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Research Article

Analysis of Length and Weight of Five Dominant Fish Species from Nurri Lake District Badin, Sindh, Pakistan

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Abstract | Measurements of the length and weight of five dominating species were taken at Nurri Lake in Badin, Sindh, Pakistan from July 2018 to June 2019. A total of 1101 specimens were examined. There were 255 *Liza subviridis*, with lengths and weights varying from 4.3 to 16.8 cm and 2.6 to 45.68g, respectively. *Mugilcephalus* was 205 and ranged in size from 7.4 to 27.46 cm and 8.7 to 213.29g. *Aulopaereaocellata* was 246 and varied in size from 5.5 to 319.2 g and 4.7 to 27.0 cm in length. *Acanthopagrus latus* had a total population of 185 individuals, measuring 3.2-20.2 cm in length and 3.56-168.86 g in weight. *Arius thalassinus* was 210 and ranged in length and weight from 5.4 to 19.8 cm and 4.32 to 88.9 g, respectively. In comparison to the other four dominating species from Nurri Lake, District Badin, Sindh, *Liza subviridis*, *Aulopaereiaocellata*, *Acanthopagrus latus*, and *Arius thalasinus* species, it was determined that the *Mugilcephalus* was extremely close to being in optimum condition (b =2.92 and r^2 = 0.98). The length-weight analysis values and the coefficient of condition showed that the growth of the five dominant species from Nurri Lake, District Badin, Sindh, Pakistan, was nearly ideal and satisfactory. The relative condition factor (Kn) was found to be fluctuating between 0.98 and 1.01 in all five dominant species. Results indicated that the values of length-weight and coefficient of condition analysis were ideal and growth of five dominant species was satisfactory from Nurri Lake District Badin, Sindh, Pakistan.

Introduction

Fish is a wonderful dietary item in the universe since it is a rich source of proteins, minerals, and vitamins. It is a significant part of the human diet and is crucial for the diet of those living in underdeveloped areas (Chandio *et al.*, 2020). According to the most recent statistics, a billion people consume fish as their

primary source of animal protein worldwide. Because of their taste and flavour, fish is considered to be in a significant position to improve the socioeconomic status of some countries through a nutritious diet as well as to provide opportunities for employment and income for those who are less fortunate (Iqbal *et al.*, 2014). Fish are only present in aquatic habitats for a variety of reasons, including physico-chemical variables, food availability, spawning grounds, water depth, clarity, and turbidity (Dastagir *et al.*, 2014). The coastal lagoons, which are present in 13% of the world's coastal regions, make up the common coastal atmosphere (Kjerfve, 1994). The assessment of these environment's natural assets, particularly their biodiversity, which is one of the main criteria utilized when specializing wetland preservation schemes, has a significant impact on their management and protection (Ramsar Convention Bureau, 2005). Nurri Lake has been chosen as the wetland for the present study project. The location of this little brackish and marine lake is 42° 21′ 03″ N, 68° 39′ 41″ E, in the Golarchi subdivision of the Badin district of Sindh, some 190 km to the southeast of Karachi. The wetland was found to be extremely supportive to a diversity of fish. In the present study, the length-weight relationship and condition factors among the individuals were determined to assess their growth and well being of the individuals as well. The length-weight analysis and condition factor of the fish fauna from Nurri Lake, District Badin, have not yet been the subject of published literature. In order to provide information on the examination of length and weight of five dominant species from the Nurri lake, the current experiments were carried out.

Materials and Methods

A total of 1101 fish specimens were collected randomly from Nurri Lake from June 2018 to July 2019. The experimental fish were obtained on a monthly basis. For the purpose of getting the most fish possible, many fishing techniques were used. Cast nets (*Uchhal jar*) and drag nets (*Chhik jar*), two types of fishing nets with different mesh sizes, were used to catch fish. Small fish were fixed in 10% formalin, whereas large fish received 10% formalin injections through the cloacal aperture. Then, well-preserved fish specimens were taken to the laboratory for identification and further examination. Fish were measured for their total length (TL) using graded tape that ran from the front to the back of the body while their weights were recorded on a portable electronic scale (Model ATL 600G/0.01G). The fish specimens' lengths were measured in centi-metres, and their weights in grammes. For the purpose of collecting fish samples, four sampling locations Yaroon Wari Laoon, Ahmed Rajo, Sada Bahar, and Shekhani Gharriwere chosen at random. For the length-weight investigation, the five major species of the lake, including *Liza subviridis, Mugilcephalus, Aulopaereaocellata, Acanthopagrus latus, and Arius thalasinus,* were examined. There were 255 *Liza subviridis*, with lengths ranging from 4.3 to 16.8 cm and weights from 2.6 to 45.68g. *Mugilcephalus* was 205 and ranged in size from 7.4 to 27.46 cm and 8.7 to 213.29g. *Aulopaereaocellata* was 246 and varied in size from 5.5 to 319.2 g and 4.7 to 27.0 cm in length. *Acanthopagrus latus* had a total population of 185 individuals, measuring 3.2-20.2 cm in length and 3.56-168.86 g in weight. *Arius thalassinus* was 210 and ranged in height and weight from 5.4 to 19.8 cm and 4.32 to 88.9 g, respectively. The experimental fish were then brought to the University of Sindh's Fresh Water Biology and Fisheries research facility in Jamshoro. Five (%) formalin was used to preserve these fishes. The fish samples were graded in terms of their centi-metre and gramme measurements. AWL was calculated using the techniques of (LeCren, 1951). The aL^b protocols were adhered to, and K= $100W/L^3$ was used to investigate the coefficient of condition. Using the least-squares approach, all fish samples were separated into groups of 5.0 cm length for the purpose of counting the length-weight and condition factor.

Results and Discussion

Analysis of length and weight
From July 2018 to June 2019, measurements of the length and weight of five dominating species were made at Nurri Lake in Badin, Sindh, Pakistan. A total of 1101 samples were examined, of which *Liza subviridis* (n=255) was found. Its length and weight ranged from 4.3 to 16.8 cm and 2.6 to 45.68 g, respectively (n = 205) *Mugilcephalus* measurements ranged from 7.4 to 27.46 cm and 8.7 to 213.29g, respectively. *Aulopaereaocellata* (n = 246) varied in size from 5.5 to 319.2 g and 4.7 to 27.0 cm in length. The size and weight ranges for *Acanthopagrus latus* were (n= 185) and 3.2-20.2 cm and 3.56-168.86 g, respectively. *Arius thalassinus* was (n= 210) ranged in length and weight from 4.32 to 88.9 g and 5.4 to 19.8 cm, respectively (Table 1). The following equations for all the dominating species from

Nurri Lake, district, Badin, Sindh, Pakistan, indicate the link between two variables.

$$Liza\ subviridis = Log\ W = -0.23 + 2.20\ Log\ L\ (r^2 = 0.920)$$

$$Mugil cephalus = Log\ W = -0.78 + 2.92\ Log\ L\ (r^2 = 0.980)$$

$$Aulopaereaocellata = Log\ W = -0.70 + 2.40\ Log\ L\ (r^2 = 0.950)$$

$$Acanthopagrus\ latus = Log\ W = -0.5 + 2.72\ Log\ L\ (r^2 = 0.970)$$

$$Arius\ thalasinuss = Log\ W = -0.65 + 2.30\ Log\ L\ (r^2 = 0.960)$$

From the equations given above, it can be seen that the *Mugilcephalus* was found to be very close to being in ideal condition (b = 2.92 and r^2 = 0.98) in comparison to the other four dominant species, *Liza subviridis* (b = 2.20 and r^2 = 0.92), *Aulopaereiaocellata* (b = 2.40 and r^2 = 0.95), *Acanthopagrus latus* (b= 2.72 and r^2= 0.97) and *Arius thalasinuss* species (b= 2.30 and r^2= 0.96) from Nurri Lake, District Badin, Sindh.

Condition factor analysis (Kn)
Five dominant fish species' condition factor (Kn)

analyses were performed in the Nurri Lake district of Badin, Sindh, Pakistan. The (Kn) values were found to range between 0.98 and 1.01 (Table 2). This demonstrated that the Nurri Lake ecosystem supports an experimental fishery.

For the five main fish that were present in the sample throughout the year from the Nurri Lake region of Badin, Sindh, Pakistan, an analysis of weight vs length was completed. The analysis showed that *Mugilcephalus* had a positive allometric association (b=2.92), but the other fish studied from Lake Nurri, including *Liza subviridis, Aulopaereiaocellata, Acanthopagrus latus*, and *Arius thalasinus*, all showed relationships that were extremely near to positive allometry. Weight-length analysis is regarded as essential for determining the appropriateness of the environment as well as for population study. Different researchers have discussed the significance of weight and length assessments in a variety of fish species from various environmental circumstances and have also established a strong relationship between the two variables. In *Pisodonophisboro*, Narejo *et al.* (2001) estimated weight length study indicated that the experimental fish were found to be in considerably

Table 1: *Data on Length and weight of five dominant species from Nurri Lake, District Badin, Sindh, Pakistan.*

Length group (cm)	Fish species									
	Liza subviridis		*Mugil cephalus*		*Aulpaeria ocellata*		*Acanthopagrus latus*		*Arius thalasinuss*	
	Ave. length (cm) ±	Ave. weight (g) ±	Ave. Length (cm) ±	Ave. Weight (g) ±	Ave. Length (cm) ±	Ave. Weight (g) ±	Ave. Length (cm) ±	Ave. Weight (g) ±	Ave. Length (cm) ±	Ave. Weight (g) ±
1.1-5.0	4.27 ± 0.25	3.6±0.44	Nil	Nil	4.65±0.15	4.4±1.6	3.90±0.22	3.8±1.2	Nil	Nil
5.1-10.0	8.37±1.63	6.14±0.86	8.93±0.07	7.58±0.22	8.10±0.10	8.25±1.05	8.26±0.74	9.43±0.57	9.16±0.33	8.15±2.85
10.1-15.0	11.41±0.44	15.80±1.34	12.50±0.25	23.0±2.50	12.50±0.8	29.50±1.0	11.55±0.65	34.55 ± 1.45	11.65±0.29	15.5 ± 1.55
15.1-20.0	16.20±0.10	41.35±3.65	17.05±0.05	56.60±3.95	16.62±0.02	63.50±6.50	16.20±0.35	77.50±8.50	16.99±0.05	50.50±5.50
20.1-25.0	Nil	Nil	21.1±0.16	108.60±6.40	22.16±0.40	188.5±12.5	20.20±1.0	168.86±5.14	Nil	Nil
25.1-30.0	Nil	Nil	27.46±1.04	213.19±6.81	Nil	Nil	Nil	Nil	Nil	Nil

Table 2: *Relative condition factor (Kn) of five dominant fish species from Nurri Lake, district, Badin, Sindh, Pakistan.*

Length group (cm)	Fish species									
	Liza subviridis		*Mugil cephalus*		*Aulpaeria ocellata*		*Acanthopagrus latus*		*Arius thalasinuss*	
	Calculated weight	Kn	Calculated weight	Kn	Calculated weight	Kn	Calculated weight	Kn	Calculated weight	Kn
1.1-5.0	0.90	1.11	Nil	Nil	0.88	1.12	1.05	1.16	Nil	Nil
5.1-10.0	5.80	1.08	6.80	1.08	10.30	0.87	10.20	0.97	11.2	1.0
10.1-15.0	18.60	0.92	26.20	0.95	29.60	1.04	38.40	0.92	17.92	1.0
15.1-20.0	47.40	0.96	62.80	0.98	72.50	0.95	90.60	0.95	54.80	1.0
20.1-25.0	Nil	Nil	115.60	1.01	222.30	0.95	170.20	0.99	Nil	Nil
25.1-30.0	Nil	Nil	215.40	0.98	Nil	Nil	Nil	Nil	Nil	Nil
	Mean Kn	1.01	Mean Kn	1.0	Mean Kn	0.98	Mean Kn	0.99	Mean Kn	1.0

better conditions. The position of the experimental fish in the River was generally indicated by the weight-length analysis to be pretty realistic. Similar findings were made by Narejo *et al.* (2003) who revealed an allometric relationship between two growth-related factors in *Mastacembelusarmatus*. Mastoi *et al.* (2005) pointed out that in *Labeocalbasu*, females developed faster than males. Analysis and condition coefficient showed an allometric growth gesture. Similar to this, Laghari *et al.* (2009) and Narejo (2006) sped up the examination of condition factor in *Cirrhinusreba* and *Rita rita* and commented that the allometric growth arrangement and ponderal condition are both in good shape. Mar *et al.* (2011) attempted to analyze the relationship between weight and length in seven different fish species from Myanmar and discovered a significant correlation. Two fish showed positive and resting allometric values with negative responses, showing a mix reaction. Five different species of fish were examined in the Zhob River by Dastagir *et al.* (2014), who concluded that the majority had progressive allometry while the minority had negative allometry. According to Dars *et al.* (2010), there is a significant relationship between weight and length in fish, and they advise using fish with increasing allometric types. As the best possible state of health for all fish, the average computed condition factor values found for all Tilapia mossambicus were chosen. All five types of dominant fish were discovered in Keenjhar Lake and Kori Lake in the district of Thatta, Sindh, as documented by Jamali *et al.* (2018) and Vohra *et al.* (2021).

Conclusions and Recommendations

According to the examination of length and weight from the Nurri Lake district in Badin, the lake's ecosystem is excellent for future commercial species rearing and supports the fish potential to a significant extent.

Novelty Statement

The examination of length and weight from the Nurri Lake district in Badin, the lake's ecosystem is excellent for future commercial species rearing and supports the fish potential to a significant extent.

Author's Contribution

Munawar Lal: Performed the experiment and prepared initial draft of the manuscript.
Naeem Tariq Narejo: Designed and conceived the idea of this experiment.
Muhammad Hanif Chandio: Helpedliterature, manuscript reviewed, composed the document with data acquisition.
Faheem Saddarand Hamida Narejo: Helped in collection offish and eggs samples for the research.
Ghulam Dastagir: Helped in the relevant literature.
Ghulam Abbas and Shahnaz Rashid: Helped in manuscript reviewed, composed the document with data acquisition.

Conflict of interest
The authors have declared no conflict of interest.

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