

Current Status of Three Major Carps (*Labeo rohita*, *Cirrhinus mirrigala* and *Catla catla*) In the Downstream Indus River, Sindh

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Abstract

Present study was conducted to analyze the status of commercial important three major carps (*Cirrhinus mirrigala*, *Labeo rohita* and *Catla catla*) at Downstream Indus River. The samples were collected from March 2015 to February 2016, from eight major landing areas. A total of 11912 fish specimen were collected from all sites. In this investigation 77 freshwater fish species were identified, including 71 native species and 6 exotic species. All of recorded 77 fishes were belonged to 9 orders and 23 families. In all of them Family Cyprinidae was observed as the dominant family with 24 fish species (26%) followed by Bagridae 13 fish species (14%). In this investigation, three important commercial species *Cirrhinus mirrigala*, *Labeo rohita* and *Catla catla* had been identified as the fish fauna of special concern. Those contribute in all catches only 4.28%, 3.53% and 1.64%, respectively. Population of these economically important species is declining due to overexploitation, habitat degradation and aquatic pollution. Therefore, effective conservation measures are suggested to sustain major carps and fish fauna at Downstream Indus River.

Keywords Biodiversity; Conservation; Downstream; Indus River; Major Carps

Introduction

Pakistan is very rich with natural water resource in the form of Rivers, streams, estuaries, man-made reservoirs, lakes and ponds. The River Indus is one of the longest river systems of the world that flows southward until it drains into the Arabian Sea in Sindh Province and forms the Indus Delta [1]. This region has number of large basins for growth and nesting of many commercial fishes. Pakistan has wide diversity of freshwater fishes, more than 171 species [2,3] and marine water fishes. The freshwater fish fauna of Pakistan is presented by a minimum of 193 fish species. These species belong to class Actinopterygii, sub-class Teleostei, 3 cohorts, 6 super orders, 13 orders, 30 families and 86 genera [4]. The population dynamics has a variety in fish community morphology that brought by various impacts such as; environmental factors, species interactions, availability of food and migration of fishes [5]. Area of Pakistan that constitutes a transitional zone which attributes the great influence and variation in fish fauna [6]. The Indus River ecosystem of Pakistan has been disturbed by intense human intervention. Due to overexploiting human activities it results in habitat loss and degradation. Consequently, many fresh water fish species have become heavily endangered. Population dynamics changes the vital rates of a population over time, where fish species are major indicator of ecological health. Hence, abundance and health of fish shows the health of water bodies [7]. Decline of fishes and fisheries influence the economic and population growth [8]. The carps are an important aquatic food item, where major carps are the commercial fish species of Pakistan. These carps including, Morakhi (*Cirrhinus mirrigala*), Rohu (*Labeo rohita*) and Thaila (*Catla catla*) are considered as major source of protein from Pakistani waters. Due to their high commercial values, all of these species are cultured in priority base.

Unfortunately, natural stock of these high commercial valued fish has been declined. Therefore, considering the importance of these valuable species, present survey was conducted. Some investigation on the status of such important species also have been conducted from other parts of Pakistan, such as from Hub Reservoir and Gomal River [9,10].

Due to introduction of several alien exotic fish species in Pakistani warm waters has damaged the natural habitat due to different nature than that of the local species. In all over the world the invasive species have been identified as an agent of the loss of biodiversity.

Material and Methods

Freshwater fish occurrence was studied from March 2015 to February 2016 in the Downstream Indus River. Eight landing areas namely, Railo Miyan (St-1), Karokho (St-2), Khanpur (St-3), Mullakatiyar (St-4), Wasi Malok Shah (St-5), Branch morie (St-6), Sujawal (St-7) and Jangseer (St-8) were selected (Figure 1). The specimen were collected by using different types of nets including scoop net, gill net, cast net, Pot net, dip net, trawl net and drag net. Fishes were preserved in 10% formalin for further studies in the laboratory. Specimens were identified to species level using appropriate identification keys (Day, 1982 and Talwar and Jhingran, 1991).

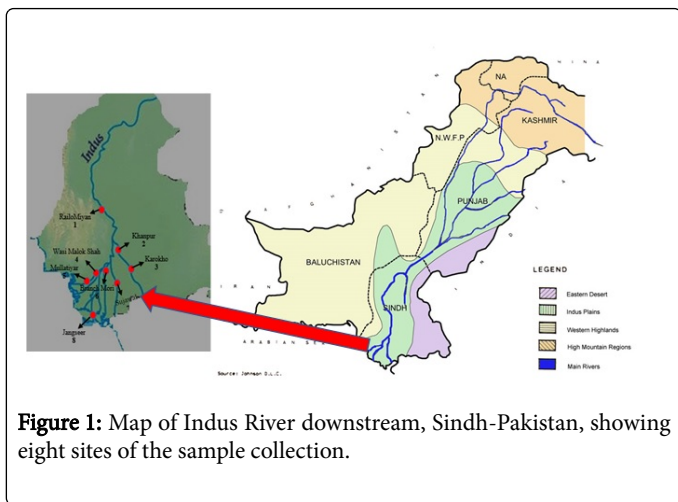


Figure 1: Map of Indus River downstream, Sindh-Pakistan, showing eight sites of the sample collection.

Result

A total of 11912 fish specimen were collected from the Downstream of Indus River from all eight sites. In this stock, 77 fresh water fish species were identified, including 71 native species and 6 exotic species. All of recorded 77 fishes were belonged to 9 orders and 23 families. In all of them Family Cyprinidae was observed as the dominant family with 24 fish species (26%) followed by Bagridae 13 fish species (14%) which shows in Figure 2. In this work done, three important commercial species *Cirrhinus mirrigala*, *Labeo rohita* and *Catla catla* had been identified as the fish fauna of special concern by presenting 4.28%, 3.53% and 1.64% respectively in overall collection. The maximum number of fish samples (N.2917) was collected from the St-1 and 77 species were recorded. Those include 2.17% all three native major carps and 3.20% of exotic fishes. While, 1027 fish specimen were found from the St-2 with 44 species including 15.09% native major carps and 6.33% exotic carps.

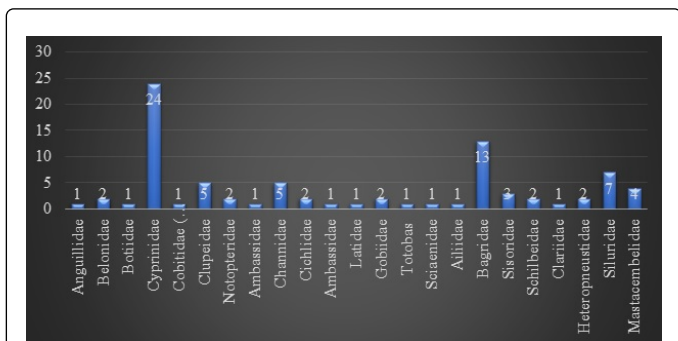


Figure 2: Shows the species distribution in families at downstream Indus River.

The collection of fish species at St-3 is not much more different from the St-2. On this Station about 883 fish specimen were marked, here little bit same ratio of native major carps 17.55% which observed at previous station whereas, 5.66% exotic carp were. Fish fauna at the St-4 in which 980 specimen were searched with 40 species were caught by the fishermen, out of these specimen 13.27% major carps and exotic carp were 9.69% monitored. At the St-5 less number of fish biomass were captured, in this site 745 samples were captured in which 16.11% major carps while just 4.03% exotic carp were found. A high

abundance of major carps were collected from the St-6 here total 2075 specimen were recorded by different fishermen with 66 species, at this place 9.64% major carps were inspected. At this site the presence of exotic carps is also in abundance about 9.40% were noticed. The numerous fish fauna at the St-7 are 1445 with 46 species collection, in which 12.11% major carps were checked rather than the exotic carps those were 6.92%. And at the last St-8 which is near to diatonic area, in this station 1840 specimen were collected but could not found any carp fish due to the high salinity water which is harmful for them. Here mostly estuary water species were observed or called them migratory fishes.

As described earlier, freshwater habitats of Indus River ecosystem are rich in biodiversity. A total of 11912 fish specimen were collected throughout downstream of Indus River. Those were identified as 77 freshwater fish species, including 71 endemic and 6 exotic species. However, the presence of three major carps, in the collected specimen, *Cirrhinus mirrigala*, *Labeo rohita* and *Catla catla* were 4.28%, 3.53% and 1.64% respectively. While in the exotic fishes they had been quietly short at all the stations except 1 or 2 stations. In the overall collection the highly edible fish *Cirrhinus mirrigala* (45%) is in abundant quantity while the *Catla catla* (17%) monitored in rare condition. On the other hand in exotic the *Ctenopharyngodon idella* (28%) noted in dominancy followed by the *Hypophthalmichthys nobilis* (9%). In overall recorded fish fauna of major carps on the top level the native carps *Cirrhinus mirrigala* (27%) was observed while in exotic carps the *Cyprinus carpio* (11%) was investigated in high level as shown in Figure 3.

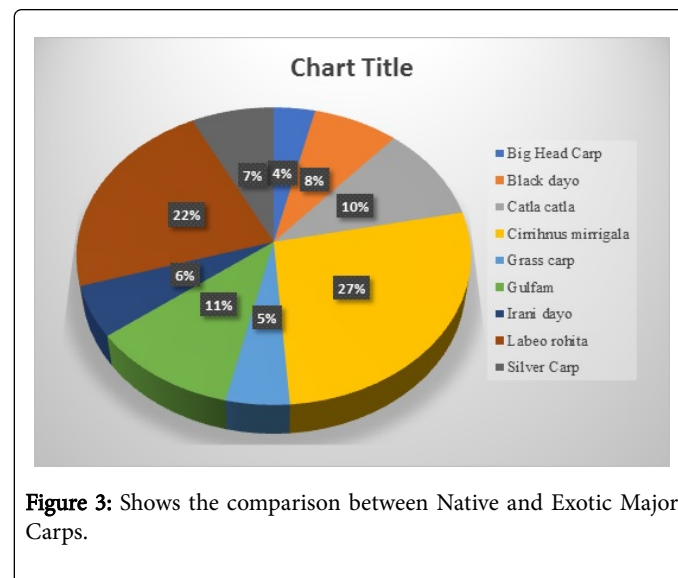


Figure 3: Shows the comparison between Native and Exotic Major Carps.

Population of these economically important species is declining due to overexploitation, habitat degradation and aquatic pollution. Therefore, effective conservation measures are suggested to sustain major carps and fish fauna at Downstream Indus River. The general physiographic variation of Fish species was equally same due to the hydrographical features of the Downstream Indus River. In addition there are several species of marine fishes entering fresh water for a variable distance, were also recorded. The systematics and distribution of these peripheral fishes have not been properly worked out so far and hence are not discussed in this paper.

Discussion

Fishes not only provides food to community but is also a source of livelihood for individuals involved in commercial fishing, especially in Inland water logged areas. Thirty one fresh water fishes have high economic value in Pakistan, those mainly described species diversity and composition of freshwater fishes, but lack important characteristics of the fish fauna, such as population dynamics of economically valued species and their conservation status and Decline in population of some of the commercially important fish species of Pakistan is associated to overexploitation, pollution and habitat fragmentation [11]. The aim of this study was to encompass the diversity of major carps at Downstream Indus River. The information gathered regarding presences status of major carps fishing activities, carp fish species diversity and the target species in different seasons. The Indus River has a very rich and diversified freshwater fish fauna. The damming of Rivers and Streams is often implicated as a cause for fish population decline and local extinction of freshwater fish [12]. In 1999 [2,3] it was reported that there were 171 fish species in Pakistan. While, in 2007 and 2012 [4,] reported 193 fish species. Hence, these digits suggest that there is the introduction of alien species in the Pakistani waters. Including other factors alien species are the major cause of decrease in fish species in various water bodies. Fish diversity at Chashma shows presence of 39 fish species in 1993 [13] while in 2008 [14] it was reported only 20 species. Hence 34 species of the fishes have been recorded from the river Chenab in 2015 [15]. Mirza et al. [16] recorded 51 species while Khan et al. documented only 30 species from the river Jhelum in 2011. Hence, from the Chashma barrage and Taunsa barrage 20 and 22 species respectively [14]. Altaf et al. [17] Identified 33 species from the Head Qadirabad. Khan et al. [18] recorded the 50 species from the Ravi.

Studies of spatial and temporal patterns of diversity, distribution and species composition of fresh water fishes are useful to examine factors influencing the structure of the fish community [19]. Including economically important species as: *Bagarius bagarius*, *Cirrhinus mirrigala*, *Cyprinus carpio*, *Eutropiichthys vacha*, *Channa marulius*, *Channa straitus*, *Gibelion catla*, *Hypophthalmichthys molitrix*, *Labeo rohita*, *Labeo gonius*, *Labeo calbasu*, *Sperata seenghara*, *Rita rita*, *Tenualosa ilisha*, *Notopterus notopterus*, *Rita macracanthus*, *Ctenopharyngodon idella*, *Cirrhinus reba*, *Clupisoma garua* and *Wallago attu*. The dominance of exotic carps may have serious implications for the native diversity of water bodies because they are considered as highly invasive and popular worldwide for decreasing the native fish diversity [20]. However, a comprehensive study is required for current status of three major carps (*Labeo rohita*, *Cirrhinus mirrigala* and *Catla catla*) in the Downstream Indus River, Sindh to analyse the role of exotic fishes if there is any towards the declining native fish diversity. Once quite common in river systems of Pakistan are now at the verge of extinction and hardly encountered in their natural habitats. The decline in fish diversity may be attributed to the environmental factors like drought, pollution etc., or over fishing or illegal poaching. However the exotic fishes like *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Hypophthalmichthys nobilis*, *Cyprinus carpio*, *Carassius auratus*, *Oreochromis niloticus* and *Oreochromis mossambicus* may also have their role in diversity decline of the native fish fauna due to their invasive behaviour.

Conclusion

Present study suggests that no predatory species should be introduced in the River and people should be motivated to cultivate

indigenous species. Hence, it is extremely interlinked and balances with all the local biotic and abiotic factors. The indigenous species is no way replaceable with the alien invasive. Furthermore, regular monitoring program should be in place to determine and document the population status of the important food fish.

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