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River Etai fishes Morphometric characteristic and Physiochemical analysis of water with respect to fish survive in district Shangla, KP, Pakistan

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Abstract

The present study was conducted to analyze the physiochemical Parameters of Water and Morphometric characteristic of fishes of River Etai District Shangla, KP, Pakistan. The current study was conducted in six different localities namely Dherai, Serai, Gujar Banda, Jalkhanai, Gir and Kas of river Etai district Shangla in the period of August 2016 to June 2016. During the studies 80 specimens of fish were collected. These species were *Mastacembelus armatus*, *Glyptothorax stocki*, *Gara gotyla*, *Tor putitora*, *Schizothorax plagiostomus*, *Barilius pakistanicus* and *Channa gachua* where their total length was 41cm, 12.5cm, 16.2cm, 15.1cm, 17.3cm, 8.9cm, and 9.2cm respectively. The physiochemical parameters of water were in permissible range and good for fish survival. From the current study it can be concluded that analysis of physiochemical parameters of water and morphometric characteristics of fish fauna of River Etai district Shangla were necessary because morphometric characteristics could be considered as very useful tools in the fisheries research, fisheries management, physiology, ecology and fish health.

Keywords: Physiochemical parameters, Morphometric Characters, River etai fishes

1. Introduction

The active features of these ecosystems are the result of changes in water levels due to difference of rainfall in the catchment areas. This dynamic brings about changes in fish community structure which are frequently brought about by ecological aspect within the fluvial environment, food availability, species connections and fish movements [1]. Fishes range in size from the very small to the very large adult gobies may be just 8 mm, whereas the whale shark, *Rhincodon typus*, may reach 12m. Some species lack eyes, scales or fins whereas others are heavily armored or have adaptations for producing sound, electricity or light. Study of spatial and sequential pattern of variety, division and species composition of freshwater, fishes are functional to check factors influence the organization of the fish population [2]. The morphometric variation among stocks be able to make accessible a basis for accumulation structure, and may be applicable for studying short-term, environmentally induced variation geared towards successful fisheries organization [3]. Morphometric measurements are widely used to identify differences between fish populations [4]. The fish scales increases in size proportionally with the increase in length of the fish. In fact, it has been frequently suggested that in many fishes the "scale size and body length" relationship show a curvilinear character throughout their lives. The size of fish is the most important factor which affects the growth and population. It had been concluded that the scale studies can be a valuable tool in investigating system relationship among the species of different genera or families of fishes. By using the characters of fish scales it will be easy to separate the various groups of fishes [5]. Shangla District is located in the Khyber pakhtunkhwa province of Pakistan. It is bounded on the east by district Batagram and tribal area of Tor ghar along which the river Indus flows for about 75 km on the west by district Swat, on the south by district Buner and tribal area on Kala Dhaka, and on the north by district Kohistan. Geographically, it is located at 34, 31 to 33°, 08° north latitude and 72, 33 to 73°, 01° east longitudes, at an elevation of 3,164 meters above sea level with a total area of 1,586 square kilometers [6]. The Etai River lies in district Shangla and flow into the Indus River. On east it is bounded by Batagram district and Tor ghar and on the west by Swat, on the south by Buner and Tor Ghar district on north by district Kohistan.

Materials and Methods

River Etai was selected for the study. The study was carried on during the period of August 2016 to December 2016 to find out the morphometric character of Etai River and their

fishes. The Etai River was divided into 6 sampling points in order to get the full description of fish fauna of each point are below in table-1.

Table 1: Selected localities of River Etai District Shangla.

S. No	Name of Collection Point	Latitude	Longitude
1	Dherai	34° 40' 56.5644" N	72° 41' 38.85" E
2	Serai	34° 40' 21.8172" N	72° 42' 15.4656" E
3	Gojarbanda	34° 40' 9.966" N	72° 43' 18.4584" E
4	Jalkhanai	34° 39' 29.0808" N	72° 43' 43.914" E
5	Gir	34° 38' 15.558" N	72° 44' 53.2032" E
6	Kas	34° 38' 6.9324" N	72° 45' 25.7724" E

- Point Dherai:** (34° 40' 56.5644" N and 72° 41' 38.85" E) is a small village surrounded by Tangor, Bella, and Qambarai.
- Point Serai:** (34° 40' 21.8172" N and 72° 42' 15.4656" E) is a small village surrounded by Dub and Sokar.
- Point Gojar Banda:** (34° 40' 9.966" N and 72° 43' 18.4584" E) is a small village surrounded by Meragai, Kankar and Dobb.
- Point Jalkhanai:** (34° 39' 29.0808" N and 72° 43' 43.914" E) is a small village surrounded by Jalatai and Kathoza.
- Point Gir:** (34° 38' 15.558" N and 72° 44' 53.2032" E) is a small village surrounded by Meragai and Kas.
- Point Kas:** (34° 38' 6.9324" N and 72° 45' 25.7724" E) is a small village surrounded by Gir, Maragai and Gadayo.

Sampling Methodology

The fishes were collected with the help of different materials, including nets of different size i.e. cast nets, hand nets, gill nets, hook, hook net, and dragon nets, pH meter (HANNA HI 8314 Membrane pH Meter), measuring power of hydrogen ion in water, digital camera (Canon Power Shot A3300 IS, 16 Mega pixels) was used for fishes photograph and Thermometer was used for temperature. The collection was made from different sites to avoid missing of species. Fish after collection were euthanized kindly and preserved with 10% dilute formalin solution. The larger fish were injected with formalin in their abdomen and other part of the body to

avoid bacterial contamination. The same species were placed in a jar and labeled with name of locality and time of collection. The fishes after collection were brought to the laboratory of Abdul Wali Khan University Mardan (Buner campus). Various morphometric measurements of fish were made with ruler and Vernier caliper. Identification and classification of fishes for scientific study were done through various taxonomic and systematic keys.

River width

The width of the river was measured at 6 different points and then the average width was calculated by dividing the whole result by 6.

River depth

The depth of the water of each point was measured at 6 different places. The average value is then divided by whole 6.

Temperature

The temperature was measured by digital measuring meter (HANNA HI 8314 Membrane pH Meter)

Water PH

PH of water was measured by digital PH meter (HANNA HI 8314 Membrane pH Meter)

Phenotypic representation of Collection points



Fig 1: Collection point Dherai



Fig 2: Collection point Serai



Fig 3: Collection point Gojar Banda



Fig 4: Collection point Jalkhanai



Fig 5: Collection point Gir



Fig 6: Collection point Kas

Results

The present study was conducted on to explore morphometric characters of river Etai district Shangla KP, in the period of June 2015 to June 2016. The exploration survey was conducted in six different localities namely Dherai, Serai, Gujar Banda, Jalkhanai, Gir and Kas of river Etai district Shangla. During the studies 80 specimens of fish were collected. This collection was taxonomically treated which revealed that there are 7 species of fish under seven genera, four orders and four families have been reported from river Etai district Shangla. The reported fish families were belonging to Metacembelidae, Cyprinidae, Sisoridae and Channidae. During the research family Cyprinidae was

dominant and reported from all localities of river Etai district Shangla KP.

Different water parameters of the collection points in river Etai

Different parameters like Depth and Width of the river, PH and Temperature of water, were calculated during the current study in river Etai.

Depth and Width of the river

The average Depth and Width of the river were calculated at each collection point. The detail of each collection point is given below in table-2.

Table 2: Table showing the average width and depth of each collection point in river Etai.

S. No	Collection point name	Latitude	Longitude	Average Width	Average Depth
1	Dherai	34° 40' 56.5644" N	72° 41' 38.85" E	14.76 Meter	0.27 Meter
2	Serai	34° 40' 21.8172" N	72° 42' 15.4656" E	16.6 Meter	0.60 Meter
3	Gojarbanda	34° 40' 9.966" N	72° 43' 18.4584" E	22.15 Meter	0.4 Meter
4	Jalkhanai	34° 39' 29.0808" N	72° 43' 43.914" E	16.92 Meter	0.5 Meter
5	Gir	34° 38' 15.558" N	72° 44' 53.2032" E	24.4 Meter	0.70 Meter
6	Kas	34° 38' 6.9324" N	72° 45' 25.7724" E	23.85 Meter	1 Meter

Water Temperature

During the current study the temperature of water was calculated in the month of December and was found variable because all the water of Etai River was coming of spring.

Therefore the temperature of the river was cold and variable. The detail of the temperature of each collection point is given below in the figure-7.

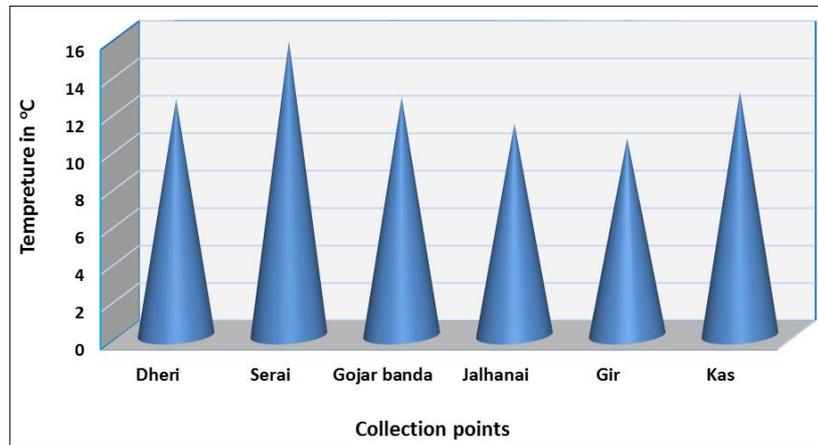


Fig 7: Statistical analysis of temperature of each collection point.

Table 3: Table Showing air and water temperature of each collection point in river Etai.

S. No	Collection points name	Water temperature	Air temperature	Month
1	Dherai	12.6 °C	16.4 °C	December
2	Serai	15.7 °C	18.1 °C	December
3	Gojarbanda	12.7 °C	15.1 °C	December
4	Jalkhanai	11.3 °C	14.1 °C	December
5	Gir	12.5 °C	15 °C	December
6	Kas	11.5 °C	14.5 °C	December

PH of water

During the study the pH of each collection point was checked.

The pH was suitable for fish. The detail of about the pH value of each collection points is given below in the figure-8.

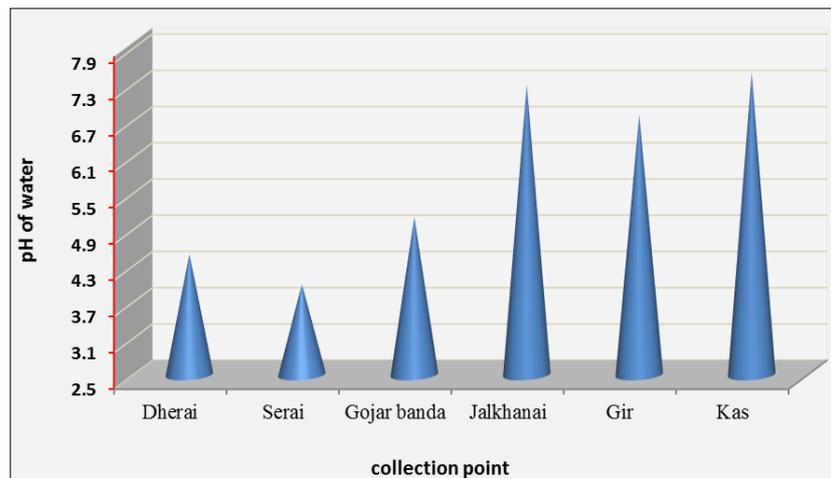


Fig 8: Statistical analysis of pH of each collection point.

Morphometric measurements of fish

During the study fishes collected were of different sizes. The large fish collected was *Mastacembelus armatus* and the small

fish collected was *Barilius pakistanicus*. The morphometric measurements of fishes collected are given in table-4.

Table 4: Morphometric measurements of fish collected during study in river Etai.

Fish species	Total length	Standard length	Fork length	Post orbital length	Head length
<i>Garra gotyla</i>	16.2 cm	12.7 cm	14 cm	10.4 cm	2.8 cm
<i>Tor putitora</i>	15.1 cm	12 cm	13 cm	8.8 cm	2.9 cm
<i>Schizothorax plagiostomus</i>	17.3 cm	14.3 cm	15.8 cm	31.5 cm	5.8 cm
<i>Barilius pakistanicus</i>	8.9 cm	7.1 cm	8.1 cm	6.6 cm	1.3 cm
<i>Glyptothorax stocki</i>	12.5 cm	11.5 cm	11.7 cm	9.3 cm	1.7 cm
<i>Mastacembelus armatus</i>	41 cm	24.2 cm	39 cm	31.5 cm	3.3 cm
<i>Channa gachua</i>	9.2 cm	8.3 cm	9.4 cm	8 cm	2.4 cm

Discussion

During the current study, the morphometric characteristics of seven species were reported from river Etai district Shangla. These species are *Mastacembelus armatus*, *Garra gotyla*, *Tor putitora*, *Schizothorax plagiostomus*, *Bariluspakistanicus*,

Glyptothorax stocki, and *Channa gachua*. The rare species were *Mastacembelus armatus* and *Glyptothorax stocki*. Because these species are warm water species. The most abundant species were *Gara gotyla*, *Tor putitora* and *Schizothorax plagiostomus*. Fishes range in size from the very

small to the very large, adult gobies may be just 8 mm, whereas the shark, *Rhincodon typus*, may reach 12 m. Some species lack eyes, scales or fins whereas others are heavily armored or have adaptations for producing sound, venom, electricity or light. Studies of spatial and temporal patterns of diversity, distribution and species composition of freshwater fishes are useful to examine factors influencing the structure of the fish community (Akhtar *et al.*, 2014) ^[1]. During our study we found that the fish in the River Etai vary in size. During the study the smallest fish collected was *Bariluspakistanicus* having total length 8.9 cm and largest was *Mastacembelus armatus* having total length 41 cm. During the study it was reported that factor like temperature, pH of water, dissolved oxygen, etc. are responsible for the distribution of fish species found in the area. Because some area has a rich population of *Schizothorax plagiostomus* while in some collection point the species like *Garra gotyla*, and *Tor putitora* are found in rich population. The richness in the collection points was due to pH and water temperature. Some points have more suitable for fish because of no anthropogenic activities. While in some points the population of fish fauna is very low due to anthropogenic activities and illegal hunting. Yousafzai *et al.*, (2013) ^[7] Water temperature of River Swat ranged from 15-26 °C during the study period. Water temperature influences the distribution and migration of fishes. Temperature affects many immunological phenomena like the stratification of water, solubility of gases, pH, amplification of odor and taste and elevation of metabolic activities of plants and animals. The metabolic rate increases 2 or 3 times for every increase of 10 °C. Saeed *et al.*, (2013) ^[8] recorded a water temperature from River Barandu which range between 15 °C to 25 °C. Masood *et al.*, (2015) ^[9] recorded the pH of water and sediments of Rawal Dam Islamabad, which was 7.21 and 7.26 respectively. While high water temperature was recorded, i.e. 30 °C. High temperature of water was due to low water level and high atmospheric temperature. Din *et al.*, (2016) ^[10] recorded the temperature between 17 °C to 25 °C from River Chamla. During our study the water temperature of Etai River was calculated which range from 11.3 °C to 12.7 °C. The water temperature of all collection points was very low because the water of Etai River was coming from cold Mountains. The pH of River Swat ranged from 7.2 to 7.9. This value is falling within the limits of WHO recommended value, 7.5-8.5. The pH value is good for fishes and show good quality of water. IUCN reported pH value of 7.3-7.9 from Swat. Usually water quality parameters are proportionately deteriorated with the increasing fish density in culture ponds. The affected fish farms were using rivers as the main source of their water with water temperature in the range of 14.3-22.7 °C, dissolved oxygen of 6.68-8.92 mg/l, pH of 7.85-8.16 (Akhtar *et al.*, 2014) ^[1]. The pH of river Barandu Buner was reported by Saeed *et al.* (2013) ranging from 6 to 8.5 ^[8]. Din *et al.*, (2016) ^[10]. Found the pH of River Chamla which range from 6.8 to 7.9. During our survey the pH of water was also calculated at each collection point which range from pH 4.50 to pH 7.3. The pH of some collection points is high while the pH of some collection points is low. The lower pH is recorded at collection points like Dherai which is 4.50 and high pH was recorded at collection points Jalkhani and Kas which has a pH 7.3 respectively. Saqib *et al.* in 2017 measured physiochemical parameters of water and soil of three dams namely Khurum dam, Muhabbat Khel dam and Khasari dam of district Karak, KP, Pakistan. The physiochemical properties like color, taste, odor, TS, electrical conductivity,

pH, temperature and, TDS of water and soil samples collected from various sites (start, mid, and end) of the three dams were analyzed. For this purpose three samples (n= 3) of water and soil were collected from the different sites of the each dam. These samples were analyzed for physiochemical parameters. From the results it was concluded that physicochemical parameter of both soil and water are within the giving range given by (WHO) and are also suitable for growing fish and productivity ^[11]. Zaryab *et al.* in 2017 conducted Length weight relationship study that shows a wide variation in results for *Labeo rohita*, *Hypophthalmichthys molitrix*, *Catla catla* average length 30.48cm, 17.78cm, 10.16cm and the average weight were 160g, 26g and 15g respectively. The weight-length relationship of *Labeo rohita*, *Hypophthalmichthys molitrix*, *Catla catla* could be considered as very useful in fisheries research, fish biology and ecology ^[12]. Zubia *et al.* in 2015 conducted study on River Indus of district Sukker and noted, the length weight relationship were ranging from 12.0cm to 14.5cm in total length (TL) and 23.2g to 38.5g in body weight (BW). While the total length of males ranged from 12.4cm to 14.4cm and body weight 23.2g to 38.1g and female's total length ranged from 12.0cm to 14.4cm and body weight 25.1g to 38.5g. ^[13]. The current study will be helpful in future for fisheries taxonomist and aquaculturists.

Conclusion

From the current study it was concluded that the fish fauna of River Etai was rich, but it is facing the illegal, domestic sewage and anthropogenic activities of humans. The available threats to fish fauna of the River Etai where riverine flood plain encroachment, agriculture runoff, Alteration of natural hydroperiod and illegal fishing techniques in the form of electric current, dynamites and chemical etc. also affect the fish population of river Etai District Shangla.

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