

Morphometric, Meristic Characteristics and Conservation of the Threatened Fish, *Puntius sarana* (Hamilton, 1822) (Cyprinidae) in the Ganges River, Northwestern Bangladesh

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Received 19 March 2008
Accepted 03 November 2008

Abstract

The present study aims to describe the morphometric, meristic characteristics and threatening factors for the critically endangered species *Puntius sarana* (Hamilton, 1822) in the lower part of Ganges River, northwestern Bangladesh. A total of 87 specimens ranging from 9.30-21.70 mm TL (total length) and 10.05-189.25 g body weight (BW) were used for the studies of the morphometric and meristic characteristics. The necessary data and information were collected through the interview or survey on >120 fishers and >80 fish farmers from March 2006 to December 2007. The results indicated that the populations are declining due to over-exploitation, pollution and environmental degradation, spread of disease, uncontrolled introduction of exotic fish, and lack of proper management. This study also suggested the measures for the conservation of the remnant isolated population of *P. sarana* in the Ganges River and nearby areas.

Keywords: *Puntius sarana*, critically endangered species, conservation, Bangladesh.

Introduction

The small fish *Puntius sarana* (Hamilton, 1822) is a member of the family Cyprinidae, commonly known as "olive barb". The conservational status of the fish has been referred to as critically endangered (IUCN Bangladesh, 1998; Ameen *et al.*, 2000; Hussain and Mazid, 2004). In addition, Mijkherjee *et al.* (2002) categorized it as a vulnerable species. It is a tasty, the most popular and favourite table fish among barb species having high nutritional and market value in Bangladesh as well as other Asian countries (Chakraborty *et al.*, 2006). This fish is widely distributed through the Indian sub-continent including Bangladesh, India, Pakistan, Nepal, Bhutan, Sri-Lanka, Afghanistan and Thailand (Talwar and Jhingran, 1991; Bhat, 2004; Chakraborty *et al.*, 2006; Froese and Pauly, 2007; Jena *et al.*, 2007). The species has also been reported from Vietnam (Yen and Trong, 1988). This small indigenous species (SIS) used to be abundantly available in rivers, streams, ponds, beels, ditches, and floodplains in the past in the South Asian countries (Bhat, 2004; Chakraborty *et al.*, 2006; Jena *et al.*, 2007), but the populations have seriously declined or on the verge of extinction due to over exploitation and various ecological changes in its natural habits which in return, severely affects biodiversity (Mijkherjee *et al.*, 2002; Chakraborty *et al.*, 2006). *P. sarana* inhabits standing and running waters, usually in streams, lakes, estuaries, reservoirs, and ponds with hard bottoms or sea grasses (Pethiyagoda, 1991; Chakraborty *et al.*, 2006). The species usually feeds on plants, shrimps, insects, molluscs, worms, detritus, and phyto and zooplankton

(Pethiyagoda, 1991; Islam *et al.*, 2006). In order to manage endangered species effectively, it is necessary to identify the reason for decline and a severe understanding of the ecology of the target species (Leunda *et al.*, 2007). The objective of the present study is to describe the morphometric and meristic characteristics and identify the main factors that threaten the species *P. sarana* and making suggestions for its conservation strategies for the protection of the remnant isolated populations in the lower part of Ganges River and nearby areas.

Materials and Methods

Samples of *P. sarana* were collected from the fisherman catch landed at the Rajshahi city, Rajshahi, Bangladesh from March 2006 to December 2007. This fish were caught by means of the traditional fishing gears *jhaki jal* (cast net), and *dughair* (conical trap) (Kibria and Ahmed, 2005). The specimens were transferred to the Department of Fisheries, University of Rajshahi (Bangladesh), where all morphometric and meristic characteristics were examined according to Froese and Pauly (2007). Specimens were measured with digital slide callipers up to the nearest 0.1 cm and weighed with an electric balance up to the nearest 0.1 g (Figure 1).

Further, the necessary data and information for this study was collected through the survey on the fishers (120), fish farmers (80), fish traders (30), Government and NGO personnel and experienced persons related to fisheries sectors, and available literatures.

Results and Discussion

A total of 87 specimens ranging from 9.30-21.70 mm TL (total length) and 10.05-189.25 g body weight (BW) was used for the studies of morphometric and meristic characteristics. The main morphometric and meristic data are reported in Table 1 and 2, respectively. Body of *P. sarana* is deep and

moderately compressed, with an elevated dorsal profile (Figure 1). Mouth is terminal. There are 2 pairs of barbels with the rostral equal to the length of orbit and a longer maxillary. The snout is rounded with no observable pores. Body scales are cycloid, with no black spots on body. The last ray of the dorsal is un-branched, strongly osseous and finely serrated along its posterior edge. The origin of the dorsal is

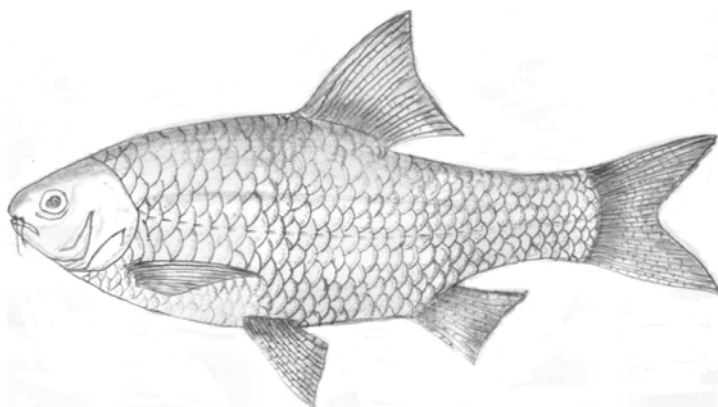


Figure 1. Drawing of *Pantius sarana* (Hamilton, 1822).

Table 1. Morphometric measurements of the *Pantius sarana* (Hamilton, 1822) specimens (n= 87) captured from the lower part of the Ganges River, northwestern Bangladesh

Measurements (cm)	Min	Max	Mean \pm SD	TL (%)
				Mean
Total length (TL)	9.30	21.70	12.81 \pm 3.71	
Fork length (FL)	8.21	19.60	11.41 \pm 3.31	89.07% TL
Standard length (SL)	7.30	17.50	10.10 \pm 3.01	78.84% TL
Post-dorsal length (PdL)	1.60	10.20	5.75 \pm 2.47	44.89% TL
Pre-dorsal length (PL)	3.31	8.40	5.04 \pm 1.52	39.34% TL
Head length (HL)	1.92	4.21	2.65 \pm 0.64	20.69% TL
Caudal fin length (CFL)	0.51	4.50	2.34 \pm 1.18	18.27% TL
Dorsal fin length (DFL)	1.21	3.95	2.30 \pm 0.81	17.95% TL
Pectoral fin length (PFL)	0.80	3.21	1.84 \pm 0.67	14.36% TL
Anal fin length (AFL)	0.80	2.50	1.75 \pm 0.45	13.66% TL
Caudal peduncle length (CPL)	0.90	3.50	1.79 \pm 0.78	13.97% TL
Pelvic fin length (PFL)	0.80	2.80	1.66 \pm 0.53	12.96% TL
Caudal peduncle depth (CPD)	0.40	2.60	1.26 \pm 0.64	9.84% TL
Mouth length (ML)	0.80	1.80	1.13 \pm 0.27	8.82% TL
Anal fin depth (AFD)	0.50	1.70	1.11 \pm 0.36	8.67% TL
Snout length (SnL)	0.42	1.12	0.73 \pm 0.23	5.70% TL

Min, minimum; Max, maximum; SD, standard deviation; TL (%) = percentage of total length (S.D. <0.01 in all cases)

Table 2. Meristic counts of the *Pantius sarana* (Hamilton, 1822) specimens (n= 87) captured from the lower part of the Ganges River, northwestern Bangladesh

Meristic data	Number	Meristic data	Number
Dorsal fin rays	III-9	Caudal peduncle scale	16
Anal fin rays	II-6	Circumference scale	25
Pectoral fin rays	I-14	No. of barbel	2 pairs
Pelvic fin rays	I-8	Scale along lateral line	33
Caudal fin rays	IV-17-IV	Scale above lateral line	6
Branchiostegal rays	3	Scale below lateral line	5
Scale before dorsal fin	10		

slightly nearer to the tip of the snout than to the caudal base. The pectoral is nearly as long as the head excluding snout. The pelvics originate below the origin of dorsal.

The survey indicated that the species populations are declining due to a combination of over-exploitation, environmental degradation, natural disasters, pesticide and aquatic pollution, spread of disease, uncontrolled introduction of exotic fishes, destruction of breeding grounds, excessive water abstraction, siltation, various ecological changes in its natural habit, and lack of proper management. Mijkherjee *et al.* (2002) and Chakraborty *et al.* (2006) also recorded the similar results. However, Welcomme (1998) reported that indiscriminate introductions of aquatic organisms from one habitat into another represent a significant threat to aquatic biodiversity. More recently, concerns have been raised about the threat to wild endemic fish populations from large scale induced breeding operations, inappropriate artificial reproduction practices and the large scale stocking of domesticated, genetically degraded fingerlings in floodplains, and large scale escapes of cultured stocks due to flooding (Rajits *et al.*, 2002).

Spawning of *P. sarana* occurs during the months of April to mid September and attains the sexual maturity in the first year of its life and prefers shallow water of floodplain for the breeding (Chakraborty *et al.*, 2006). There is a need to conduct in-depth studies on ecology and biology of the species and enact strict conservation strategies for the protection of the remnant isolated populations in the Ganges River during the spawning season. Development of artificial breeding and rearing of the species have also been conducted by several research and education institutes in Bangladesh and India (Mijkherjee *et al.*, 2002; Chakraborty *et al.*, 2006).

Population surveys and stock assessment are urgently needed to establish the status of the wild stocks in terms of abundance and distribution, as well as ecological requirements for the successful proliferation of the species. The establishment of suitable sanctuaries in selected areas of streams, estuaries and lakes is suggested, as well as identification of the real causal factors to the decline of the species and necessary measures taken to conserve the species preferred habitats. A total ban should be put to destructive fishing practices and law enforcement enhanced during the fishing season. Broodstocks management centres and hatcheries should be established for conservation and aqua ranching initiated for sustained natural recruitment of the species.

Acknowledgements

Authors are grateful to A. H.M. Ibrahim, Department of Fisheries, University of Rajshahi, Bangladesh and to the local fishers, farmers and traders for their cooperation in collecting specimens

and data during the study. We also would like to thank the Editor and journal referees for their useful comments.

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