



Morphometric Analysis Of Fish *Catla* From Tumaria Reservoir, Udham Singh Nagar, Uttarakhand

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Abstract: This study is emphasized on morphometric analysis of fish *Catla* from Tumaria reservoir during the year 2017 and 2018. Fishes were collected from Tumaria reservoir for morphometric analysis. The morphometric measurements of *Catla* (*Catlacatla*) are as total length 34.23 to 59.32 (46.23±1.43) cm for *catla*, whereas total weight 700.00 to 5700.00 (3197.917±157.814) gm was observed for *Catlacatla* during the first year of study i.e. 2017. It was observed that regression coefficient (b) was minimum 0.470 in ED-TL for *catla*, 0.641 in Snl-TL and 0.934 in PPvL-TL while it was maximum 2.690, 3.160 and 3.019 for *catla* WT-TL. The value of 'b' shows negative allometric growth ($b < 3.0$), positive allometric growth ($b > 3.0$) and isometric growth ($b = 3.0$).

Key words: *Catla*, Tumaria Reservoir, Morphometric analysis.

Introduction:

India is the second largest producer of fish after China. In country, this sector constitutes about 5% of the global fish production. In India, the major carps, *Catla* (*Catlacatla*), Rohu (*Labeorohita*) and Mrigal (*Cirrhinus mrigala*) are the mainstay of freshwater aquaculture. The major carps are the most preferred farm fishes because of their fast growth and higher acceptability to consumers. Indian major carps are the most cultivable fish species in India contributing about 87% of the total freshwater aquaculture production of the country. *Labeorohita*, *Catlacatla* and *Cirrhinus mrigala* are Indian carps (FAO (2017)). *Catla catla* (Hamilton, 1822) is also known as the major carp in India. It is an economically important freshwater fish of family cyprinidae. *Catlacatla* is native to rivers and lakes in India, Bangladesh, Nepal and Pakistan. *Catlacatla* is a fish with large and broad head, a large protruding lower jaw, and upturned mouth. It is a surface and mid-water feeder. It becomes sexually mature at the age of 2 years and attains weight of 2-3 kg. *Catlacatla* breeds during the monsoon season in rivers (FAO, 2003). This study is basically emphasized on morphometric analysis of fish *Catlacatla*.

Materials and methods

➤ Tumaria Reservoir is located to the north-west of Kashipur, a city in District Udham Singh Nagar (Uttarakhand) at 78⁰55 E longitudes and 29⁰20 N latitude at an elevation of 288meters above the sea level, The Tumariarervoir is constructed near Tumaria village which is 21 km away from Kashipur in District Udham Singh Nagar. Tumaria Reservoir was built in two parts first part is Tumaria main and second is Tumaria construction, an earthen dam of 20.4 km long in between Dhela and Phika Rivers. Tumaria main reservoir was constructed in the year 1961-1962 and its extension reservoir in the year 1969-1970. Specimens were collected regularly for the period of the two years. The length and weight of fishes recorded. The length-weight relationship of male and female were analyzed season wise. Length-weight relationship formula ($W = aL^b$) was applied for calculation. Where W= fish weight, L= fish length and “a” is a constant and “b” the exponent. The value of “a” and “b” are to determine by $Y = a + bx$

For condition factor (Kn) the formula ($Kn = W/W^-$) were used.

Where Kn = Relative condition factor, W = fish weight, W^- = Calculated weight following the description given by Mishra (1952) and Day (1878).

Results and Discussion:

The morphometric measurements of catla (*Catlacatla*) are presented in the Table -2 which depicts that total length 34.23 to 59.32 (46.23±1.43) cm for catla, whereas total weight 700.00 to 5700.00 (3197.917±157.814) gm was observed for *Catlacatla* during the first year of study i.e. 2017. During the second year of stuy i.e. 2018 which depict that total length 35.45 to 60.12 (47.12±1.15) cm for catla, whereas total weight 700.00 to 5700.00 (3197.917±157.814) gm was observed for *Catlacatla*.

Total length (TL) which is independent variable was kept on x-axis while other morphometric parameters (dependent variables) on y-axis and it was observed that significant correlations exist in standard length-total length (SL-TL), fork length-total length (FL-TL), head length-total length (HL-TL), eye diameter-total length (ED-TL), pre dorsal fin length-total length (PDL-TL), pre pectoral fin length-total length (PPL-TL), pre pelvic fin length-total length (PPvL-TL), pre anal fin length-total length (PAL-TL) body depth-total length (BD-TL), height of dorsal fin-total length (HOD-TL), anal fin length-total length (AL-TL), body depth-total length (BD-TL), caudal depth-total length (CD-TL) and caudal length-total length (CL-TL). The correlation coefficient (r) was minimum 0.512 in snout length-total length (SnL-TL) whereas it was maximum 0.989 in standard length-totallength(SL-TL) for the catla. Negiet.al., (2007) also found similar results. Similar results also observed by Ctven (1951), Das *et al.* (2013), Davies, *et al.* (2013). Balaiet.al., (2014) also described these variables for measuring morphometric analysis of fishes.The regression coefficient (b) was also observed and it was minimum 0.470 in ED-TL for catla, 0.641 in Snl-TL and 0.934 in PPvL-TL while it was maximum 2.690, 3.160 and 3.019 for catla WT-TL. The value of ‘b’ shows negative allometric growth ($b < 3.0$), positive allometric growth ($b > 3.0$) and isometric growth ($b = 3.0$) (Table-2).

Table-1: Measured morphometric parameters of Indian major carps

Parameters	Code	Description of measured parameters
Total length	TL	It is a measurement of body length from tip of largest jaw (snout) to the largest part of caudal fin.
Standard length	SL	Length from snout to the origin of caudal fin.
Forked length	FL	Length from snout to the point of bifurcation of caudal fin.

Head length	HL	Length from snout to the posterior most part of operculum.
Snout length	SnL	Length from snout to the anterior most margin of the eye orbit.
Eye diameter	ED	Maximum length of eye orbit from one margin to other.
Pre-dorsal length	PDL	Length from snout to the origin of the dorsal fin.
Pre-pectoral length	PPL	Length from snout to the origin of pectoral fin.
Pre-pelvic length	PPvL	Length from snout to the origin of pelvic fin.
Pre-anal length	PAL	Length from snout to the origin of anal fin.
Height of dorsal fin	HOD	Height of dorsal fin from base of origin of dorsal fin to end of longest fin ray.
Anal fin length	AL	Length from origin of 1st anal fin ray to the origin of the last anal fin ray.
Body depth	BD	Maximum vertical length of body (deepest part of the body).
Caudal depth	CD	Minimum vertical length of the body (minimum depth on caudal peduncle).
Caudal length	CL	Total length – Standard length

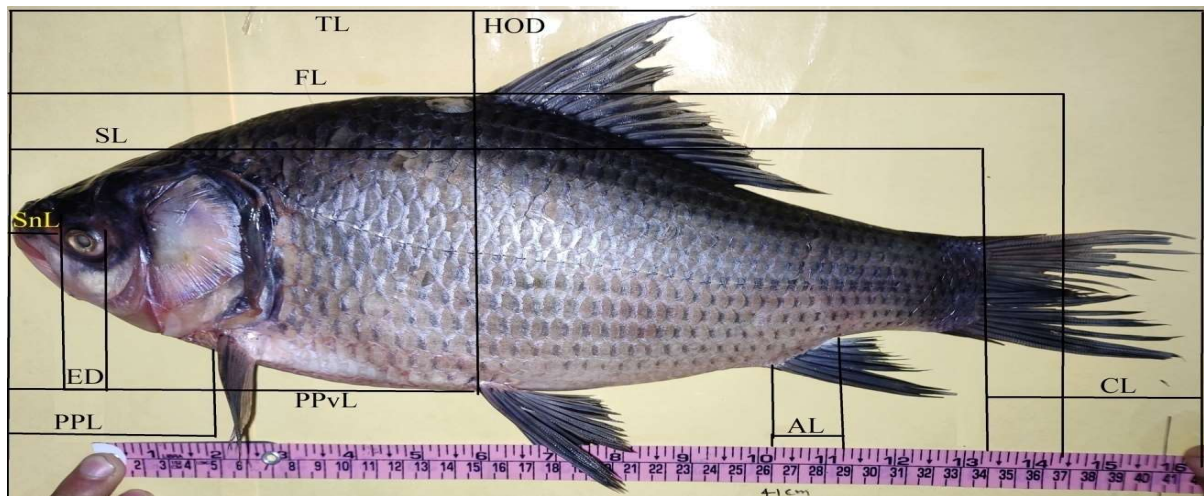


Figure- 1. Photograph showing typical morphological parameters of *Catlacatla* [TL (Total length), SL (Standard length), FL (Forked length), HL (Head length), SnL (Snout length), ED (Eye diameter), PDL (Pre-dorsal length), PPL (Pre-pectoral length), PPvL (Pre-pelvic length), PAL (Pre-anal length), HOD (Height of dorsal fin), AL (Anal fin length), BD (Body depth), CD (Caudal depth) and CL (Caudal length)].

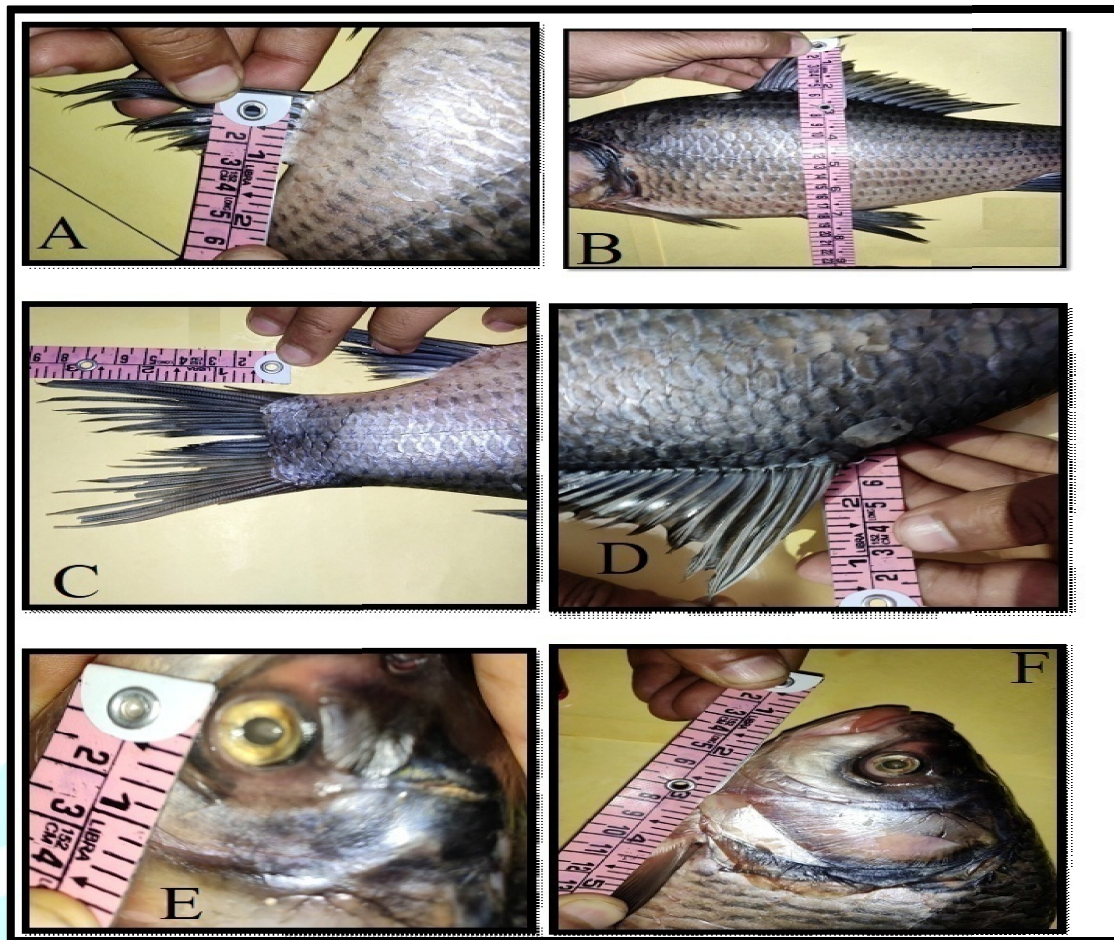


Figure – 2. Photographs (A-F) Showing morphometric measurements of fish *Catlacatla*

Table-2: Morphometric and regression analysis of fish *Catlacatla*.

	During 2017	During 2018	Y=Log(a) +b*x (r)
Parameters	Range value (Mean±SD)	Range value (Mean±SD)	
Total Length (TL)	34.23-59.32 (46.23±1.43)	35.45-60.12 (47.12±1.15)	
Standard Length (SL)	27.21-52.19 (43.19±1.32)	27.46-53.02 (42.32±1.52)	-0.047+0.985TL (0.989)
Forked length (FL)	25.23-58.23 (46.23±1.21)	26.92-59.30 (47.10±1.01)	-0.162+1.121TL (0.967)
Head length (HL)	9.23-19.21 (14.12±0.32)	9.85-19.89 (15.00±0.40)	-512+0.954TL (0.980)
Snout length (SnL)	4.23-14.27 (10.21±0.38)	5.02-15.10 (11.01±0.29)	-0.321+0.641TL (0.512)
Eye diameter (ED)	1.400-2.600 (1.87±0.04)	1.500-2.800 (1.98±0.038)	-0.528+0.470TL (0.801)
Pre-dorsal length (PDL)	14.100-29.600 (20.532±0.62)	15.300-30.400 (21.174±0.70)	-0.310+0.912TL (0.921)
Pre-pectoral length (PPL)	8.100-17.200 (13.100±0.320)	8.920-19.200 (14.300±0.420)	-0.460+0.871TL (0.930)
Pre-pelvic length (PPvL)	13.300-33.300 (24.00±0.582)	14.500-34.100 (24.20±0.590)	-0.538+0.934TL (0.970)
Pre-anal length (PAL)	22.700-49.200 (36.27±0.867)	24.200-50.500 (37.50±0.921)	-0.212+1.20TL (0.973)
Height of dorsal fin (HOD)	6.700-12.900 (10.400 ±0.090)	7.100-13.200 (11.100 ±0.12)	-0.421+0.875TL (0.876)
Anal fin length (AFL)	2.100-5.700 (3.98±0.090)	2.300-5.700 (3.98±0.090)	-0.920+0.867TL (0.890)
Body depth (BD)	7.600-29.00 (19.43±0.870)	7.800-29.80 (19.98±0.810)	-0.872+1.210TL (0.922)
Caudal depth (CD)	3.800-10.200 (7.32±0.290)	3.800-10.200 (7.32±0.290)	-1.245+1.190TL (0.959)

Caudal length (CL)	7.100-17.300 (13.400±0.19)	7.900-18.000 (15.000±0.28)	-0.940+1.140TL (0.890)
Body weight (WT)	800.00-2200.00 (1100.00±1.10)	810.00-2400.00 (1190.00±1.15)	-1.098+2.690TL (0.984)

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