

Exploration of Fish Diversity in the West Banas River, Banaskantha, Gujarat

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Abstract

The West Banas River, Gujarat was explored from Ichthyofaunal diversity perspective. Seven species were reported from the river. Cypriniformes was the dominant order with five species followed by Perciformes and Osteoglossiformes represented by one species each.

Keywords: Diversity, Fish, Gujarat, West Banas River

Introduction

Gujarat, a maritime State on the west coast is one of the richest fishing zones in India harbouring wide range of marine and vast inland aquatic fisheries resources. The favorable climate and environment conditions of the state support booming fish production through aquaculture (Sharma, *et al.*, 2016).

The West Banas River is mainly a seasonal west flowing river that originates near Naya Sanwara in south Sirohi district of Rajasthan. The basin of the river lies between 24° 19' 55.98" to 24° 54' 51.02" North latitude and 72° 35' 22.07" to 73° 10' 03.50" East longitudes. The West Banas River basin is by and large a very small dry area and falls at the fringe of arid climatic region is surrounded by hills.

The basin is bounded by the Sabarmati River basin in the eastern side, the Sukli River basin in the west, Luni River basin in the north and northwest. The total catchment area of the basin is very small and extends over an estimated area of 1,876 kms². The West Banas River flows for 50 kms in Rajasthan state before entering Gujarat. The river courses in a south-westerly direction between Mount Abu on the west and the easterly edge of the Aravallis on the east. It continues south through the plains of Gujarat state, flowing through Banaskantha and Patan districts and finally after traversing 266 kms, empties into the Little Rann of Kachchh.

Western parts of Banaskantha and Patan districts touch the Kachchh district and are unique in terms of geography and biota. The Thar Desert comprising salt pans, scrublands, known as Little Rann extends in to western parts of Banaskantha and Patan districts. Eastern parts of Banaskantha and Patan districts are near to Aravalli hills hence topography of this region is entirely different. Dantiwada Dam is situated on Banas River at Dantiwada town of Banaskantha district of Gujarat with catchment area of 2862 kms².

The actual number of fish species of India is still not precisely worked out because of taxonomic confusions due to lack of exploration and synonyms (Hoagland, 1996). The combined diversity of fishes in Gujarat is about 23.85% of total Indian fishes. According to (Sen & Banerjee, 2000) the Inland fish fauna of Gujarat is represented by 119 species whereas, Devi and Indra, (2012) has given an account of 120 freshwater species. In this context Dholakia (2004) has given an account of 96 freshwater fishes from the state of Gujarat. Besides, our knowledge regarding freshwater fishes of the Gujarat state is enhanced by the work done by (Goswami & Mankodi, 2010) and (Gohil & Mankodi, 2013) on Nyari-II reservoir and Mahi River where authors have found 15 & 26 species of fishes respectively. The fish species from the seasonal wetlands of Kachchh were explored mainly by Singh *et*

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al., (1999) and identified 22 species of fishes from Little Rann of Kachchh (LRK) however, Banyal and Kumar (2013b) have given details of 3 fish species from seasonal wetlands of Kachchh Biosphere Reserve (KBR), beyond India Bridge, Gujarat, 12 species of fish faunal diversity from Tundi wetland in Little Rann of Kachchh (Banyal & Kumar, 2014a), 4 species of fishes from Khadir Beyt in Great Rann of Kachchh (Banyal & Kumar, 2014b) and a total of 17 species of fishes from entire KBR (Kumar & Banyal, 2018).

Banyal and Kumar (2013a) have also worked on the ichthyofauna of the West Banas River in Rajasthan state and provided an account of 11 species. But, the West Banas River ecosystem has not been explored extensively from Ichthyofaunal diversity perspective in Gujarat state until present work carried out by the authors. The river was explored in December, 2017 near Dantiwada town of Banaskantha district.

Material and Methods

Fish collection was made by using cast nets, hand, scoop and drag net and fixation and preservation was done using 5-10% formalin. The fish species were identified after Talwar and Jhingran (1991), Jayaram (1999) and Froese and Pauly (2017) *i.e.* www.fishbase.org, [version December, 2017)]. Nature of river flow was adjudicated after Gordon *et al.*, (1992). Category of the river bottom was ascertained according to the criteria given by Armantrout (1999) (Figures 1&2).



Source: Google Earth

Figure 1. Satellite image depicting area of study.



Figure 2. A view of area of study downstream to Dantiwada dam.

Results and Discussion

The fisheries segment has an important role in the Indian economy. This segment also provides income to a large section of the country, particularly in the inland fisheries. Besides, it is a source of cheap and healthy proteinous food. The aquaculture and fisheries in India are vivacious economic activities, during the last three decades. 65% of total production in India, is from inland resources and remaining 35% from marine sources. In marine fish production, Gujarat has emerged as the leading producer (accounts 20.20 % in total). Marine resources of Gujarat are spread largely in the Arabian Sea, the inland waters in the form of ponds, rivers, canals, reservoirs, estuaries, brackish water, waterlogged areas etc. provides bulk of inland fisheries in the state (Sharma, *et al.*, 2016).

The study area is characterized mainly by open scrub vegetation around the banks of the river with few trees. Since, the river falls under the category of intermittent river (Gorden, *et al.*, 1992) only few water holes were observed at the point of study due to proximity of the sampling site from the Dantiwada Dam. Although riffle and pool habitats were observed to be prominent but, the river flow is basically dependent on rainfall and frequency of release of water from the Dam. The river bed material consists of gravels, cobbles, boulders and sand which artisan its flow.

Depth as a single most important factor is related to number of fish species present in a water body was proved by (Sheldon, 1968). It has been evidenced that deep water is related to environmental steadiness and allows vertical

separation of microhabitat of fishes (Baker and Ross, 1981; Gorman, 1988a; 1988b). Power, 1987 is of the view that due to the presence of avian predators, fishes are restricted to deeper pools. Fish populations are more in that macrohabitat which has reasonable current, moderate depth and stable substratum. Cover provides refuge for fish from aquatic, terrestrial and air borne predators as well as physical conditions such as high current velocities and bright sunlight. In certain condition depending on water transparency, water depth provides camouflage and availability of such water depths are positively connected with richness of certain fish species (Jowett *et al.*, 1996) and their life stages (Johnson *et al.*, 1992; Aadland, 1993). Importance of rocky substratum for perpetuation of the minnows is very much proved by (Fuselier & Edds, 1995). Aforesaid observations are in conformity with present observations. Fish diversity was recorded to be maximum in deep pools. Moreover, it has been found that cover is extremely important for minnows like *Pethia ticto*, which are abundant in large numbers in that portion of river where there is availability of various sizes of stones & pebbles. Large fishes were found mainly in deeper zones, with depth cover. Visibility for predators was also low in deeper section of river. Since, only few shallow water holes were present at the point of study therefore only seven species were reported from the river. Cypriniformes was the dominant order with five species followed by Perciformes and Osteoglossiformes represented by one species each. Among the reported fishes *Notopterus notopterus*, *Labeo boggut*, *Labeo calbasu* and *Systemus sarana* are commercially important. Whereas, *Osteobrama cotio* and *Chanda nama* are commercially insignificant. *Pethia ticto* is used in aquarium trade and is also relished by piscivorous birds. Composition of different orders of the fishes is presented in Chart 1.

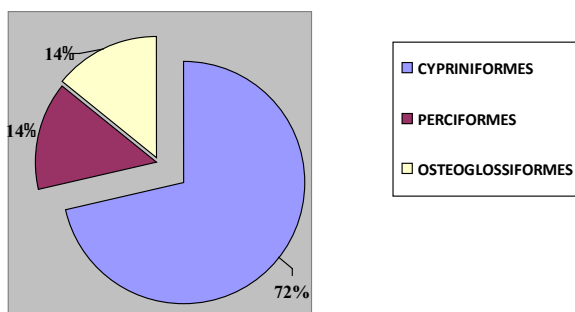


Chart 1. Showing composition of different orders of fishes.

Systematic List of Fish Species

Phylum CHORDATA
 Class ACTINOPTERYGII
 Order CYPRINIFORMES
 Family CYPRINIDAE

- *Pethia ticto* (Hamilton, 1822)
- *Labeo boggut* (Sykes, 1839)
- *Labeo calbasu* (Hamilton, 1822)
- *Systemus sarana* (Hamilton, 1822)
- *Osteobrama cotio* (Hamilton, 1822)

Order OSTEOGLOSSIFORMES
 Family NOTOPTERIDAE

- *Notopterus notopterus* (Pallas, 1769)

Order PERCIFORMES
 Family AMBASSIDAE

- *Chanda nama* Hamilton, 1822

Systematic Account

1. *Pethia ticto* (Hamilton, 1822)

1822. *Cyprinus ticto*, Hamilton-Buchanan, *Fishes of Ganges*: 314,398, pl.8, fig.87 (type-locality: south eastern parts of Bengal).
2015. *Pethia ticto*, Atkore, V. M., Knight, J. D. M., Rema Devi, K. and Krishnaswamy, J. 2015 (4 May) A new species of *Pethia* from the Western Ghats, India (Teleostei: Cyprinidae). *Copeia* 103(2): 290-296.

Common name: Two- Spot barb.

Material examined: 1 ex., West Banas River near Dantiwada, Banaskantha, Gujarat, 11.xii.2017, coll. H. S. Banyal, Reg. No. V/3633.

Diagnostic characters: D ii 8; A ii 5; P i 12; V i 8. Body extended, mouth petite & terminal, barbels absent, dorsal fin situated posterior to base of pelvic fin with its last unbranched ray osseous, solid and saw-toothed at posterior edge, pectoral fin with a black spot; lateral line complete with 23 scales.

Geographical distribution: Extensively distributed in India in diverse aquatic ecosystems.

Remarks: It is a quite common fish relished by the birds and is also a popular barb of the aquaria.

2. *Labeo boggut* (Sykes, 1839)

1838. *Chondrostoma boggut*, Sykes, *Proc. Zool. Soc. Lond.*, **6**: 160 (type-locality: Poona waterways, Maharashtra).
 2013. *Labeo boggut*, Ahmed, Abu, Md., A. T., Rahman, M. and Mandal, S. Mandal *Biodiversity of hillstream fishes in Bangladesh. Zootaxa*, **3700**(2): 283-292.

Common name: Boggut Labeo

Material examined: 1 ex., West Banas River near Dantiwada, Banaskantha, Gujarat, 11.xii.2017, coll. H. S. Banyal, Reg. No. V/ 3630.

Diagnostic characters: D iii 8; V I 8; A ii 5; P i 16; Vi 8. Extended and lean body, its dorsal shape more convex than ventral. Thick snout projecting beyond mouth. Snout is dotted with pores. Dorsal fin implanted closer to snout tip. Dark spot close to the base of caudal fin. A short pair of maxillary barbels is present. Scales are very small. Lateral line is with 63 scales.

Distribution: Northern India up to Cauvery river system.

Remarks: One of most slim among *Labeo spp.* Most plentiful freshwater fish in Gujarat.

3. *Labeo calbasu* (Hamilton, 1822)

1822. *Cyprinus calbasu*, Hamilton-Buchanan, *Fishes of Ganges*: 297, 387, pl. 2, fig. 33 (type-locality: rivers and ponds of Bengal and in the western provinces).
 2013. *Labeo calbasu*, Kottelat, M. The fishes of the inland waters of South East Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. *Raffles Bulletin of Zoology Supplement No. 27*: 1-663.

Common name: Kalbasu

Material examined: 1 ex., West Banas River near Dantiwada, Banaskantha, Gujarat, 11.xii.2017, coll. H. S. Banyal, Reg. No. V/ 3631.

Diagnostic characters: D iv 13; A ii 5; P i 16; Vi 8. Snout depressed and equitably pointy, lacking lateral lobe, dotted with pores. Mouth inferior barbel two pairs (rostral and maxillary) dorsal fin with a extended base, inserted halfway between snout-tip and base of caudal fin. Fins black colored.

Geographical distribution: Common in India

Remarks: It is one of the main Indian carps. It is a vital food fish and at several places is denoted to as the 'Black Rohu'.

4. *Systemus sarana* (Hamilton, 1822)

1822. *Cyprinus sarana*, Hamilton-Buchanan, *Fishes of Ganges*: 307, 388 (type-locality: ponds and rivers of Bengal).
 2013. *Systemus sarana*, Kottelat, M. The fishes of the inland waters of southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. *Raffles Bulletin of Zoology Supplement No. 27*: 1-663.

Common name: Olive barb

Material examined: 1 ex., West Banas River near Dantiwada, Banaskantha, Gujarat, 11.xii.2017, coll. H. S. Banyal, Reg. No. V/ 3632.

Diagnostic characters: D iii 8; A iii 5; P i 15; V i 8. Mouth judicious; barbels two pairs, rostral one as long as orbit, maxillary pair much longer. Dorsal fin inserted a little nearer to tip of snout than to base of caudal fin; lateral line complete, with 32 scales; a gloomy blotch on lateral line before base of caudal fin.

Geographical distribution: Extensively distributed in India.

Remarks: This barb forms minor fishery in various water bodies of India.

5. *Osteobrama cotio* (Hamilton, 1822)

1822. *Cyprinus cotio* Hamilton-Buchanan, *Fishes of Ganges*: 339, 393, pl. 39, fig. 93 (type-locality: ponds and ditches of Bengal).
 2003. *Osteobrama cotio*, Mirza, M. R., Checklist of freshwater fishes of Pakistan. *Suppl. Ser. 3*: 1-30

Common name: Cotio

Material examined: 3 exs., West Banas River near Dantiwada, Banaskantha, Gujarat, 11.xii.2017, coll. H. S. Banyal, Reg. No. V/ 3624.

Diagnostic characters: D iii-iv 8; A iii 33-38; P i 12-14; V i 8. Body significantly compressed, abdominal edge

piercing from behind pelvic-fin base to anal fin but rounded in front of pelvic fins. Mouth small; barbels absent. Dorsal spine feeble and saw-like, lateral line with about 65 scales, the scales are somewhat deciduous and unevenly arranged.

Geographical distribution: Widely distributed in India.

Remarks: This species which attains a length of 15 cm, is of no attention to fisheries; possibly a valuable larvicide.

6. *Notopterus notopterus* (Pallas, 1769)

1769. *Gymnotus notopterus*, Pallas, *Specil. Zool.*, 7: 40, pl. 6, fig. 2 (type-locality: ponds and rivers of Bengal).
2013. *Notopterus notopterus*, Ahmed, Abu, Md., A. T., Rahman, M. and Mandal, S. Biodiversity of hill stream fishes in Bangladesh. *Zootaxa* 3700(2): 283-292.

Common name: Grey featherback

Material examined: 1 ex., West Banas River near Dantiwada, Banaskantha, Gujarat, 11.xii.2017, coll. H. S. Banyal, Reg. No. V/ 3625.

Diagnostic characters: D 8; A+ C 109; V 6. Body rhombus and powerfully compressed. Head length is about 4.5 times in standard length; preorbital ragged. Dorsal fin implanted nearer to snout-tip than to base of caudal fin. Pectoral fins reasonable range beyond anal fin origin. Colour in life, silvery-white with numerous fine grey spots on body.

Distribution: Broadly distributed in India.

Remarks: This species appears to flourish well in lentic waters. This fish is not in excessive demand.

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7. *Chanda nama* Hamilton, 1822

1822. *Chanda nama*, Hamilton-Buchanan, Fishes of Ganges: 109, 371, pl. 39, fig. 37 (type-locality: ponds throughout Bengal).
2013. *Chanda nama*, Kottelat, M. 2013 (22 Nov.) The fishes of the inland waters of Southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. *Raffles Bulletin of Zoology Supplement No. 27*: 1-663.

Common name: Elongate glass-perchlet

Material examined: 4 exs., West Banas River near Dantiwada, Banaskantha, Gujarat, 11.xii.2017, coll. H. S. Banyal, Reg. No. V/ 3626.

Diagnostic characters: D VII + 1 15-17; A 111 15-17; P ii 11-12; V15. Body oval and strappingly compressed, mouth hefty with a protruding lower jaw; scales tiny, often unevenly arranged; lateral line with 100 to 107 scales.

Geographical distribution: Inhabits fresh and brackish waters, both in standing and running waters. Widely present in India.

Remarks: These small, bony, fleshy fishes are sold in masses along with other small fishes in the fish bazaars.

Summary

Seven species of fishes belonging to three orders and three families were recorded from the West Banas River near Dantiwada, Banaskantha district, Gujarat. This is the first attempt to describe fish diversity of West Banas River from Gujarat state.

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Plate 1



Pethia ticto (Hamilton, 1822)



Labeo boggut (Sykes, 1839)



Systemus sarana (Hamilton, 1822)



Labeo calbasu (Hamilton, 1822)



Osteobrama cotio (Hamilton, 1822)



Chanda nama (Hamilton, 1822)



Notopterus notopterus (Pallas, 1769).