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Diversity of fishes of head Marala, Punjab, Pakistan

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SUMMARY

Pakistan has 19 Ramsar sites and manages significant canal irrigation systems. There are around 27,977 fish species worldwide; Pakistan has almost 1000 species of fishes. Fish distribution and diversity are intimately tied to a variety of parameters, including breeding sites, food supply, geography, physicochemical characteristics and water depth. As a result, research on the diversity and density of fish in diverse elevations as well as habitats are needed. As a result, this study was designed to investigate the fish diversity of head Marala in order to collect additional data on fish diversity and dispersion. From February 2018 to January 2020, data were collected both directly and indirectly (conversation with fishermen of head Marala) to determine the fish diversity of head Marala. In this research, 555 fish specimens from 34 different species were collected from the head of Marala in Punjab, Pakistan. The Shannon-wiener Index was 1.15, the Richness was 12.02, and the Evenness was 0.75. It has been noted that the research region has a great fish diversity.

Keywords: Head Marala, Freshwater, Fishes, Diversity

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INTRODUCTION

Pakistan has the world's largest canal system, as well as around 225 wetlands, just 19 of which are Ramsar sites. Pakistan has 9.7 percent wetland area, with almost 26 percent being coastal and 74 percent being freshwater wetland (Altaf *et al.*, 2014). Freshwater is an essential resource for animals, as well as for human activities such as home necessities, agriculture, and industry, and it is also important for the evolution of fauna and flora. Freshwater has had an important influence in the evolution of human societies (Bartram and Ballance, 1996; Gleick *et al.*, 2002; Gupta and Gupta, 2006).

There are almost 28,000 species of fishes in the world, with 786 of them being marine fishes (Mirza and Alam, 2000) and more than 170 species of fishes of freshwater (Mirza, 2004) documented in this country. Froese and Pauly (2014) has counted diversity of freshwater fishes from of Asia i.e. China (1643 species of fishes), India (951 species of fishes), Bangladesh (250 species of fishes), Iran (277 species of fishes) and Afghanistan (128 species of fishes).

Although several ichthyologists have studied the fish variety of the Indus and its tributaries, additional research on fish diversity and distribution is required. Furthermore, deforestation, global warming, illegal hunting, poaching and pollution pose numerous risks to river ichthyofauna (Khan *et al.*, 2008; FAO, 2011; Khan *et al.*, 2011; Mirza and Mirza, 2014; Altaf *et al.*, 2015; Hussain *et al.*, 2015; Hussain *et al.*, 2016; Muhammad *et al.*, 2017).

Marine and freshwater fish diversity and habitat are declining globally as a result of a variety of reasons such as "habitat loss", "agricultural intensification", "industrial development", "urbanization", "overexploitation", "changes in drainage", and "water flow through diversion" and "damming". Fish distribution as well as diversity are intimately tied to a variety of characteristics, including water depth, food availability, geography, breeding sites, and water physicochemical properties. As a result, it is critical to study the diversity of fish in varied environments. The purpose of this study was to learn about the fresh water fish variety in the province of Punjab, Pakistan.

MATERIALS AND METHODS

METHODOLOGY AND STUDY AREA

Data was observed during research by both i.e. "direct" as well as "indirect" (i.e. discussion with fisherman of head Marala) methods to know freshwater fishes of head Marala, from February, 2018 to January, 2020.

Fish specimens were gathered from head Marala, Punjab (Figure 1), utilizing diverse types of techniques i.e. "cast-nets", "gill-nets", "hooks", "drag-nets" and "hand-nets" on monthly basis for two years.

STATISTICAL ANALYSIS

The "Shannon-Weiner Diversity index" was abbreviated as (H'), and calculated (Shannon and Weaver, 1949) with the formula given below;

$$\text{"}H' = - [\sum P_1 \text{Ln} P_1]\text{"}$$

Where

H': "Shannon-Weiner Index"
P_i: "Proportion of species / Total no. of species".
Ln P_i: "Natural Logarithm of P_i".

The "Evenness Index" (Pielou, 1966) was abbreviated as (E), and calculated with the given below formula;

$$\text{Evenness Index} = \text{"}H' / \text{Logn}(S)\text{"}$$

While
The "Logn" is "natural logarithm" and
The "S" is "total number of species".

The "Richness Index" (Margalef, 1958) was abbreviated as (R), and calculated with the formula given below;

$$\text{Richness Index} = \text{"}S- 1 / \text{Logn}(N)\text{"}$$

While
The "N" is "total number of specimens of all species".

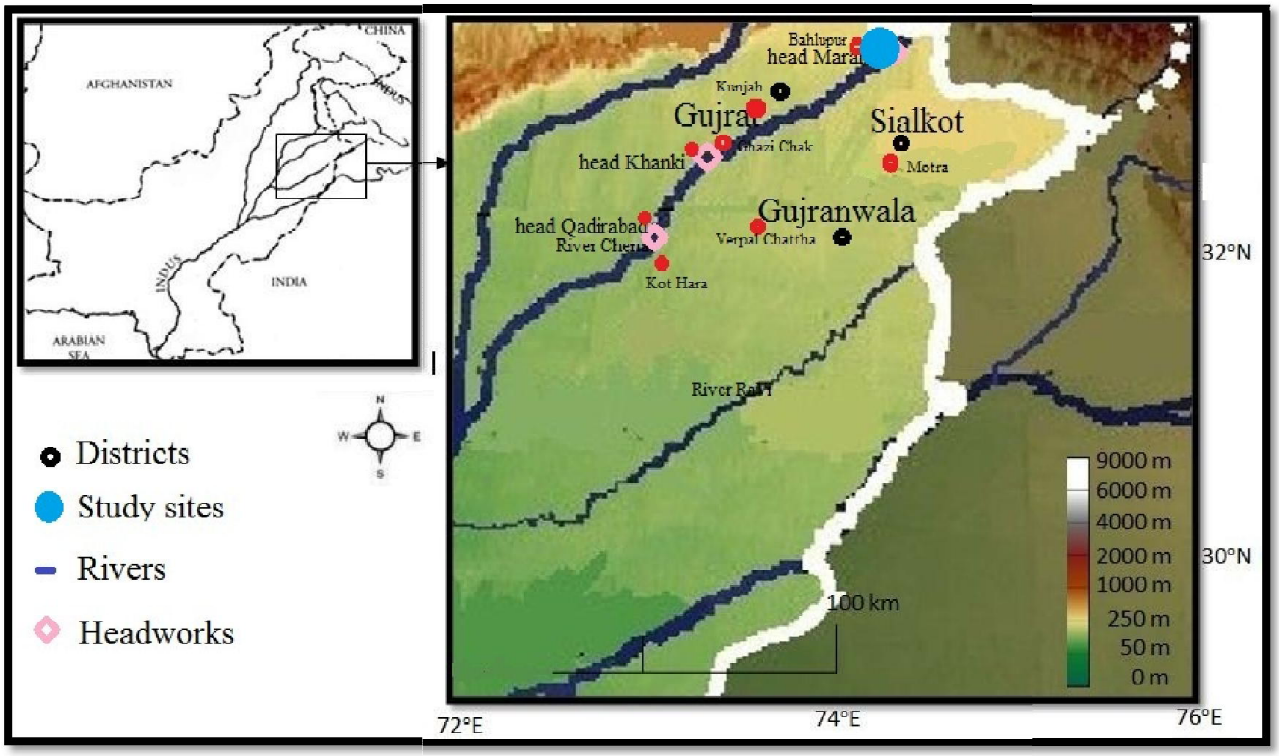

Figure 1. Map of Head Marala.

RESULTS AND DISCUSSION

In this research, 555 fish specimens from 34 different species were collected from the head of Marala in Punjab, Pakistan. The "Shannon-wiener index" was 1.15, "Richness" was 12.02, and "Evenness" was 0.75 (Table 1). Ashraf *et al.* (2022) reported the 21 "species of fishes" were from Chashma Barrage. Hussain *et al.* (2015) reported the 22 "species of fishes" from river Ravi. Altaf *et al.* (2015) reported 34 "species of fishes" from the "river Chenab". Altaf *et al.* (2011) documented the 33 ichthyofauna species from "head Qadirabad". Khan *et al.* (2008) reported the 20 "species of fishes" from "Chashma barrage" and also 22 "species of fishes" from the "Taunsa barrage". While, Khan *et al.* (2011) recorded the 50 "species of fishes" from "Ravi river" while 30 "species of fishes" reported from "Jhelum river".

During the study noted that abundant species of fishes (Figure 2) are written as; Khaga *Rita rita* (0.040), Mori *Cirrhinus mrigala* (0.040), Kalbans *Labeo calbasu* (0.041), Grass Carp *Ctenopharyngodon idella* (0.063), Silver Carp *Hypophthalmichthys molitrix* (0.079), Common Carp *Cyprinus carpio* (0.081), Dola *Channa punctata* (0.081), Raho *Labeo rohita* (0.119), Tilapia *Oreochromis niloticus* (0.141), and Thaila *Catla catla* (0.178).

CONCLUSION

During the survey noted that fish diversity is high at head Marala and it is significant and vital wetland of Pakistan, it should be included in Ramsar site.

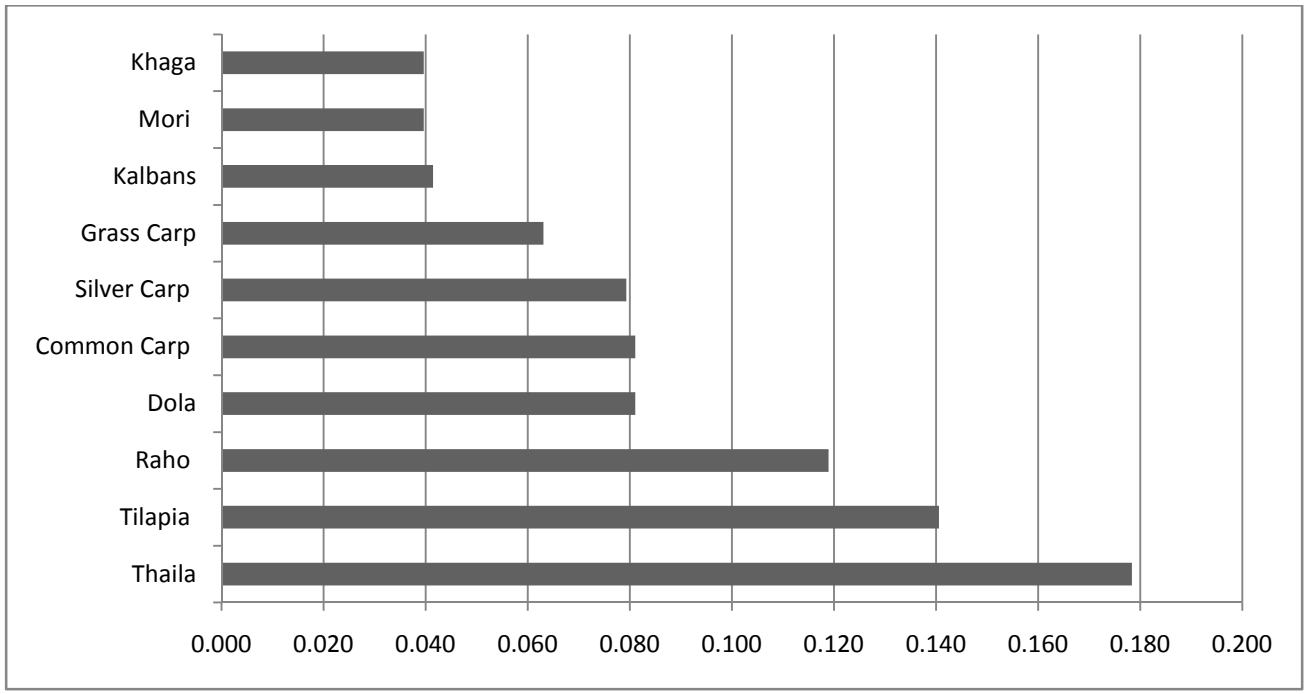

Figure 2: Top ten abundant species of fishes in head Marala.

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Table 1: Diversity of fishes of head Marala.

Sr.	**Scientific name**	**Common Name**	RA	**LogPi**	**PiLogPi**
1	*Bagarius bagarius*	Foji Khaga	0.022	-1.67	-0.04
2	*Barilius bendelisis*	Patha Chalwa	0.004	-2.44	-0.01
3	*Catla catla*	Thaila	0.178	-0.75	-0.13
4	*Channa marulious*	Soul	0.020	-1.70	-0.03
5	*Channa punctata*	Dola	0.081	-1.09	-0.09
6	*Cirrhinus mrigala*	Mori	0.040	-1.40	-0.06
7	*Cirrhinus reba*	Reba Machhali	0.007	-2.14	-0.02
8	*Clupisoma garua*	Bachhwa	0.004	-2.44	-0.01
9	*Ctenopharyngodon idella*	Grass Carp	0.063	-1.20	-0.08
10	*Cyprinus carpio*	Common Carp	0.081	-1.09	-0.09
11	*Eutropiichthys vacha*	Jhali	0.013	-1.90	-0.02
12	*Gagata cenia*	Gagata Cenia	0.002	-2.74	0.00
13	*Garra gotyla*	Pather Chat	0.002	-2.74	0.00
14	*Heteropneustes fossilis*	Sangehi Machhali	0.002	-2.74	0.00
15	*Hypophthalmichthys molitrix*	Silver Carp	0.079	-1.10	-0.09
16	*Labeo calbasu*	Kalbans	0.041	-1.38	-0.06
17	*Labeo dero*	Dero Machhali	0.022	-1.67	-0.04
18	*Labeo rohita*	Raho	0.119	-0.92	-0.11

19	*Macrognathus pancalus*	Groj	0.002	-2.74	0.00
20	*Mastacembelus armatus*	Baam Machhali	0.002	-2.74	0.00
21	*Mystus cavasius*	Tangra Machhali	0.004	-2.44	-0.01
22	*Notopterus notopterus*	But Pari	0.002	-2.74	0.00
23	*Oreochromis niloticus*	Tilapia	0.141	-0.85	-0.12
24	*Osteobrama cotio*	Pali Roo Machhali	0.002	-2.74	0.00
25	*Parambassis ranga*	Ranga Sheesha	0.002	-2.74	0.00
26	*Puntius sophore*	Sophore Popra	0.002	-2.74	0.00
27	*Puntius ticto*	Ticto Popra	0.002	-2.74	0.00
28	*Rita rita*	Khaga	0.040	-1.40	-0.06
29	*Salmostoma bacaila*	Choti Chal Machhali	0.002	-2.74	0.00
30	*Sisor rabdophorus*	Kirla Machhali	0.002	-2.74	0.00
31	*Sperata sarwari*	Sangari	0.013	-1.90	-0.02
32	*Tor macrolapis*	Masheer	0.004	-2.44	-0.01
33	*Wallago attu*	Mali	0.004	-2.44	-0.01
34	*Xenentodon cancila*	Kaan Machhali	0.002	-2.74	0.00
Total			1.00		-1.15
H' = - [$\sum P_i LogP_i$]"					1.15
E = H' / Logn(S)					0.75
R= S- 1 / Logn(N)					12.02

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