FISH BASELINE STUDIES OF THE RANGLA WETLANDS COMPLEX, MUZAFFARGARH, PUNJAB, PAKISTAN

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Table of Contents

1.INTRODUCTION

Rangla wetland complex is stretched over an area of 24,140 haters and present in present in Muzaffargah District in the province of Punjab, Pakistan at 30^{o} 40' N, 70^{o} 11' E (Khan and Shah, 1993). It is a complex of many small and medium sized lakes viz., Rangla Lake, Jarrwali Lake, Drowle Dhand, Bheriwala Lake, Kuttaywali Lake, Hansewala Lake, Bhando, Dori Head, Bhudena, Mubarik Wala, Drawae Wala, Bhangan and Nai Wala and many others. All these wetlands are present in an area of 25 of 30 kms. Only five important and comparatively big lakes comprising of Rangla Lake, Jarrwali Lake, Bheriwala Lake, Kuttaywali Lake, and Hansewala lakes were explored during the above said studies

Rangla Wetland Complex is an example of rich biodiversity in the desert. The lakes on the western side are presently located amongst the agriculture areas while those falling in the eastern side are located in the off-shoots of Cholistan Desert. The western wetlands are mainly freshwater lakes while the ones in eastern side and located in the desert are brackish in nature. The salinity, however, varies from lake to lake and determines the presence or absence of fish. Most of these wetlands were originated after the construction of Muzaffargarh canal originating from the eastern side of the barrage. Before this, these were shallow agricultural lands providing the local needs. The water is mainly the seepage water or the run off received during the monsoon when the canal and its tributaries are inundated. Water also enters in these lakes when the earthen banks of a nearby irrigation channel are broken. This canal water also supplies the lakes with the fish, its fries, fingerlings or eggs.

Presently, the wetlands are under heavy pressure of Typha cutting which is being used for backing the bricks. This practice is a real threat that can cause an irreparable damage the wildlife of these wetlands. It will spoil the natural refuge for wildlife species, the breeding centers for fishes and birds, and severe reduction in natural buffering capacity of the wetlands. The livestock trampling and grazing pressure along with illegal hunting and poaching is also a potential threat in these wetlands. During monsoon season, each year, the flood water from Indus River reaches the wetlands through Muzaffargarh canal and thus adds to its biodiversity particularly fishes. This wetland is a neglected area and keeping in view the ecological importance of the wetlands it is strongly recommended that a comprehensive research plan should be launched for its long-term conservation and sustainable use.

1- FISH COLLECTION METHODOLOGY

2.1- Sampling Methodology:

Fish sampling gears are mostly selective depending upon the conditions of the rivers. Electrofishing is most popular method for collection of fishes in wadable streams and rivers but it is not effective for large reservoirs. The alternative methods used for obtaining a representative sample of the fish assemblages are the gill netting and cast netting. Collection of a representative sample of the fish assemblage in a defined

stretch of each station is a prerequisite of the sampling methodology. A standard length of 200 m covering maximum of representative habitats, was used to obtain a representative sample. The data collected through the two methods was pooled and called the representative sampling of that station.

2.2-Gill netting:

Three nets, each measuring 50 m length with mesh size 2.5X2.5 and 1.5X1.5 was used for gill netting. The gill nets one set were checked in the evening and early in the morning.

2.3-Cast netting:

Cast nets with known circumference were casted in a stretch of 200 m. Twenty cast nets were casted on a line of 200 m at different stations along the bank of the reservoir. Fish species collected were identified and photographed in the field and number of specimens of each species noted at the spot. Most of the specimens were released after identification while voucher specimens were kept for record and preserved in 10 % formaldehyde.

3-LITERATURE REVIEW

Fish fauna of the river Indus and its associated canals in the Muzaffargarh and Southern Punjab is well studied and documented in various reports. Rafique (2006) presented a comprehensive report on the fish fauna of Taunsa Barrage. The fish fauna of Indus plain (Punjab and Sindh) as a whole has highest diversity and represents almost all the warm water fish fauna of Pakistan (Rafique,2000). The fish fauna of Punjab is represented by 120 species (Mirza, 2004, Rafique, 2000), majority of which is expected to be present at Taunsa Barrage which is the main source of fish in the Rangla wetlands complex. Presently, there is no any direct report on the fish fauna of the Rangla wetlands. There are, however, few comprehensive reports on the fish fauna of adjoining areas of the Taunsa Barrage. Mirza and Jan (1993) reported 43 species from the proposed Kalabagh Dam area. Mirza and Abubakar (1993) reported 54 species from Chashma reservoir. Rafique et al. (2003) reported 50 species from Jinnah Barrage area. The other reports are Khan *et al*., 1991, Mirza and Ahmed, 1987, and Kashif et al., 1997.

4-RESULTS

Twenty four fish species have been recorded from the Rangla Wetlands Complex. The Bheriwala Lake has maximum fish fauna and represents all the 24 species recorded. Rangla Lake has only the Tilapia fish which is the only species found in this lake. The lake is full of Tilapia and the size of the fish is quite big which shows that food productivity for this fish is enormous in the lake and as there is no any other competitor of this fish in the lake so it is holding a large number of the fish. The source of the fish is the canal water which occasionally enters in the lake as a result of collapsing of the earthen banks of the water channels irrigating the agricultural fields in the desert. As the fish is pond breeder, so now it is extensively breeding in the lake.

Table I: Fish Fauna in different lakes of the Rangla Wetlands Complex

Nos.	Scientific Name	Family	Bheriwala Lake	Rangla Lake	Jarrwali Lake	Kuttaywali Lake	Hansewala lake
1.	*Notopterus notopterus*	Notopteridae	+	-	-	-	-
2.	*Chela cachius*	Cyprinidae	+	-	-	-	-
3.	*Amblypharyngodon mola*	Cyprinidae	+	-	-	-	-
4.	*Securucula gora*	Cyprinidae	+	-	-	-	-
5.	*Salmostoma bacaila*	Cyprinidae	+	-	-	-	-
6.	*Aspidoparia morar*	Cyprinidae	+	-	-	-	-
7.	*Barilius vagra*	Cyprinidae	+	-	-	-	-
8.	*Cirrhinus mrigala*	Cyprinidae	+	-	-	-	-
9.	*Cirrhinus reba*	Cyprinidae	+	-	-	-	-
10	*Labeo rohita*	Cyprinidae	+	-	-	-	-
11	*Osteobrama cotio*	Cyprinidae	+	-	-	-	-
12	*Puntius sophore*	Cyprinidae	+	-	-	-	-
13	*Puntius ticto*	Cyprinidae	+	-	-	-	-
14	*Crossocheilus diplocheilus*	Cyprinidae	+	-	-	-	-
15	*Cyprinus carpio*	Cyprinidae	+	-	-	-	-
16	*Mystus cavasius*	Bagridae	+	-	-	-	-
17	*Mystus vittatus*	Bagridae	+	-	-	-	-
18	*Wallago attu*	Siluridae	+	-	-	-	-
19	*Channa punctata*	Channidae	+	-	-	-	-
20	*Channa marulius*	Channidae	+	-	-	-	-
21	*Chanda nama*	Chandidae	+	-	-	-	-
22	*Mastacembelus armatus*	Mastacembelid	+	-	-	-	-
23	*Oreochromis mossambicus*	Cichlidae	+	+	-	-	-
24	*Heteropneustes fossilis*	Heteropneusted	+	-	-	-	-

Table 2: Physico-Chemical factors of the five Lakes of the Rangla Wetlands Complex

Lake	Site	Long/lat	Water temp. (°C)	TDS (ppt)	D.O. (mg/l)	pH	Salinity (%)
Rangla Lake	Site 1	30° 11' 35.9" N 71° 08' 17.1" E	31.7	9.8	7.6	7.0	9.0
	Site 2	30° 11' 36.5" N 71° 08' 17.7" E	31.4	9.8	6.34	7.0	9.0
	Site 3	30° 11' 6.08" N 71° 08' 36.4" E	30.4	9.8	5.1	8.0	9.0
	Site 4	30° 11' 48.00" N 71° 08' 33.00" E	31.0	9.8	4.54	8.0	9.0
	Site 5	30° 11' 15.01" N 71° 08' 30.00" E	31.4	9.8	4.86	8.0	9.0
Kuttay wali Lake	Site 1	30° 12' 48.01" N 71° 08' 16.00" E	31.1	7.10	4.2	8.0	10.0
	Site 2	30° 12' 57.00" N 71° 08' 27.03" E	31.0	7.10	3.1	8.0	10.0
	Site 3	30° 13' 13.05" N 71° 08' 13.02" E	31.5	9.05	3.6	8.0	10.0
Jarr Lake	Site 1	30° 10' 46.04" N 71° 09' 01.04" E	31.8	8.05	3.2	8.0	12.0
	Site 2	30° 10' 24.01" N 71° 09' 16.05" E	32.6	7.10	3.4	8.0	12.0
	Site 3	30° 10' 21.02" N 71° 09' 12.09" E	33.2	7.10	3.6	8.0	12.0

Hanswali Lake	Site 1	30° 11' 38.05" N 71° 07' 05.03" E	34.2	7.10	3.2	8.0	18.0
	Site 2	30° 12' 13.03" N 71° 07' 05.01" E	35.7	7.10	3.5	8.0	18.0
	Site 3	30° 12' 12.08" N 71° 07' 03.02" E	34.5	7.10	3.2		12.0
	Site 4	30° 11' 38.07" N 71° 07' 05.08" E	34.2	7.10	3.4	8.0	18.0
Bheriwala Lake	Site 1	30° 13' 32.01" N 71° 06' 40.05" E	33	7.8	4.2	8.4	4.0
	Site 2	30° 13' 34.01" N 71° 06' 38.08" E	33.2	7.7	4.2	8.3	4.0
	Site 3	30° 13' 36.09" N 71° 06' 37.07" E	33.0	7.5	4.2	8.4	4.0
	Site 4	30° 13' 40.05" N 71° 06' 39.08" E	33.0	7.5	4.3	8.4	4.0

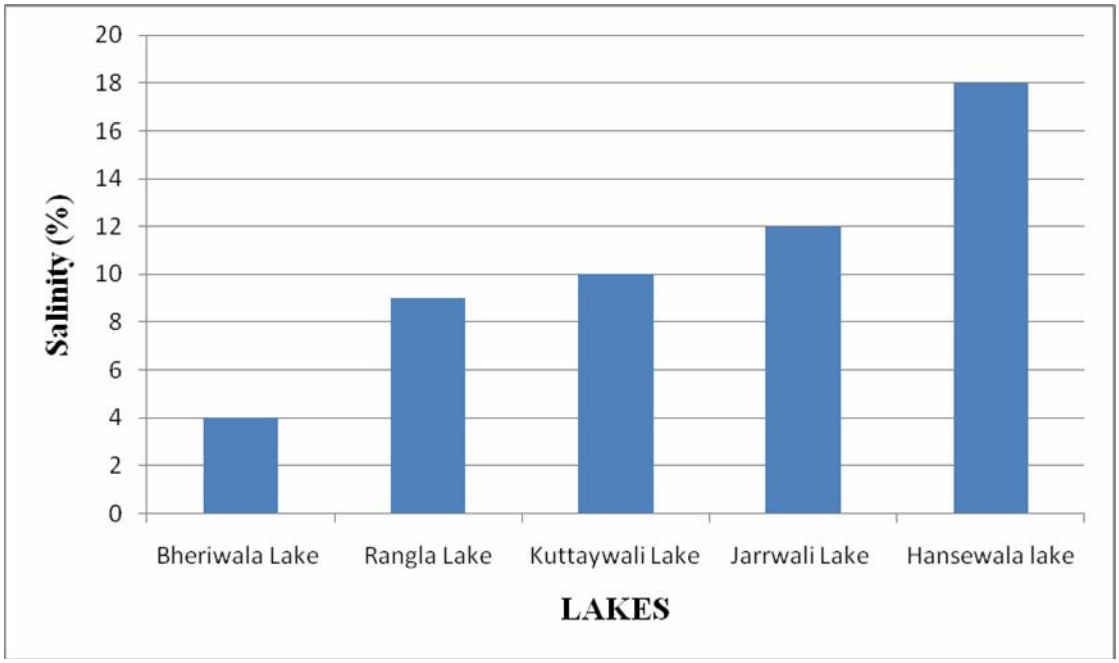


Figure 1: Concentration of Salinity in different lakes of Rangla Wetlands Complex

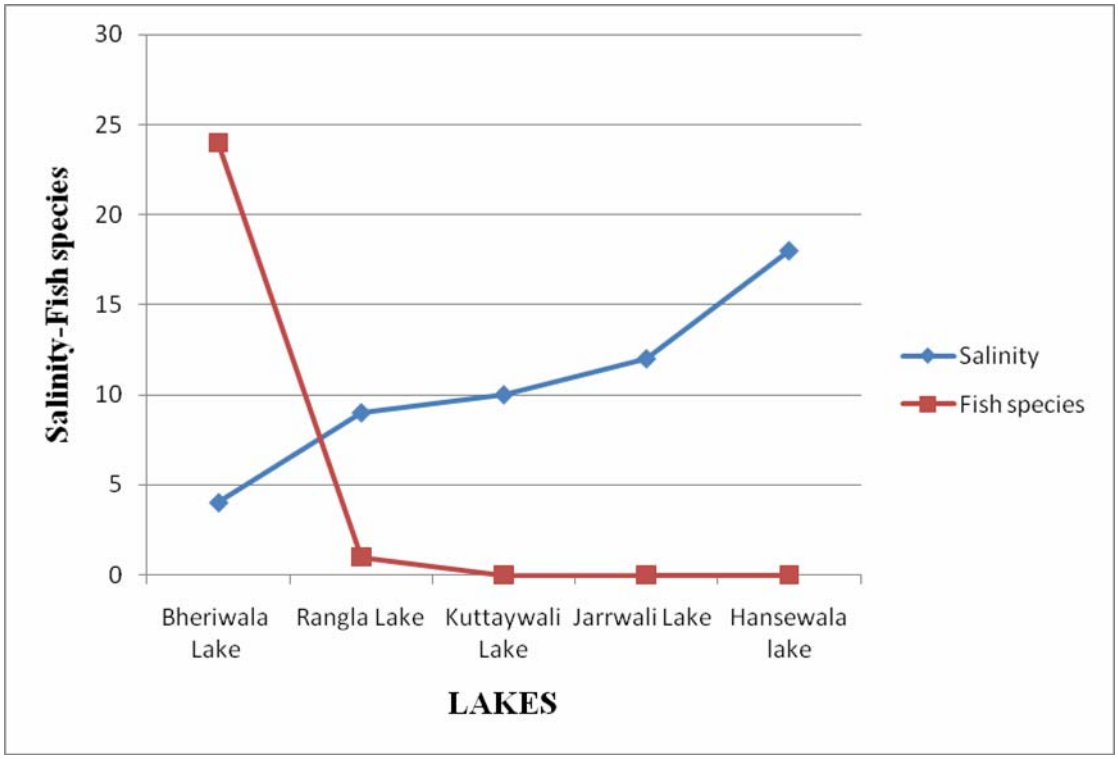


Figure 2: Representation of fish species in response to Salinity in different lakes of Rangla Wetlands Complex

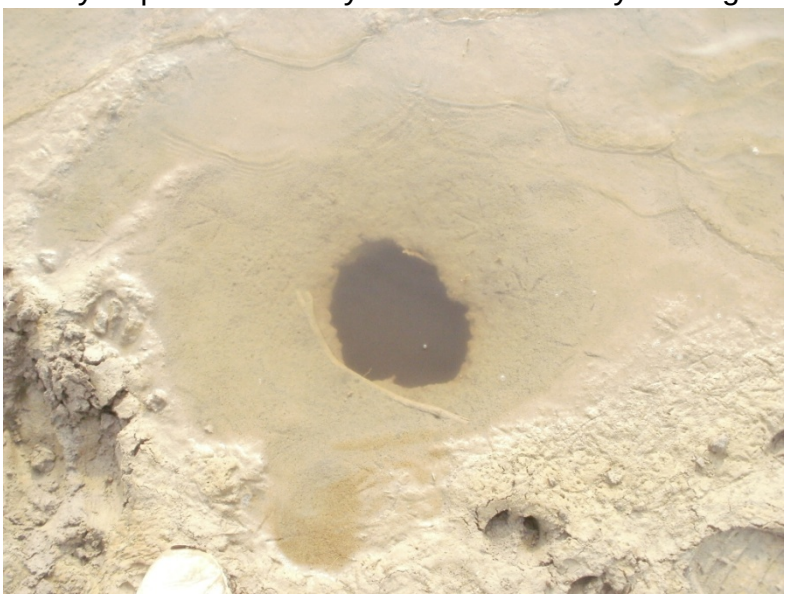
5-DISCUSSION

5.1-Fish fauna

Twenty four species of fishes belonging to nine families have been reported from the Rangla Wetlands Complex (Table 1). Of these, nine species viz., *Cirrhinus mrigala, Labeo rohita, Cirrhinus reba, Cyprinus carpio, Wallago attu, Channa marulius, Channa punctata, Mastacembelus armatus,* and *Oreochromis mossambicus* are commercially important. All the species, except *Cyprinus carpio* which is exotic, are indigenous fish fauna. Presence of fish fauna in these lakes is highly linked with the salinity. The Bheriwala Lake has the least salinity (4%) and is richly inhabited by the fish fauna representing all the 24 fish species found in the complex. It is quite a big water body and has very good fisheries potential if it is properly managed and stocked with the fish seed each year. Presently, *Tilapia* is the most abundant species in this lake.

Rangla Lake is more saline (9%) than the Bheriwala Lake and is only inhabited by the Tilapia fish which has the capacity to tolerate this much salinity. As it is the only fish species found in the Lake, its population in the lake is very high due to lack of competition for food and habitat sharing. It has enormous size which is generally not seen in regular water bodies. Lake water temperature is high which is suitable for breeding of this fish. The abundance of fries and fingerlings in the lake shows that it is the most suitable breeding ground for this fish. The abundance of the Tilapia in this lake is supporting a large number of piscivorous birds specially the Cormorants, Pelicans and the Egrets. Large flocks of Cormorants and Egrets in this comparatively smaller water body is definitely being supported by an abundant food source in the form of Tilapia.

The salinity level in rest of the three lakes viz,. Kuttaywali Lake, Jarrwali Lake and Hansewala Lake were very high ranging from 10-18 % (Table 2, Fig. 1)) which render the water of these lakes unfit for inhabiting by any fish species (Fig. 2). All the other physic-chemical factors were not critically important as they do not much vary among these Lakes. Dissolved oxygen is very low in all the lakes which are due to high temperature, muddy bottoms, and large quantities of decomposing matter in these lakes. Water temperature, TDS and pH values are more or less consistant showing less variation among all the lakes.



5.2-Tilapia reproductive behavior observed in the Rangla Wetlands Complex

Specific breeding behavior was observed in the Rangla Wetlands Complex. Large numbers of reproductive holes dug by the Tilapia fish in the bottom of the lakes were observed. These holes serve for shedding the eggs of the Tilapis as well as for a hiding place for shallow water dwelling Tilapia fries. If the water is disturbed by any predator, all the fries immediately enter in the deep narrow holes and are again dispersed in the vicinity of the holes as soon as they feel themselves out of the danger.

Tilapia spawns every month or so, as long as the water is warm. The male begins the reproductive behavior by digging holes in the pond bottom or side wall about 35cm across and 6cm deep. The female will deposit her eggs, about 75 to 200 of them, in the nest, and then the male releases his milt. The female picks up the eggs and the milt in her mouth, so the fertilization of the eggs of actually takes place in the females' mouth.

The eggs remain in the female's mouth until they hatch after 3 to 5 days. Then the fry stay in the female's mouth until the yolk sac is gone. During this time, the female does not eat. The main reason for this mouth-breeding is for protection of the young fish, since the tilapia have relatively few eggs compared to some other pond fish. Tilapia is also a favourite food for a number of predators. Because the fry are so well taken care of by the mother (and even sometimes by the father fish), these young fish are easier to raise than some other species of fry.

5.3-Important Fish Fauna

Securucula gora

Oreochromis mossambicus

Puntius sophore

Barilius vagra

Cirrhinus mrigala

Labeo rohita

Cirrhinus reba

Heteropneustes fossilis

6-PROBLEMS FACED BY RANGLA WETLANDS COMPLEX

1- Cutting the Typha for backing the Bricks

Typha is an important component of the wetlands. It provides the nesting, feeding and breeding grounds for fish and birds. It is a natural shelter for the wildlife associated with the wetlands. It also saves the banks of the lakes from erosion and provides a buffering system during the drought or floods. Presently numerous centers for chopping the typha have been established all around the wetlands. The chopped Typha is used as fuel for backing the bricks in the temporary established kilns. People are engaged in cutting the Typha. The sell it in the centers where it is chopped and loaded on trolleys of the tractors and transported to the kilns sites for using it as cheap fuel. This is a greedy business where money is being made by spending nominal money. This practice needs to be addressed to save the important wetlands in the area and in all over the county.

2- Overgrazing the area

The Rangla Wetlands Complex is being overgrazed by huge number of livestock including water buffaloes, cows, goats, camels, horses and donkeys. The heavy pressure of livestock tramples the vegetation specially Typha in the wetland areas causing an irreparable loss to the vegetation which otherwise could serve as refugium and breeding and feeding center for the wildlife species inhabiting the wetland areas.

3- Illegal hunting and poaching

Though the wetland areas are well protected by the wildlife department but still due to insufficient manpower, political influences and inaccessibility of wildlife guards, illegal hunting and pouching is still being practiced in these wetland areas. The fishing is illegally done in some f the wetlands using unfair and forbidden means.

4- Fluctuation in water levels and increase in Salinity

There is no permanent water source for these wetland areas. These wetlands are fed during monsoon inundations, casual water supply through broken irrigation channels through seepage process. During prolonged drought periods, all these water sources are no longer available and the water level in these lakes shrinks tremendously. Due to high evaporation rate, the salinity level in these lakes increases which cause a drastic change in the water chemistry and drop in the dissolved oxygen. It disturbs the food chain and the food web causing a decrease of fauna and flora at different trophic levels.

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