International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391

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

[1]K. C. Nagar*, [2]M. S. Sharma

[1]Lecturer, Department of Zoology, M.L.V. Govt. College, Bhilwara (Rajasthan)
[2]Professor (Rtd) & Ex. Vice Chancellor, University of Kota, Kota, (Rajasthan)

*Corresponding Author: nagar_kc[at]yahoo.com

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],

Licensed Under Creative Commons Attribution CC BY

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.

Acknowledgement

We gratefully acknowledge University of Kota, Kota (Rajasthan) and Department of Zoology, M.L.V. Government, College, Bhilwara (Rajasthan) for providing necessary facilities.

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

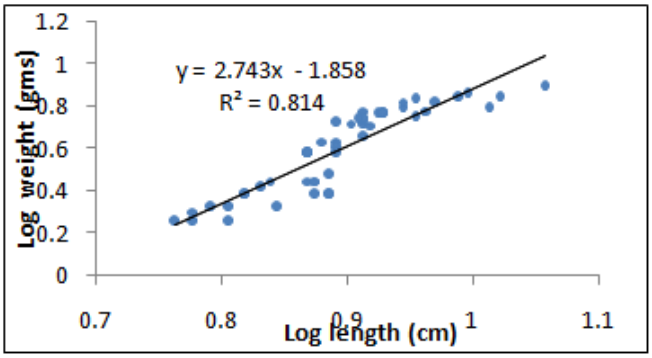


Figure 1: Length-weight relationship of female ***Chela bacaila***

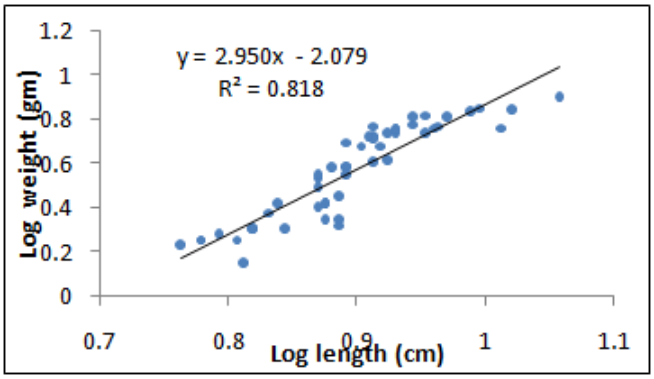


Figure 2: Length-weight relationship of male ***Chela bacaila***

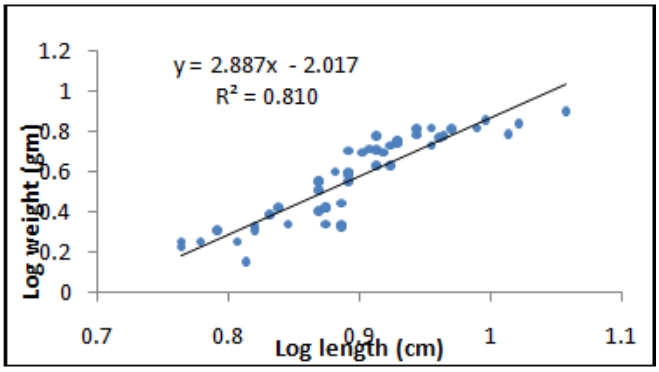


Figure 3: Length-weight relationship of combined sex ***Chela bacaila***

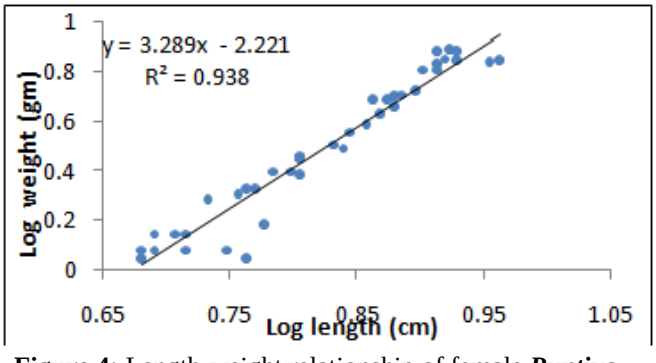


Figure 4: Length-weight relationship of female ***Puntius sophore***

Licensed Under Creative Commons Attribution CC BY

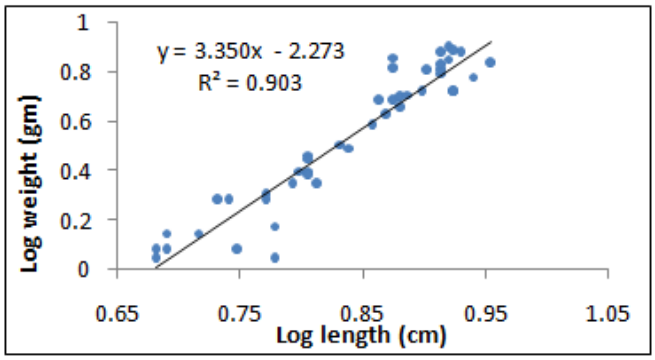


Figure 5: Length-weight relationship of male ***Puntius sophore***

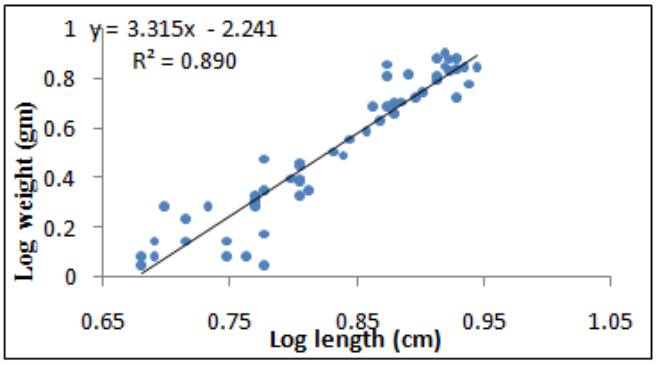


Figure 6: Length-weight relationship of combined sex ***Puntius sophore***

References

[1] Mohan M.V. and Sankaran T.M., 1988. Length-weight Relationship of Indian major Carps with Improvement in Expressing, Exponential Formula. Journal of Aquaculture in Tropics 3: 43-46.

[2] Kurup B.M., 1990. Population Characteristics, Bionomics and Culture of Labeo dussumieri (Val.), Final Report Submitted to Indian Council of Agricultural Research, 108 p.

[3] Reddy, Y.S. and M.B. Rao., 1992. Length-Weight relationship and relative condition of Puntius sophore (Hamilton-Buchanan) from Lake Hussain Sagar, Hyderabad, India. J. Indland Fish Soc. India. 24(1):22-25.

[4] Biswas S.P., 1993. Bionomics of Labeo pangusia (Ham.) from the Highlands of North East India. In: Proceedings of the Fisheries Forum 135-139p

[5] Pandey A.C. and Sharma M.K., 1997. A Preliminary Study on the Relative condition factor of exotic Carps Cultivated on Sodic Soil Pond Conditions in U.P, India. Indian Journal of Fisheries 45: 207-210.

[6] Sarkar S.K., Medda C., Ganguly S. and Basu T.K., 1999. Length- weight and Relative Condition of Bundh and Hatchery-Breed Labeo rohita (Ham.) during the Early Period of Development. Asian Fisheries Science 12: 289- 296.

[7] Sunil M.S. 2000. Length- weight Relationship in *Rasbora danicnius* (Ham.) from Achenkoli River, Pathanamthitta. Kerala, India. *Indian Journal of Fisheries* 47: 271-274.

[8] Geol C., Bharat A., Pande V., Ali S. and Rohit K. 2011. Length-weight relationship of snow trout (*Schizothorax richarsonii*) based on linear & non linear models from hill stream of Uttarakhud, India.

[9] Shahista Khan, M. Afzal Khan, Kaish Miyan and Mohd. Mubark 2011. Length- Weight Relationships for Nine Freshwater Teleosts Collected from River Ganga, India. *International Journal of Zoological Research* 7 (6) : 401- 405.

[10] SS Kharat and YK Khillare 2013. Study of Length-weight Relationship and relative condition factor of a hill stream teleost *Nemacheilus moreh*, *Int. J. Bioassays*, 2013, 2 (07), 942-945.

[11] Rimzhim Gogoi, Umesh.C. Goswami 2014. Length-Weight relationship and sex ratio of fresh water fish *Amblypharyngodon mola* (Ham-Buch) from Assam, *International Journal of Fisheries and Aquatic Studies*, 1(4): 68-71.

[12] Das Madhubanti, Das Geetali and Deka Parag 2015. Length-Weight relationship and relative condition factor of Puntius sophore (Hamilton, 1822) and Systomus sarana (Hamilton, 1822) of Deepar Beel (wetland) of Assam, India. International Journal of Fisheries and Aquatic Studies 3(2): 476-479.

[13] Le Cren, E.D.1951. The Length-Weight relationship and seasonal cycle in gonad weight and condition in perch, Perca fluvitilis. J. Anim. Ecol. 20:201-219.

[14] Hile, R. 1936. Age and Growth of the Cisco, *Leucichthys artedi* (Le Sueur) in lakes of the north eastern highland, Wisconsin, Bull. U.S. Bur. Fish. Washington, 48:211-317.

[15] Martin, W.R. 1949. The mechanics of environmental control of body form in fishes. *Publ. Ont. Fish. Res Lab*, 70:1-91.

[16] Allen, K.R. 1938. Some observations on the biology of trout (*Salmo trutta*) in Windermere, *J. Animal. Ecol.* 7:333-349.

Author Profile



Dr. M.S. Sharma, Professor (Rtd.), Former Vice- Chancellor, UOK, Kota, Ex. Dean & Head of Department of Zoology, University College of Science, M.L.S. University Udaipur, Rajasthan, India has forty years of teaching and research experience. He has received his Ph.D. degree from, M.L.S. University Udaipur, Rajasthan, India in 1980. He is a life member of "Pollution Research", "National Environment Science Academy" and "Science and Environment Society". He has authored three books and has published more than hundred research papers. He is principal investigator of major research projects funded by UGC. He is awarded "Eminent Scientist Award" in 2004 by "National Environment Science Academy". He received "National Fellowship" in 2006 by "Science and Environment Society".



Mr. K. C. Nagar is working as a lecturer in Department of Zoology, M.L.V. Govt. College, Bhilwara, Rajasthan, India and Ph. D. Research Scholar in University of Kota, Kota. Currently He is doing Ph.D. in the field of Hill Stream Fishes under the guidance of Dr. M. S. Sharma.

Licensed Under Creative Commons Attribution CC BY