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Present status and future potential of the gene pool of local sarpunti, *Puntius sarana* (Hamilton)

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Abstract

To investigate the present geographical distribution and artificial breeding success of *Puntius sarana* data were collected from the fishermen of four selected open waterbodies (the Old Brahmaputra river of Mymensingh, the Kangsha river of Netrokona, the Sukhair Haor of Sunamganj and the Boira haor of Kishorganj district), fish consumers of four selected markets adjacent to the four selected open waterbodies and from the ten fish hatcheries of Mymensingh district region. The result of annual catches from four selected sites showed that the highest number of *P. sarana* were caught from the Sukhair haor followed by Boira haor, the Kangsha and the Old Brahmaputra river. The fish market survey showed that the mean number of observation per person was highest in the Sukhair haor followed by the Boira haor, the Kangsha and the Old Brahmaputra river. To know the occurrences of artificial propagation, the survey was conducted among ten hatcheries and found that four hatcheries practiced artificial propagation but their average *P. sarana* fry production was very negligible (8.75%) compared to the production of fry of other species. The reported data from hatchery owners in response to inducing agent, fertilization rate, the hatching rate and survival rate of *P. sarana* were approximately 75, 67, 58 and 62%, respectively which was satisfactory indication for mass production of the species. The results suggested that the haor region of Sunamganj and Kishorganj district are the main resource of existing brood stocks. Necessary attempt should be taken for mass production of the species as well as conservation of its gene pool in Bangladesh.

Keywords: Survey, Endangered, *Puntius sarana*, Conservation, Gene pool

Introduction

Puntius sarana (Hamilton 1822) is an important food fish which is distributed over Bangladesh, Afghanistan, Pakistan, India, Nepal, Bhutan (Talwar and Jhingran, 1991) and Sri-Lanka (Pethiyagoda, 1991). In Bangladesh, it is locally known as 'sarpunti', 'saral punti', or 'pudah' and has long been regarded as a favorate food fish to the people of Bangladesh because of its excellent taste and high market demand among the barb species. This freshwater barb (Olive barb) belonging to the family Cyprinidae of the order Cypriniformes was abundantly available in haors, boars, beels, rivers and natural depressions of Bangladesh in the past (Gupta, 1980). Like many other fresh water fish species, the catches of *P. sarana* from openwaters have been declined drastically in recent years because of over exploitation and destruction of breeding grounds viz haors, baors, beels, flood plains and rivers. Now they are categorized as critically endangered species by IUCN- Bangladesh (2000) based on seven aspects.

The commercial farming of this species offered great interest in Bangladesh because of decreasing trend of natural broodstocks and their sustainable production. The enormous aquaculture potential of *P. sarana* in Bangladesh has also been described by Akhteruzzaman *et al.* (1992). Therefore, the commercial propagation of this species is very essential for its revival from the endangered situation as well as increasing economical and nutritional status of the small scale fish farmers. Thus the objective of this study was to collect information regarding the present distribution, availability and artificial breeding performances of *P. sarana* for its revival from their endangered situation as well as conservation of the gene pool.

Materials and Methods

Study Area

Survey of open waterbodies': Based on its abundances and the history of the availability of the species four open waterbodies namely the Old Brahmaputra river of Mymensingh district, the Kangsha river of Netrokona district, the Sukhair hoar of Sunamganj district and the Boira haor of Kishorganj district were selected to collect data from fishermen.

From each waterbody, the fishermen caught *P. sarana* with Veshal jal (lift net) from ten fixed positions. The catches were recorded at six times in a year and the catch effort of each fisherman was three hours in a sampling day. The total sampling time of each fisherman was 20 days in a month. The method followed was the slight modification of MacKinnon lists (MacKinnon & Phillips, 1993).

Survey of fish markets: Simultaneously consumers of four fish markets adjacent to four open waterbodies were also studied to know the consumer's opinion regarding their observation on the availability of *P. sarana* during last one year. Consumer's opinion regarding the availability of the species was collected randomly from four fish markets. From each market 30 peoples were individually asked about their observation on *P. sarana* in the market during last year and their opinions were recorded. The total number of observations were then divided by total number of consumers studied. Thus the observation number per person was estimated and indicated the availability of the species. This survey was conducted during the winter (December-January) season when the catch was highest. When the average catch in each sites is less than 30 the status of catch is regarded as nearly absent, when less than 400 the status is poor and when the average catch is around 800 it is regarded as satisfactory.

Survey of fish hatchery: The artificial breeding status of *P. sarana* was studied from ten hatcheries which are located in Mymensingh region. For this study, Mymensingh region was selected because of highest number of fresh water spawn production is now being carried out by the hatcheries situated here. The survey was conducted to know the breeding success by knowing their sources of brood collection, response of injected fish to the inducing agent (PG), ovulation rate, fertilization rate, hatching rate and survival rate to reach at its juvenile stage.

Data analysis

The relationship between the catches of *P. sarana* from four selected sites and the consumer's opinion regarding their observation on the availability of the species in four selected markets are analyzed using the computer program SPSS (version 11).

Results and Discussion

The results of open waterbodies survey are shown in Table 1. The highest numbers of fish were caught from the Sukhair haor, which was followed by the Boira haor, the Kangsha river and the Old Brahmaputra river (814, 799, 361 and 43 respectively). The highest number of catch was obtained in the month of December and the lowest was in June in all the waterbodies.

Table 1. Yearly (June 2004- April 2005) catches of *P. sarana* from four selected waterbodies

Sites	Survey month and year	Mean catches of each survey	Status of catch
The Old Brahmaputra	June, 2004	05	
River	August, 2004	05	
(Mymensingh)	October, 2004	08	
	December, 2004	15	
	February, 2005	10	
	April, 2005	00	
	Total catch	**43**	**Nearly absent**
The Kangsha	June, 2004	34	
River	August, 2004	49	
(Netrokona)	October, 2004	75	
	December, 2004	92	
	February, 2005	70	
	April, 2005	41	
	Total catch	**361**	**Poor**
The Sukhair Hoar	June, 2004	73	
(Sunamganj)	August, 2004	140	
	October, 2004	165	
	December, 2004	222	
	February, 2005	134	
	April, 2005	80	
	Total catch	**814**	**Satisfactory**
The Boira Haor	June, 2004	65	
(Kishorganj)	August, 2004	120	
	October, 2004	145	
	December, 2004	245	
	February, 2005	140	
	April, 2005	84	
	Total catch	**799**	**Satisfactory**

The results of consumer's opinion regarding their observation on the availability of *P. sarana* are shown in Table 2. The highest mean number of observation of consumers was found in the Dharmopasa and Chamta ghat fish market (1.0) and the lowest was in the Machua Bazar (0.05).

The results of correlation between the sampling of caught fishes through fishermen and consumer's opinion of the adjacent markets are shown in Table 3.

Table 2. Fish market survey of *P. sarana* through consumer's opinion

Markets name	Number of person included	Observed number of persons	Mean number of observations per person
Machua Bazar (Mymensingh)	30	3	0.10
The Kangsha (Netrokona)	30	18	0.60
Chamta ghat fish market (Kishorganj)	30	30	1.00
Dharmopasa fish market (Sunamganj)	30	30	1.00

Table 3. Showing the correlation between the result of fishermen survey and the consumer's opinion regarding the abundance of *P. sarana*

Parameters	Biological sampling	Consumer's opinion
Biological Sampling	1.000	0.988*
Consumer's Opinion	0.988*	1.000

*Pearson correlation is significant at the 0.05 level (2-tailed)

The artificial breeding status of *P. sarana* taken by the hatchery owners regarding broodstock collection, response to the inducing agent, fertilization rate, hatching rate and survival rate are shown in Table 4. Among ten hatcheries surveyed only four hatchery operators such as Brahmaputra Fish Seed Complex, Sarker Hatchery and Nursery, Bhai-Bhai Fish Seed Multiplication Farm and Jhalok Fish Seed Hatchery performed successful propagation of this species in their hatcheries. The average response to the inducing agents, fertilization rate, the hatching rate and survival rate of *P. sarana* were approximately 75, 67, 58 and 62%, respectively.

Table 4. The artificial breeding status of *P. sarana* in selected hatcheries

Name of the hatchery	Sources of broods	Response (%)	Fertilization rate (%)	Hatching Rate (%)	Survival rate (%)	Total spawn production (%)
Brahmaputra Fish Seed Complex	Sunamgonj	80	68	58	65	10
Sarkar Hatchery and Nursery	Netrokona	75	65	57	65	15
Bhai-Bhai Fish Seed Multiplication Farm	Kishorgaonj	80	67	60	58	5
Government Fish Farm	-	-	-	-	-	-
Jhalok Fish Seed Hatchery	Netrokona	65	67	55	60	5
Anudan Hatchery	-	-		-	-	-
Al-Falah Fisheries Limited	-	-	-	-	-	-
Mukhti Hatchery	-	-	-	-	-	-
Desh Bondhu Hatchery	-	-	-	-	-	-
Char Bhai Fish Hatchery	-	-	-	-	-	-
Average		75	66.75	57.5	62	8.75

The survey work on *P. sarana* was conducted in four selected sites to find out the possible reasons for reducing their distribution and taken the required measures for their gene pool conservation. The results of sampling in the selected sites indicated that the availability of *P. sarana* was satisfactory in the Sukhair and the Boira haor, poor in the Kangsha river and nearly absent in the Old Brahmaputra river. Miah *et al.* (1999) made a study on catch assessment of the Old Brahmaputra river and found that there were 34 fresh water fish species, which included two *Puntius* spp such as *P. ticto* and *P. sophore* but none of *P. sarana*. The poor abundances of *P. sarana* in the Old Brahmaputra and the Kangsha river are related with the siltation, overexploitation and water pollution from drainage system. The bed of Old Brahmaputra and the Kangsha river are seriously affected by heavy siltation, which reduces the water flow and causes habitat degradation. Khan *et al.* (1994) reported that in the Ganges-Brahmaputra river system alone, approximately 2.1 million hectares of wetlands has been lost due to flood control, drainage and irrigation development. Another important cause of depletion of *P. sarana* from these rivers may be the indiscriminate destructive fishing practices. It is well known that this species spawns into shallow water. The fishermen and other people can easily catch the brood fishes during their spawning time. Some of them, which escape the onslaught, breed in the water but the resultant hatchlings and fingerlings subjected to be captured by different types of fishing gears. In this way, the *P. sarana* populations become reduced in the Old Brahmaputra and the Kangsha river system. On the other hand, this species are available in the haor region of Sunamganj and Kishorganj district which may be due to presence of natural small bushes and marshes that provide the suitable breeding ground for *P. sarana*. The haor basin consisted of a rich mosaic habitat by the permanent and seasonal lakes and ponds with abundant aquatic vegetation which provide enough food and shelter for fish and other aquatic fauna. Another important reason may be the occurrences of less water pollution by drainage from cities and industrial effluents in the haor.

The result of catches of *P. sarana* in four selected sites indicated that the catch was lower in the rainy season (April to August) and satisfactory during dry season (October to December). Because during the rainy season, the adjacent large area of these haors become flooded but in the dry season, the water area is reduced to form small beels. Sometimes, the entrepreneurs completely dry out the beels at the end of dry season to harvest rich fish stock which leading to the loss of this species and other aquatic diversity.

The consumer's opinion regarding the sampling of *P. sarana* in four selected markets showed significant ($p<0.05$) correlation (Table 3). This indicated that *P. sarana* is satisfactory available in haor region of Sunamganj and Kishorganj district.

Several research works (Akhteruzzaman *et al.*, 1992; Kohinoor *et al.*, 1995 and Chakraborty *et al.*, 2002) have been conducted on breeding performances of this species and indicated that this fish could be bred artificially through hypophysation. In the ten surveyed hatcheries, it was recorded that the artificial propagation has been started in four hatcheries and their average *P. sarana* spawn production was negligible (about 9%) compared to the breeding performances of other species. However, according to hatchery owner's opinion, the breeding data (the responses of the brood fishes to inducing agent, fertilization rate, hatching rate and survival rate) were found 75, 67, 58 and 62% respectively which is indicative to revive this species from their endangered situation. The hatchery owners reported that *P. sarana* showed lower growth performances in the farmer's pond, which was the major problem for the large scale production. The lower growth performances of *P. sarana* have also been observed by Akhteruzzaman *et al.* (1992) and Gupta *et al.* (1989) but the possible reasons were not explained.

This study on *P. sarana* can be concluded that this fish has become endemic in the haor region of Sunamganj and Kishorganj districts of Bangladesh and their artificial breeding performances are satisfactory. If necessary attempts are taken for revival of this species as well as conservation of its gene pool, the species can be saved from extinction.

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