship of *Labeo-rohita* increase with the weight and thereby shows the weight of the fish is a function of length. The relation between length and weight is expressed by hypothetical law W = aLb and the value of b fish is closely related to 3 as like an ideal fish. The correlation found to be higher than 0.5, showing the length weight relationship.

This study provides first basic and base line information on LWR of this commercial importance fish from this reservoir. This would be beneficial to fishery biologist and conversationalist to impose adequate regulation for sustainable fishery management and conservation activities of this fish species.

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