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## Length-weight relationship and relative condition factor of Asian seabass, *Lates calcarifer* (bloch) from Chilika Lagoon, Odisha

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### Abstract

The length-weight relationship and relative condition factor of Asian seabass *Lates calcarifer* (Bloch) was estimated based on the length and weight data collected from Chilika lagoon during March, 2008-February, 2009. The total length of fishes ranged from 20.0 to 113.70 cm and wet weight of fishes ranged from 500 to 3394.00 g. The length-weight relationship was estimated as  $W = 0.003 L^{2.890}$  and the size-wise relative condition factor ( $K_n$ ) fluctuated from 0.90 to 1.11. The 'b' value indicated that the growth pattern is not isometric even though, the general wellbeing of fish inferred from relative condition factor ( $K_n$ ) was suitable during the study period. The condition factor may be used to estimate the total weight of fish caught from length-frequency data, thereby eliminating the need for bulk weighing of groups of fish from the lake and, measuring changes in robustness/health of this population relative to past or future samples at the same place and season.

**Keywords:** Length-Weight relationship, Relative condition factor, Chilika

### 1. Introduction

With a water spread area spread over 906 km<sup>2</sup> in summer and 1165 km<sup>2</sup> in monsoon covering the districts of Puri, Khurda and Ganjam of Odisha, the Chilika is the largest coastal lagoon in India and is the second largest in Asia,. The highly productive Chilika lagoon eco-system with its rich fishery resources sustains the livelihood of fishermen over 0.2 million inhabiting in and around the lagoon. The total fish, shrimp, prawn and crabs varied from 5000Mt to 14000 MT through 2000 to 2009. Of this fish alone constituted on an average 60-70% of the total catch. Asian seabass, *Lates calcarife* (Bloch) is locally as Bhukti is one of the commercially important fish species harvested from the lagoon. Annual landings of this species during 2000-2008 fluctuated between 62.99 MT (2000-01) and 185.50 MT (2003-04) with a exhibiting a declining trend from 2006 onwards.

Understanding the length-weight relationship is of paramount importance in fishery resource management and useful in comparing life history and morphological aspects of populations inhabiting in different regions [4]. Furthermore, this relationship is used to ascertain the condition of fish and to determine whether the growth pattern is isometric or allometric. Besides, the length-weight measurement also provides information on the stock composition, life span, mortality, growth and production of fish [2, 5 & 8]. The relative condition factor is used to know the variation between the observed and expected weight of fishes [6]. Therefore, in the present study, an attempt has been made to estimate the length-weight relationship and relative condition factor of *L. calcarifer* harvested from Chilika lagoon. Such information is useful in understanding the key biological attributes of this species and its sustainable management.

### 2. Materials and Methods

Data on the total length and weight of *L.calcarifer* collected from Chilika lagoon during the period from March, 2008 to February, 2009 was used for length-weight analysis and determining the condition factor. The total length of fishes was measured accurately to the nearest mm with a ruler and wet weight was determined to the nearest g using an electronic balance. Altogether, 314 fish individuals with a length range from 20.00 to 113.70 cm and

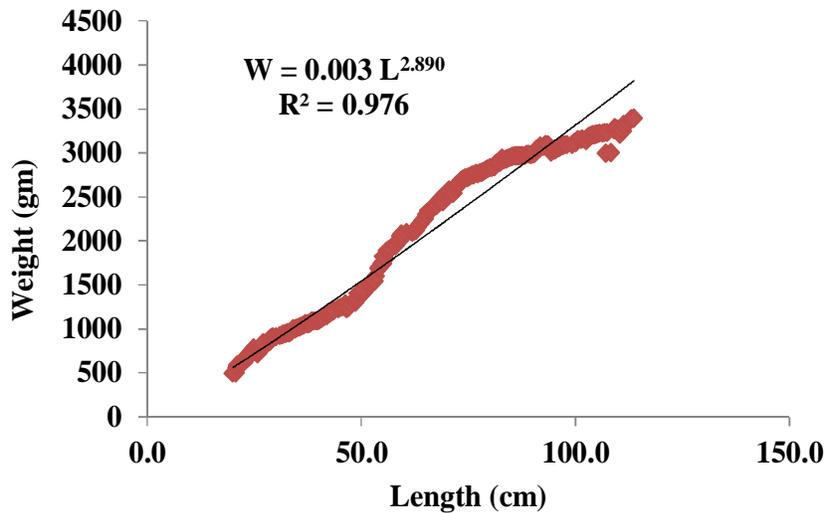
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weight from 500.00 to 3394.00 g were collected for analysis and interpretation. The length-weight relationship was estimated by the formula,  $W = aL^b$  developed by [7], where W is the weight of fish, L is the total length, 'a' is the intercept and 'b' is the regression coefficient. 'a' and 'b' values were estimated from a linear regression between length and weight of fish. The relative condition factor (Kn) which is a ratio of observed weight (Wo) and calculated weight (Wc) i.e.  $W_o/W_c$  was estimated as suggested by LE CREN (1951).

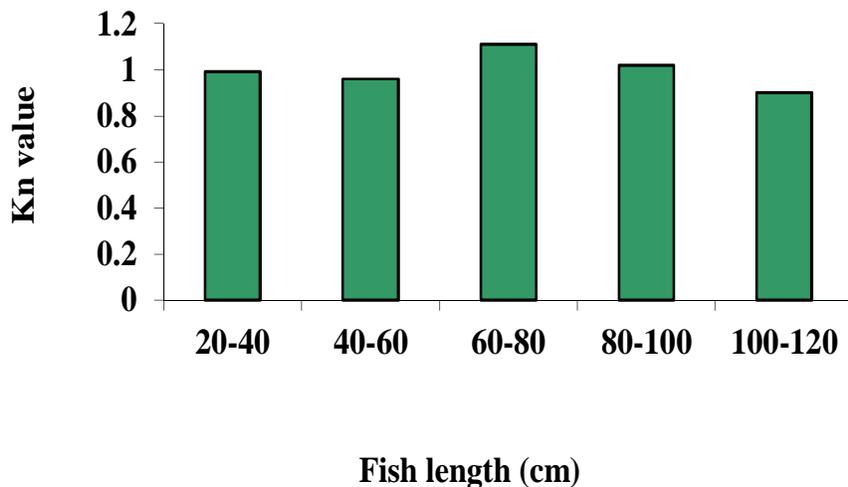
**3. Results and Discussion**

One of the most important and widely used statistical model in determining length-weight relationship of fishes is  $W = aL^b$ . Growth generally contributes to the increase of

both length and weight of a fish. Length and weight are very important to establish the statistical relationship between these two parameters. According to ALLEN (1938), if the value of 'b' is 3, then the fishes follows cubic law. But in general assumption, weight of fish does not vary with the cube of length. [10] stated that the departure of 'b' values from 3.0 would be due to the seasonal changes while, [7] opined that the deviation of 'b' value from isometric growth either due to environmental condition or condition of fish. In the present study, the length-weight relationship is estimated as  $W = 0.003 L^{2.890}$  (Fig. 1). [9] estimated the 'b' value of *L. calcarifer* from Chilika lagoon, as 2.916. Therefore the 'b' value obtained in the present study agrees to the findings of previous authors.



**Fig 1:** Length-Weight relationship of *Lates calcarifer* collected from Chilika lagoon during Mar, 08 to Feb, 09



**Fig 2:** Relative condition factor (Kn) of *L. calcarifer* collected from Chilika lagoon during Mar, 08 to Feb, 09

Kund GC *et al.* [6] reported that the relative condition factor (Kn) of small size fishes are higher due to their voracious nature of feeding. On the contrary the intensity

of feeding in case of bigger fishes is less than small fishes, but their physiological status combined with gonad weight causes a higher weight gain particularly in breeding season

showing an overall increase of Kn values. However, the variation in Kn values is dependant on the body weight of fishes. Bhatta VS <sup>[1]</sup> pointed out that the condition factor decreases with an increase in length and increases with feeding. In the present study, the length wise relative condition factor of *L. calcarifer* (Fig. 2) were estimated as 0.99, 0.96, 1.11, 1.02, 0.90 at the length group of 20 cm-40 cm, 40 cm-60 cm, 60 cm-80 cm, 80 cm-100 cm and 100cm-120cm respectively indicating very less fluctuation within the size group. The relative condition factor being one or closer to one indicates, the good condition of fish. In addition, the value of the relative condition factor being closer to one in all the cases suggested the overall suitability and wellbeing of *L. calcarifer* in Chilika waters.

#### 4. Acknowledgement

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#### 5. References

1. Bhatta VS. Studies on the biology of some freshwater fishes. IV *Mystus seenghala*. Journal of the Bombay natural History Society 1970; 67(2):194-211.
2. Bolger T, Connolly PL. The selection of suitable indices for the measurement and analysis of fish condition. Journal of Fish Biology 1989; 4:171-182.
3. Ganguly DN, Mitra B, Bhattacharya N. On the inter relationship between total length, standard length, depth and weight of *Lates calcarifer*. Proceedings of the National Institute of Sciences of India 1959; 25(B):175-187.
4. Karna SK, Sahoo DK, Panda S. Length-Weight Relationship and Growth estimation of *Lates calcarifer* (Bloch) in Chilika lagoon, India. Bulletin of Environment, Pharmacology & Life Sciences, 2012; 1(3):61-66.
5. King RP. Length-weight relationship of Nigerian Coastal water fishes. Fishbyte 1996; 9(4):53-58.
6. Kund GC, Mishra G, Sathapathy D. Length-weight relationship and relative condition factor of Mugil cephalus in Chilika lagoon, east coast of India. Journal of Applied Zoological Researches 2011; 22(2):153-156.
7. Le-Cren ED. The length-weight relationship and seasonal cycles in gonadal weight and condition in perches (*Perca fluviatilis*). Journal of Animal Ecology 1951; 20:201-209.
8. Moutopoulos DK, Stergiou KI. Weight-length and length-length relationships for 40 fish species of the Aegean Sea. Journal of Applied Ichthyology 2000; 18:200-203.
9. Patnaik S, Jena S. Some aspects of biology of *Lates calcarifer* from Chilika Lake. Indian Journal of Fish. 1976; 23(1&2):65-71.
10. Patra KP, Das S, Sahu S. Seasonal fluctuation of trace metals in *P. Monodon* of Ganjam, East coast of India. Indian J fish 2000; 47(3):271-274.
11. Volvich L, Appelbaum S. Length to weight relationship of Sea bass *Lates calcarifer* reared in a closed recirculating system. The Israel Journal of Aquaculture- Bamidgeh 2001; 53(3-4):158-163.