

Relative Condition Factor of Catfish, *Clarias batrachus* from Bhadravathi Area, Karnataka

I. Ramesh, B. R. Kiran

Received 11 February 2017; Accepted 14 March 2017; Published online 1 April 2017

Abstract The present investigation deals with the relative condition factor of cat fish *Clarias batrachus* in Bhadravathi area of Karnataka. The fish specimens were collected during the period January to June 2009 and the total length and weight of both the sexes of fishes were recorded. The mean relative condition factor showed seasonal variation in both sexes. The mean relative condition factor value was found to be highest in February for both the sexes. The reduction in the relative condition factor (Kn) during spawning phase may be because of the fish becoming exhausted due to spawning activity. The condition of the fish was coincided with the maturation stage of the fish. The mean Kn values for different length groups indicated good conditions of the fishes.

Keywords Relative condition factor, *Clarias batrachus*, Bhadravathi area, Spawning.

Introduction

The relationship between length and body weight provides an opportunity to calculate and index known as relative condition factor (Kn), which is commonly used by fishery biologists to know the well-being of a fish. Fish with high value of Kn are heavy for its length, while fish with low Kn value are lighter which has been calculated as the ratio between the observed weight and that of the expected weight from the observed length (regression analysis) [1].

The catfish *Clarias batrachus* is a species of freshwater air breathing catfish native to Southeast Asia, but also introduced outside its native range where it is considered an invasive species. It is named for its ability to walk across dry land, to find food or suitable environments. While it does not truly walk as most bipeds or quadrupeds do, it has the ability to use its pectoral fins to keep it upright as it makes a sort of wiggling motion with snakelike movements [2]. This fish normally lives in slow-moving and often stagnant waters in ponds, swamps, streams and rivers, flooded rice paddies or temporary pools which may dry up. When this happens, its walking skill allows the fish to move to other sources of water. Considerable taxonomic confusion surrounds this species and it has frequently been confused with other close relatives [3-5].

The relative condition factor is used to know the variation between the observed and expected weight of fishes [6, 7]. Hence, an attempt has been made to estimate the relative condition factor (Kn) of *Clarias batrachus* from Bhadravathi area, Karnataka. Such

I. Ramesh
Department of Zoology, Government Science College,
Chitradurga 577501, Karnataka, India

B. R. Kiran*
ResearchTeaching Assistant in Environmental Science,
Directorate of Distance Education, Kuvempu University,
Shankaraghatta 577451, Karnataka, India
e-mail: drbrk2003@gmail.com

*Correspondence

data is very helpful in understanding the fish biology of this species and sustainable fishery management.

Materials and Methods

A total of 30 specimens were collected from local market of Bhadravathi town (Latitude 13°52' N and Longitude 75° 40' E), Shimoga district, Karnataka from January to June 2009 and analyzed for the relative condition factor (Kn). Total body length and weight were taken for estimation of Kn. The total lengths of the fish were recorded to the nearest millimeter from the tip of the snout to the tip of the caudal fin. Weights of fish were recorded to the nearest gram with the help of electronic weighing balance. The equations used for the present estimations were followed according to Le Cren [8].

Relative condition factor

The length-weight data were utilized for calculating the relative condition factor. The relative condition factor, Kn [8] was calculated for different months by making use of the formula :

$$Kn = \frac{W}{W^{\wedge}}$$

Where, W = observed weight, W^{\wedge} = estimated weight. In order to find out the relation, if any, between spawning season and relative condition factor, monthly mean values of Kn were calculated separately for two sexes. The weighted average of relative condition factor was also calculated for the whole period under study for male and female fish.

Results and Discussion

The relative condition factor (Kn) was calculated for male and female fishes by using the respective length-weight relationships. Figure 1 represents the monthly averages of the relative condition factor for males and females during January to June 2009. In each case the weighted average for the whole period was also calculated.

Both the sexes of *C. batrachus* showed more or less a similar pattern of the fluctuation in Kn related to their lengths. The fluctuation of Kn ranged from a minimum value of 0.78 during April to a maximum of

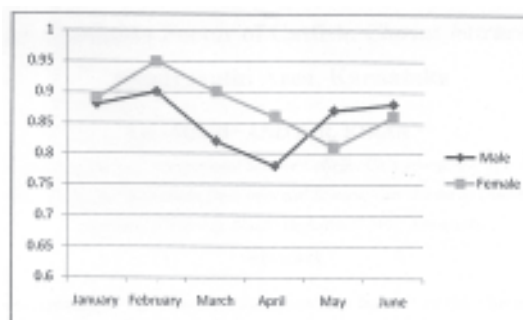


Fig. 1. Monthly averages of the relative condition factor for male and female *Clarias batrachus* during 2009.

0.90 in males during February. Whereas, in females it varied between 0.81 (May) and 0.95 (February). The proximate peaks in fluctuation of Kn value were observed in the month of February in both sexes. A lowered trend in fluctuation of Kn was observed during March in both males and females.

Fluctuation in Kn in relation to length of fish

Figure 2 depicts fluctuation in Kn in relation to different length groups of fishes. The lower fluctuating points that were observed in relation to the fish lengths are 10 cm, 15 cm, 22 cm, 24 cm and 26 cm in females and at 13 cm, 22 cm, 24 cm, 26 cm in males. The rise and fall in the values of Kn in subsequent length sizes appear to be more or less cyclic in nature which might have resulted from the repeated recovery and spawning, respectively, during the life of the fish.

Shikha Sharma et al. [9] studied the length-weight relationship and relative condition factor of *Clarias batrachus* (linn.) from the Maulagarh wetland of Chandausi, Moradabad. They recorded highest Kn value of 1.246 having fish length of 24 cm.

Le Cren [8] has suggested relative condition factor (Kn) to estimate the effect of length and other factors such as age, sex, maturity, feeding intensity, selection in sampling on Kn. The present study on the variation in the relative condition of males and females showed that the Kn values are more or less similar in both the sexes thus indicating almost equal metabolic activity.

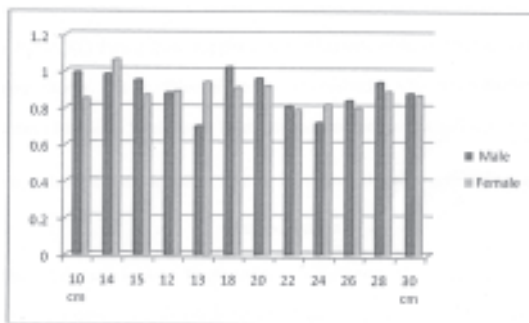


Fig. 2. Average values of the relative condition factor for male and female *Clarias batrachus* in different length groups.

Uniyal et al. [10] reported relative condition factor with better feeding period due to favorable ecological parameters in *Tor chelynooides* from river Western Nayar. According to Nagesh et al [11] the average Kn values for *Labeo rohita*, *Catla catla* and *Cirrhinus mrigala* were found to be 1.02, 1.022 and 1.03 respectively. The Kn values for three species indicate that all three species exhibit healthy and robust condition showing good compatibility with the environment. Sanwal et al. [12] studied both the relative condition factor (Kn) as well as condition factor (K) for chocolate mahseer *Neollessoscheilus hexagonolepis* and found the values almost similar in between 0.885 to 1.019. The value of Kn was always slightly more than the value of K [1].

George et al. [13] reported that Kn indicates the general well-being of the fish. If the values of Kn greater than 1 (> 1) indicates that the wellbeing of the fish is good whereas, its value less than 1 reflects that the wellbeing of the fish is not in a good condition. It can be suggested from the present study that the well-being of the fish was good at Bhadravathi area population as the Kn values was recorded to be closer and greater than 1. Higher value of Kn may be due to several reasons such as feeding intensity, maturity, breeding cycle or environmental factor [14, 15] and the decline in Kn values could have been caused by the dominance of larger specimens in the samples and also by the spent gonads [15, 16]. The fluctuations in the relative condition factor of both the sexes could be attributed to the seasonal sexual cycle, spawning and intake of food.

Bahuguna et al. [17] studied the relative condition factor of *Puntius conchoniis* and reported that it was maximum in the month of May (1.006 ± 0.058) and minimum in the month of August (0.970 ± 0.001) for male and high in May (1.0020 ± 0.081) and least in August (0.911 ± 0.228) for female. Seasonal values of Kn also reported by Bahuguna et al. [17] were maximum in spring for male (1.0012 ± 0.064) and summer for female (1.0091 ± 0.071) (1). Ram Krishan and Dobriyal [1] reported the value of relative condition factor (Kn) for each fish *Amblyceps mangois* and finally the average Kn value for different sexes during different month was calculated. The maximum during monsoon and winter can be correlated to sexual maturity (Monsoon) and the suitability of environment for food availability (winter) in the river Mandal.

The study provides information on relative condition factor in *Clarias batrachus* of study area which would be useful for fishery managers as well as the sustainable management. Findings of the present work will helpful in future research of *Clarias batrachus*.

Conclusion

The monthly fluctuations in the condition factor were found to be related to the maturation, spawning and intake of food in cat fishes. From the present findings, it can be concluded that the population of *Clarias batrachus* is under exploitation level at Bhadravathi area. Therefore, protection from over exploitation, water pollution, non-allowable mesh size gears/nets, banning of fishing during the breeding season is recommended, which in turn will help to manage this fishery in a sustainable way.

References

1. Ram Krishan, Dobriyal AK (2015) Observation on length-weight relationship and relative condition factor. *Int J Sci Technol & Mgm* 4 : 234—242.
2. Catfish walk down street. *Metro.co.uk*. (2008-07-18). Retrieved 2008-07-18.
3. Froese Rainer, Pauly Daniel (eds) (2011) *Clarias batrachus* in Fish base, Dec 2011 Version.
4. Ng. Heok Hee, Kottelat, Maurice (2008) The identity of *Clarias batrachus* (Linnaeus, 1758), with the designation of a neotype (Teleostei : Clariidae). *Zool J Linn Soc* 153 : 725—732.
5. <http://en.wikipedia.org>.
6. Kund GC, Mishra G, Sathapathy D (2011) Length-weight

- relationship and relative condition factor of *Mugil cephalus* in Chilika lagoon, east coast of India. J Appl Zool Res 22 : 153—156.
7. Mohanty AK, Nayak L, Bhatta KS (2014) Length-weight relationship and relative condition factor of Asian seabass, *Lates calcarifer* (bloch) from Chilika Lagoon, Odisha. Int J Fish and Aqua Studies 1 : 222—224.
 8. Le Cren ED (1951) The length-weight relationship and seasonal cycle in gonad weight and condition in the Perch (*Perca fluviatilis*). J Anim Ecol 20 : 210—219.
 9. Sharma Shikha, Pathak JK, Alam Mohd (2009) Length-weight relationship and relative condition factor of *Clarias batrachus* (linn). From the Maulagarh wetland of Chandausi, Moradabad. J Env Bio-Sci Vol 23 : 47—49.
 10. Uniyal SP, Dobriyal AK, Bisht MS, Balodi VP, Joshi HK, Singh R, Thapliyal A, Phuralatpan S, Kukrety M, Sandhya Pankaj (2004) Length-weight relationship and relative condition factor in *Tor chelynoides* (Pisces: cyprinidae) from Garhwal Himalaya. Uttar Pradesh J Zool 24 : 217—222.
 11. Nagesh TS, Jana D, Khan I, Khangngain O (2004) Length-weight relationship and relative condition of Indian major carps from Kulia beel, Nadia, West Bengal. Aqua 5 : 85—88.
 12. Sanwal S, Sharma D, Singh NO (2010) Effect of stage and seasonal differences on length weight relationship and condition factor of chocolate mahseer (*Ncolissocheils hexagonolepis*). J Inland Fish Soc Ind 42 : 52—56.
 13. George JP, Sharma AK, Venkateshvaran K, Sinha PSRK, Venugopal G, Biradar RS (1985) Length- weight relationship and relative condition factor in *Cirrhinus mrigala* and *Labeo rohita* from a sewage fed tank. Ann Zoo 23 : 70—90.
 14. Shafi M, Quddus MMA (1974) The length weight relationship and condition factor in *Hilsa ilisha* (Hamilton) (Clupeiformes : Clupeidae). Bangladesh J Zoo 2 : 179—185.
 15. Manorama M, Ramanujam SN (2014) Condition factor and relative condition factor of an ornamental fish, *Puntius shalynius* Yazdani and Talukdar in Meghalaya, India. Int J Res in Fish and Aqua 4 : 77—81.
 16. Masud S, Singh KP (2011) Length-weight relationship and condition factor of *Gudusia chapra* (Ham.) from river Yamuna. J Inland Fish Soc Ind 43 : 45—50.
 17. Bahuguna PK, Joshi HK, Goswami S, Dobriyal AK (2005) Length-weight relationship between body and brain in *Puntius conchoni* (Pisces : Cyprinidae). J Curr Sci 7 : 169—172.