



Biodiversity study of SIS (Small Indigenous Species) of fish in Northwest part of Bangladesh and detection of threatened species

Rohul AMIN^{*1}, Shakur AHAMMAD¹, Hafiz All AMIN², Ferdous MEHBUB³, Main UDDIN-MIAH⁴

¹Department of Fisheries Biology and Genetics, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

²Department of Agroforestry, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

³Department of Fisheries Technology, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

⁴Department of Agroforestry and Environment, Bhangabondhu Agricultural University, Gazipur, Bangladesh.

Abstract

This study provides the current status of small indigenous fish species especially the threatened species. Regular data were collected from some important urban and peri-urban fish markets and from natural waters of the Northwest part of Bangladesh. The availability of SIS of fish declined to a great extent over the years and many of them are rare or endangered. Due to high population growth there is an ever-increasing gap between supply and demand of SIS of fish. Some rivers of the Northwest part of Bangladesh are well connected with Indian rivers and that causes the SIS of fish diversity in the natural waters comparatively rich. The most significant message of this study is that, some vulnerable and endangered SIS of fish are locally abundant in the natural waters of the Northwest part of Bangladesh. So they should be conserved for their common availability and sustenance throughout the country that would be a most important step in favor of global ichthyo-biodiversity conservation.

Key words: Ichthyo-biodiversity, small indigenous species, endangered fish, Bangladesh.

1. Introduction

Bangladesh is blessed with numerous inland water bodies which are very rich in diversity of aquatic species. In the past, various SIS of fish were abundant in the rivers, beels, canals, streams and ponds. These are usually caught by the subsistence fishermen that provided a large portion of the animal protein intake of them. Since 1970s the abundance of small indigenous fish species has been declining due to despite their ability to reproduce quickly and withstand poor environmental conditions. Both natural and manmade catastrophes degradation of aquatic environment and the reduction of many wetlands and water areas of Bangladesh have resulted in the disappearance of many suitable habitats of floodplain riverine and brackish water small indigenous fish species (Wahab *et al.*, 2003). Many of these valuable indigenous fish species have been threatened or endangered. Indeed some are already on the verge of extinction. Small indigenous species (SIS) of fish are important source of nutrition and livelihood for the rural people of Bangladesh. SIS of fish in our country is considered to those which grow to a maximum length of about 25 cm or 9 inch at maturity (Khanam *et al.* 2003; Felts *et al.* 1996; Hossain *et al.*, 1997 and 1999). From the 260 freshwater fish species of Bangladesh, over 150 species have been classified as small indigenous species (SIS). These small indigenous fish species are the main, indeed the only source of the protein and most of the fat soluble vitamins for the rural people who represent more than 80% of the total population (Hossain *et al.* 2002).

* Corresponding author / Haberleşmeden sorumlu yazar: akm_ramin@yahoo.com

Besides, Due to high population growth there is an ever-increasing gap between supply and demand of fish (including SIS) in Bangladesh. Narrowing the gap not only requires increasing production but also improvements at all aspects of marketing and distribution systems (ICLARM 1991, SAARC, 1994).

However, as SIS of fish have been considered as an important source of essential macro and micro nutrients, they can play a vital role in the elimination of malnutrition. SIS of fish can play a significant role to prevent night blindness as a rich source of vitamin-A. Analysis SIS of fish showed that they contain large amount of calcium and most likely also iron and zinc. Some species of fish like mola, dhela, darkina and kaski etc. also contain high amount of vitamin-A (Thilsted *et al.*, 1997). Anyway, although some researchers have been conducted research on SIS of fish in Northern part of Bangladesh (Hossain *et al.*, 1997; Afroze *et al.*, 1997), sufficient data on biodiversity of SIS of fish in the Northwest part of Bangladesh especially in Dinajpur district has not yet been available. So, the present study has been classified on the following objectives:

- To know the biodiversity of SIS of fish in Dinajpur district
- To identify status of threatened SIS of fish in Dinajpur district

2. Materials and methods

Bangladesh lies between the longitude of 88E and 92.30 E and the latitudes of 20 N and 26.30 N. The country is an extensive plain land except its eastern and southeastern margin where low ranges of Lushai and the Garo Hills are found. This flat plain is built by the enormous load of alluvium laid down by the great rivers and their tributaries (Rahman, A. K. A., 2005). This country is called country of hundred rivers and it has 290 rivers from which 94 are international along with numerous ponds, beels, haors, lakes, flood plains, brackish water and marine waterbodies. However, Northwest part of Bangladesh is mainly important for the availability of various freshwater ecosystems.

The research work has been performed from January – December/2008. Two types of fish markets were used for this study- urban and peri-urban fish markets. On the other hand, required data about SIS of fish were collected from important rivers and beels of the Northwest part of Bangladesh.



Figure-1. Map of Dinajpur district showing data collection areas

The urban and peri-urban fish markets from where data were collected are-

- Urban fish markets: Bhabadur bazar, Railway bazar, Fulbari bazaar and Parbatipur bazar.
- Peri-urban fish markets: Basherhat fish market, Jamtoli bazaar, Doshmail bazar, Bushirbandar bazar and Chirirbandar bazar.

2.1 Experimental fish markets

a) Urban fish markets: Among the studied urban fish markets, Bahadurbazar is a larger fish market of the Northwest part of Bangladesh and is situated in the main town of Dinajpur district. Fish from various natural waters and ponds of different sites of Dinajpur district have been supplied here for selling. Fishes have also been distributed to various local small fish markets of this district from here. The main consumer group of this fish market is businessmen and service holders. Besides, Railway bazar, Fulbari bazar and Parbatipur bazar are also the largest fish markets of the Northwest part of Bangladesh which are located in various upazilas of Dinajpur district.

b) Peri-urban fish markets: The data collecting peri-urban fish markets of this study were- Basherhat fish market, Jamtoli bazaar, Doshmail bazar, Bushirbandar bazar and Chirirbandar bazaar which are located near to important natural waters of the Northwest part of Bangladesh. The main consumer groups of these peri-urban fish markets are the villagers, businessmen and service holders of the respective localities.

2.2 Experimental natural waterbodies

Required data about small indigenous species of fish (SIS) were collected from important natural waterbodies of the Northwest part of Bangladesh. The list of survey conducted natural waterbodies is given below:

Table 1. The list of survey conducted natural water bodies

Type of the water body	Name	Location
River	Kankra river	Chirirbandar
	Atrai river	Chirirbandar
	Choto jamuna	Parbatipur
	Gorveshori river	Parbatipur
	Kanchan river	Dinajpur sadar
	Dhepa river	Dinajpur sadar
Beel	Koroi beel	Birol
	Asholia beel	Nowabganj
	Small local beels	Dinajpur Sadar

2.3 Data collection

Field works were undertaken in each of the 6 Upazillas over which important rivers and beels spread in Northwest part of Bangladesh: Dinajpur sadar, Parbatipur, Fulpur, Chirir bandar, Birol and Nawabgonj. Data were collected from: interviews and focus group discussions with fishermen, retailers, middlemen and consumers of fish; secondary literature, semi structured and structured questionnaires were developed, pretested and adapted prior to the survey proper. Weekly sampling was performed through the whole year from the major natural water bodies and fish markets of the Northwest part of Bangladesh both in morning (7 am to 9 am) and evening (4 pm to 6 pm).

2.4. Data analysis

The analysis of the data mainly involved tabular and descriptive technique. The data were summarized and a number of tables and graphs were prepared in accordance to the objectives of the study. The technique of analysis included the classification of tables and graphs into meaningful result by arithmetic mean and Percentage.

2.5 Species identification

The collected fish were identified on the basis of the descriptions of Rahman (2005), Jhingran and Talwar (1991) and Froese and Pauly (2007).

3. Results

3.1. Supply of SIS of fish in the studied fish markets of the Northwest part of Bangladesh:

The supply of SIS of fish in the urban fish markets during the study period found to average range normally 0.8-160 kg per month. Besides, a few number of SIS of fish were also irregularly supplied in this fish market. The minimum average 10 lowest and highest SIS of fish were shown in the figure-2 (a, b). It is found that most abundant SIS of fish are Taki, Punti, Tengra, Chela, Khoki, Jouary etc. and least supplied SIS are Rani, Tara bain, Ek-thuta, Bhol etc. On the other hand, in Basherhat fish market (periurban fish market) the height supplied SIS of fish were Tila

koksha (khorki), Joya (Jouary), Tengra, Chela, Gutum, Punti, Bhangon bata, kolisha etc and least supplied SIS of fish were Koi, Magur, Balichata gutum, Rani, Tara baim, Golsha etc. The monthly average 10 highest and least supplied SIS of fish are presented in the figure – 3 (a, b). All the highest available fish species were found every day in both fish markets in the study period. But the least available SIS of fish were not regularly found. Such as, Rani (*Botia dario*) was found only for three days; Putul rani (*Botia lohachata*) was found in five days; Tara baim was found for seven days; Bhol was seen only for ten days; Buzuri tengra was found for twelve days and Bheda was found for thirteen days only.

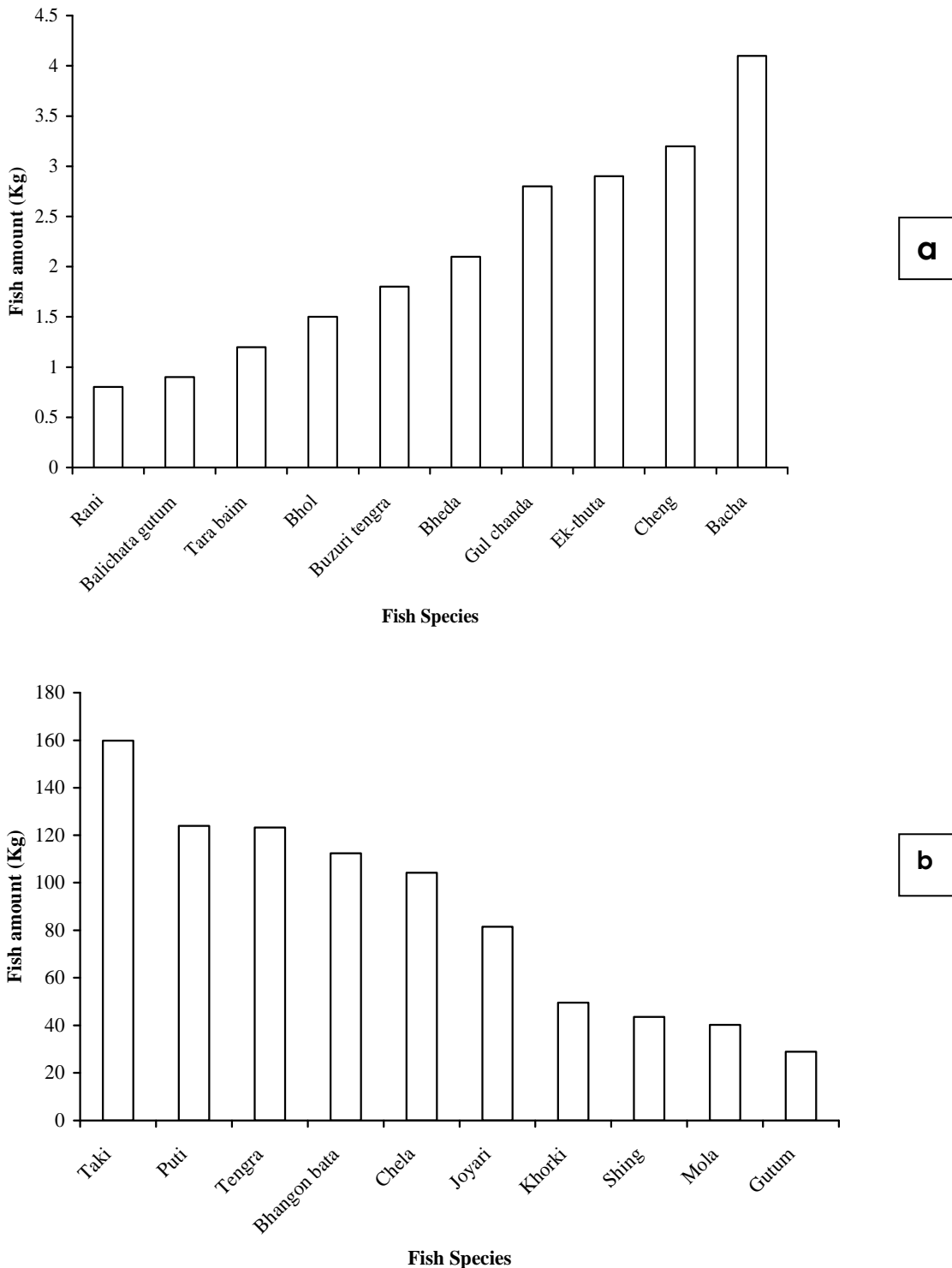


Figure-2(a, b). The monthly average (kg) 10 least supplied (a) and highest supplied (b) SIS of fish in the Urban fish markets

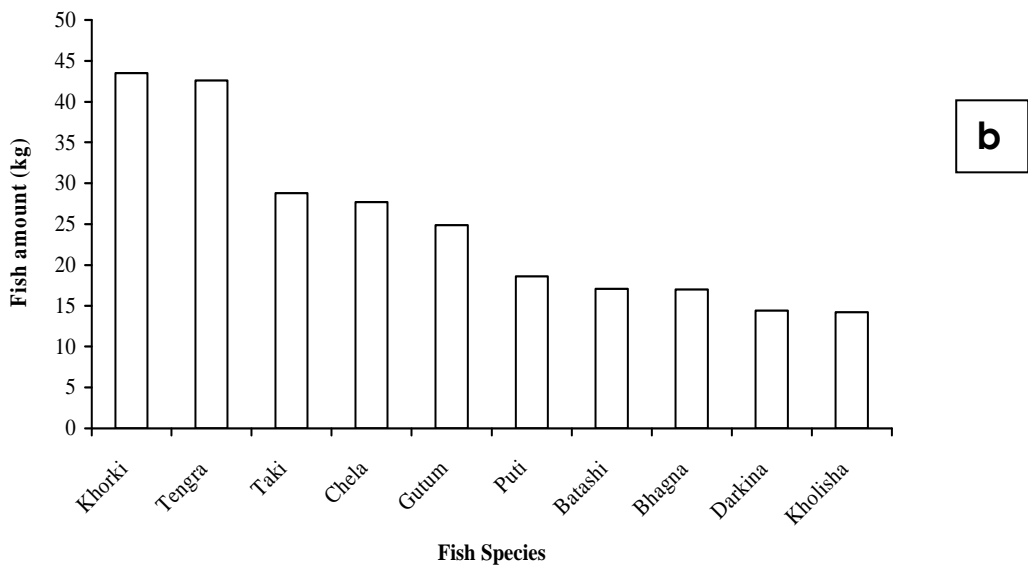
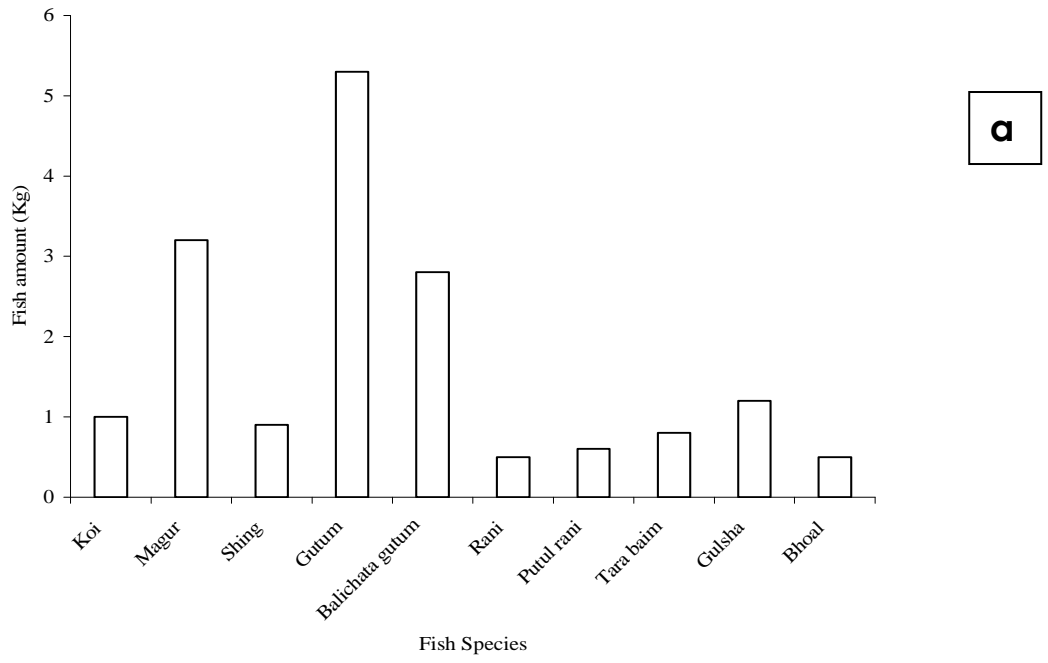


Figure-3 (a, b). The monthly average (kg) 10 least supplied (a) and highest supplied (b) SIS of fish in peri-urban fish markets

Apart from this, during the study period it was observed that some species were found as mixture with the above cited SIS of fish and these were rarely available such as-, Bagir, Potka, Kanpona, Cheka, Sissor, Chebli, Shilong, Kajoli, Napitkoi, Nephtani etc. The total found SIS of fish in the studied fish markets of the Northwest part of Bangladesh is shown in the table-2. It was found that a total of 45 SIS of fish were supplied in the studied urban and peri-urban fish markets of the Northwest part of Bangladesh. There sources were both the natural waters and culture ponds.

Table 2. List of the supplied SIS of fish in the studied fish markets of the Northwest part of Bangladesh

Sl. no.	Local name	Scientific name
1.	Juary/Joya	<i>Aspidoparia jaya</i>
2.	Khorki/Tila Koksa	<i>Barilius tileo</i>
3.	Bhangon bata	<i>Labeo bata</i>
4.	Bhagna/Tatkini	<i>Cirrhinus reba</i>
5.	Jat puti	<i>Puntius sophore</i>
6.	Tit punti	<i>P. ticto</i>
7.	Pahari gutum	<i>Somileptes gongota</i>
8.	Gutum/Puiya	<i>Lapidocephalus guntea</i>
9.	Rani	<i>Botia dario</i>
10.	Putul rani	<i>B. lohachata</i>
11.	Magur	<i>Clarias batrachus</i>
12.	Shingi	<i>Heteropneustes fossilis</i>
13.	Batasi	<i>Pseudeutropius atherinodes</i>
14.	Golsha	<i>Mystus cavasius</i>
15.	Bujuri tengra	<i>Mystus vitatus</i>
16.	Foli	<i>Notopterus notopterus</i>
17.	Tara baim	<i>Macrognathus aculeatus</i>
18.	Guchi baim	<i>Mastacembelus pancalus</i>
19.	Kolisha/chopra	<i>Colisa fasciatus</i>
20.	Boicha	<i>C. lalia</i>
21.	Koi	<i>Anabus testudineus</i>
22.	Nama chanda	<i>Chanda nama</i>
23.	Gul chanda	<i>Pseudanbasis ranga</i>
24.	Kakila	<i>Xenentodon cancila</i>
25.	Taki/lata	<i>Channa punctatus</i>
26.	Cheng	<i>C. orientalis</i>
27.	Ghora chela	<i>Securicula gora</i>
28.	Narkali chela	<i>Salmostoma bacaila</i>
29.	Mola	<i>Amblypharyngodor mola</i>
30.	Kaski	<i>Corica soborna</i>
31.	Mola punti	<i>Puntuius guganio</i>
32.	Modho pabda	<i>Ompok pabda</i>
33.	Balichata gutum	<i>Acanthocobitis botia</i>
34.	Shilong	<i>Silonia silonia</i>
35.	Kajuli/Baspata	<i>Ailia coila</i>
36.	Chapila	<i>Gudusia chapra</i>
37.	Napit	<i>Badis badis</i>
38.	Dhela	<i>Ostiobrama cotio</i>
39.	Chep chela	<i>Chela cachinus</i>
40.	Chebli	<i>Danio devario</i>
41.	Bani koksha	<i>Barillius barna</i>
42.	Chuna kolisha	<i>Colisa sota</i>
43.	Kani pubda	<i>O. bimaculatus</i>
44.	Phutani punti	<i>P. phutunio</i>
45.	Hora gutum	<i>Nemacheilus sikmaiensis</i>

3.2. Demand of SIS of fish in the studied fish markets

SIS of fish were not well demanded in past due to their abundance in rivers, hours, beels and other natural waterbodies. But presently SIS of fish are not commonly abundant in natural waterbodies. Another important thing is that as the SIS of fish are highly nutritional and tasty they are highly demanded to health aware people. The low supply and high demand make some SIS of fish like Mola, Dhela, Pabda, Chela, Shing, magur etc. very expensive. In a word, it can be said that the supply of SIS of fish is declining where the demand is increasing gradually. Khanam *et al.*, (2003) was also found similar result in a study conducted in peri-urban fish markets.

3.3. Market chain of SIS in the Northwest part of Bangladesh

The marketing channel of SIS of fish varied from one place to another. Anybody can purchase SIS of fish from anybody and anyone can sell SIS to anybody. The general marketing pattern of SIS of fish including a number of middlemen. In case of urban fish markets, the market chain from fisherman to consumers passes through a number of intermediaries: after buying fish from fisherman/farmer, middleman (locally known as foria) bring them to the wholesale market and sale to the wholesaler (ArotDar). The retailers buy SIS of fish from wholesaler through auction with a highest bid. The retailers then bring the SIS of fish to particular market where they usually sale the fish to the consumers. There is no licensing system of fish retailer and middlemen. Fisherman or fish farmer also sale SIS of fish directly to the wholesaler or even to the consumers (figure-4) mainly in peri-urban fish markets. It is a very common scenario almost in all the sites of Bangladesh that fishermen and fish farmers do not get expected price from their harvested fishes although consumers have to pay high price to buy from the retailers where ultimately middlemen become benefited. This statement is also supported by Hossain *et al.*, (2002). Hannan (1994) described that fishermen lived from hand to mouth and highly highly neglected class in both Muslim and Hindu society. Baily (1994) also noted fishermen and their families in South and Southeast Asia often are considered to be among the poorest of the poor.

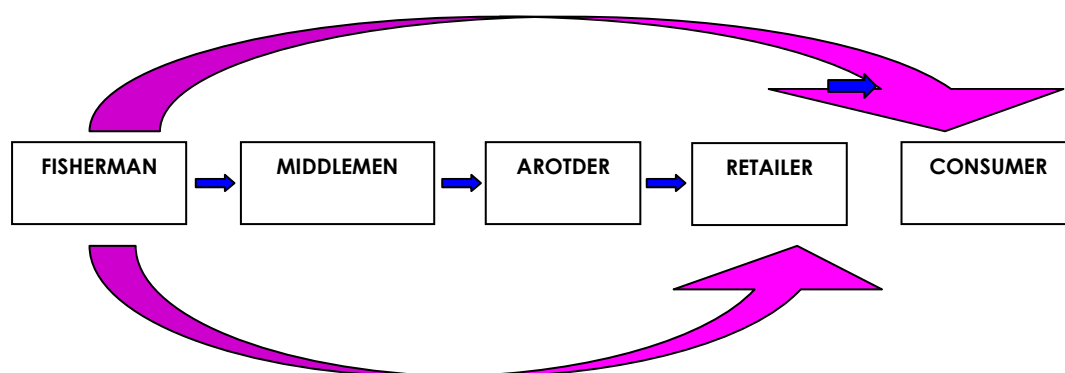


Figure 4. Marketing chain of SIS of fish in the Northwest part of Bangladesh

3.4. Present status of SIS of fish biodiversity in the Northwest part of Bangladesh

Due to warm temperature, good rainfall and nutrient rich fertile soils and waters make the aquatic environment of Bangladesh rich in varieties of aquatic flora and fauna. The vast wetlands, wide river-bed systems, rainfall and warm temperature play a significant role in the rich ichthyo-diversity of this country. There are a total of 260 species of indigenous freshwater fish belonging to 55 families are available in Bangladesh. Out of them 143 freshwater fishes are categorized as small indigenous species (SIS) of fish. Most of the SIS of fish were available in the natural waterbodies of the Northwest part of Bangladesh. Since 1970s, the production of SIS of fish has been declining despite their ability to reproduce of short intervals and withstand poor environmental conditions. However, the list of identified SIS of fish of the Northwest part of Bangladesh is mentioned in the table-3.

A total of 61 small indigenous species of fish was identified collected from various natural waters. Because of various environmental modification and man made interventions, some SIS of fish are in endangered or critically endangered in Bangladesh (IUCN, 2001). Similarly, in the natural water bodies of the Northwest part of Bangladesh, some SIS of fish are reducing alarmly and found very rare. More or less same statement is described by Hossain *et al.*, 2003. According to them, the habitat degradation recently has become a great concern in most aquatic ecosystems in Bangladesh. Marked changes have been observed in natural fish populations of many fish species because of unplanned environmental modifications and man made interventions affecting the spawning and feeding grounds of fishes. In this situation, it is crucial that appropriate measures to be taken to reduce habitat loss to conserve aquatic ecosystem and to protect the biodiversity of the SIS of fish. It is clear that availability of SIS of fish is gradually declining through out the country.

Table3. Presently identified SIS of fish biodiversity in the Northwest part of Bangladesh

Sl. No.	Local Name	Common Name	Scientific Name
1.	Kakila	Indian needle fish	<i>Xenentodon Cancila</i>
2.	Ek-thota	Congaturi halfbeak	<i>Hyporhamphus limbatus</i>
3.	Taki	Spotted snakehead	<i>Channa punctatus</i>
4.	Cheng	Walking shakehead	<i>Channa orientalis</i>
5.	Rani	Bengal Loach	<i>Botia dario</i>
6.	Putul rani	Reticulata loach	<i>Botia lohachata</i>
7.	Chep chela	Minnow	<i>Chela cachius</i>
8.	Narkeli chela	Large razorbelly minnow	<i>Salmostoma bacaila</i>
9.	Mola	Mola carplet	<i>Amblypharyngodon mola</i>
10.	Dhela	Cotio	<i>Osteobrama cotio cotio</i>
11.	Kaski	Ganges river spral	<i>Corica soborna</i>
12.	Chapila	Sardine	<i>Gudusia chapra</i>
13.	Modo pabda	Pabdah catfish	<i>Ompok pabda</i>
14.	Bheda bhol	Trout barb	<i>Raiamas bola</i>
15.	Bhangan bata	Boga labeo	<i>Labeo bata</i>
16.	Bacha	Garu bacha	<i>Clupisoma garua</i>
17.	Korki	Tila koksha	<i>Barilius tileo</i>
18.	Juary/ Joya	Jaya	<i>Aspidoparia jaya</i>
19.	Bele	Tank goby	<i>Glossogobius giuris</i>
20.	Bagair	Dwarf goonch	<i>Bagarius bagarius</i>
21.	Gang magur	Grey eel-catfish	<i>Plotosus canius</i>
22.	Potka	Ocellated puffer fish	<i>Tetraodon cutcutia</i>
23.	Khanpona	Blue panchax	<i>Aplocheilus panchax</i>
24.	Darkina	Flying barb	<i>Esomus danricus</i>
25.	Panga	Panga	<i>Pangio pangia</i>
26.	Cheka	Squarehead catfish	<i>Chaca chaca</i>
27.	Sisor	Sissor catfish	<i>Sisor rhabdophorus</i>
28.	Bhagna	Reba carp	<i>Cinhinus reba</i>
29.	Chebli	Sind danio	<i>Danio devario</i>
30.	Shilong	Sliond catfish	<i>Silonia silonia</i>
31.	Kajoli	Gangetic ailia	<i>Ailia coila</i>
32.	Mola punti	Glass barb	<i>Puntius guganio</i>
33.	Phutuni Punti	Spotted barb	<i>Puntius phutunio</i>
34.	Jat punti	Pool barb	<i>Puntius Sophore</i>
35.	Tit punti	Ticto barb	<i>Puntius ticto</i>
36.	Sarputi/Punta	Olive barb	<i>Barbodes sarana</i>
37.	Puiya/ Gutum	Guntea loach	<i>Lepidocephalus guntea</i>
38.	Hora gutum	Anandale loach	<i>Lepidocephalus annandalei</i>
39.	Pahari gutum	Gongota loach	<i>Somileptes gongota</i>
40.	Belichata gutum	Mottled loach	<i>Acanthocobitis botia</i>
41.	Shing	Stinging catfish	<i>Heteropneustes fossilis</i>
42.	Magur	Walking catfish	<i>Clarias batrachus</i>
43.	Tengra	Day's mystus	<i>Mystus bleekeri</i>
44.	Buzuri tengra	Ghuitta tengra	<i>Mystus tengra</i>
45.	Batashi	Indian potasi	<i>Pseudeutropius atherinoides</i>
46.	Gulsha	Gangetic mystus	<i>Mystus cavasius</i>
47.	Foli	Brongee feather back	<i>Notopterus notopterus</i>
48.	Tara baim	Lesser spiny eel	<i>Macrognathus aculeatus</i>
49.	Guchi	Barred spiny eel	<i>Mastacembelus pancalus</i>
50.	Kolisha	Banded gourami	<i>Colisa fasciatus</i>
51.	Choto Kolisha	Dwarf gourami	<i>Colisa chuna</i>
52.	Boisa / Chuna kolisa	Dwarf gourami	<i>Colisa lalia</i>
53.	Napit koi / Napit	Spiketail paradise fish	<i>Badis badis</i>
54.	Bheda	Mottled nandus	<i>Nandus nandus</i>
55.	Koi	Climbing perch	<i>Anabus testudineus</i>
56.	Nama chanda	Glassy perchlet	<i>Chanda nama</i>
57.	Gul chanda / Ranga chanda	High fin glassy perchlet	<i>Pseudambassis lala</i>
58.	Lal chanda	Indian glassy fish	<i>Pseudomonas ranga</i>
59.	Nephtani	Frail gourami	<i>Ctenops nobilis</i>
60.	Kani pabda	Butter catfish	<i>Ompok bimaculatus</i>
61.	Bhangan bata	Boga labeo	<i>Labeo bata</i>

Out of one hundred forty three (143) SIS of freshwater fish species of Bangladesh, fifty four (54) are considered as threatened species by IUCN (2001). A authentic study (FAP6, 1994) has also found that the number of the number of fresh water fish species have been gradually declining and some species have been locally extinct. Full flood control and control flooding had an adverse impact on fish biodiversity and resulted in a reduction of 33% of the total number of fish species recorded annually in Bangladesh. Although it is the common scenario for natural waters of Bangladesh some exceptional information is true for the natural waters of the Northwest part of Bangladesh. After completion of this experiment, it has been observed that a few critically endangered and endangered SIS of fish are abundantly found in the natural waterbodies of the Northwest part of Bangladesh especially in Dinajpur district. The list of commonly abundant threatened SIS of fish is presented in the table-4. It was observed that more or less 16 important SIS of threatened fish are commonly available in the North-west part of Bangladesh. Although fifty four (54) are considered as threatened species by IUCN (2001) through out the Bangladesh, 16 endangered SIS of fish are locally common available in the Northwest part of Bangladesh due to the well connection of some Indian rivers with the natural waters of Dinajpur.

Table 4. Commonly available threatened SIS of fish in the natural waters of the Northwest part of Bangladesh

Sl. Number	Local name	Scientific name	National status
1.	Juary/Joya	<i>Barilus bengalensis</i>	Endangered
2.	Khorki/Tila koksha	<i>Barilius tileo</i>	Endangered
3.	Bhagna	<i>Cirrhinus reba</i>	Vulnerable
4.	Bhangan bata	<i>Labeo bata</i>	Endangered
5.	Foli	<i>Notopterus notopterus</i>	Vulnerable
6.	Chela	<i>Chela laubuca</i>	Endangered
7.	Tit punti	<i>Puntius ticto</i>	Vulnerable
8.	Sarpunti/Putu	<i>Barbodes sarana</i>	Endangered
9.	Tara baim	<i>Macrogathus aculiatu</i>	Endangered
10.	Balichata gutum	<i>Acanthocobitis botia</i>	Endangered
11.	Phari gutum	<i>Somileptes gongota</i>	Endangered
12.	Rani	<i>Botia dario</i>	Endangered
13.	Putul rani	<i>Botia lohachata</i>	Endangered
14.	Golsha tengra	<i>Mustus cavasius</i>	Vulnerable
15.	Ghaura	<i>Clupisoma garua</i>	Critically endangered
16.	Bhol	<i>Raiamas bola</i>	Endangered

Therefore, it is a very important message for our nation because if we immediately take protective measures to conserve these commonly available rare SIS of fish in natural waters of the Northwest part of Bangladesh, then our country would be able to save them from their extinction. Educationalists, journalists, social workers, nutritional researchers, NGOs are interested in managing the sustainable aquatic habitats for all these smaller fishes. But the improvement of farming system particularly for the HYV, setting up of industries, encroachments of wet lands for agro cropping, populations explosion, over-fishing and dewatering with mechanized pumps etc. damage the environments in some cases at beyond recovery level. All these activities declining the aquatic biodiversity including ichthyo-biodiversity and the biota that are now threatened due to environmental destruction (Hossain 1992 & 1997 a,b).

4. Conclusions

Recently we can see more slogans such as Globalization, Green house effects, Poverty alleviation, Sustainable management resources, Livelihood approach and Organic farming etc. Incorporation on small indigenous fish species (SIS) in the carp polyculture system away from all these slogans. It is the duty of the scientists, social workers, donor agencies and Government organizations to aware the people and communities about the potential role in ensuring nutritional security and poverty alleviation of the rural poor in Bangladesh through protecting and conserving of small fishes. The availability of SIS of fish is in decline, partly due to fishing pressure from the ever increasing population and partly due to loss of natural habitats.

Apart from this, the presently practiced carp and large fish always encourage fish farmer to eliminate indiscriminately all the SIS from their waterbodies before large fish stocking. It causes the supply of SIS of fish is highly fluctuating and far less than the market demand. So, the price is increasing alarmingly. Therefore, once mostly abundant and easily available SIS of fish is quickly getting out of the reach of poor people and ultimately become gradually rare available. So, it is significant and urgent to take all the necessary steps to protect and conserve all the most and least available SIS of fish through out the world including Bangladesh.

Acknowledgements

The authors wish to express their heartiest gratification to University Grants Commission of Bangladesh (UGC) for giving financial support to perform this research.

References

- Afrose, S., Sultana, S., and Hossain, M. A. 1997. Small fish as a source of nutrition for our people. Proc. National Workshop on Small Indigenous Fish Culture in Bangladesh, Rajshahi University, PP. 57- 64.
- Bailey, C. 1994. Employment, labour productivity and income in small-scale fisheries of South and Southeast Asia. In: Socio-economic issues in Coastal Fisheries Management. Proceedings of the IPFC Symposium, Bangkok, Thailand, 23-26 November, 1993; FAO Indo pacific Fishery Commission (IPFC), no. 8 pp. 24-45.
- Felts, R. A., Rajts, F., and Akteruzzaman, M. 1996. Small indigenous fish species culture in Bangladesh. IFADEP Sub-Project - 2. Development of Indian Fisheries. 41 PP.
- Hannan, M. 1994. Fisherfolk organization in Bangladesh. In: Socio-economic issues in Coastal Fisheries Management. Proceedings of the IPFC Symposium, Bangkok, Thailand, 23-26 November, 1993; FAO Indo pacific Fishery Commission (IPFC), no. 8 pp. 216-222.
- Hossain, M.A., Ahsan, M.K., and Hussain, M. A. 2003. Small fish resources in the rivers, flood plains and unplanned areas of Bangladesh. Technical Proc. of BAU-EENRECA/DANIDA Workshop on Potentials of SIS in Aquaculture and rice-field stocking for improved food of nutrition security in Bangladesh. 30-31 October 2002, BAU, Mymensingh, Bangladesh. pp. 166.
- Hossain, M.A. and Afoze, S. 1991. Small fish as resource in rural Bangladesh. Fish byte, 9(2). 16-18.
- Hossain, M.A., Afsana, K., and Azad Shah, A.K.M. 1999. Nutritional value of some. Small indigenous fish species (SIS) of fish in Bangladesh, Bangladesh Journal of Fisheries Research 3(1). 77-85.
- Hossain, M.A. 1997a. Conservation of animals for a balanced environment. Presidential address, Silver Jubilee (1972-1997), Zoological Society of Bangladesh (ZSB), Department of Zoology, Dhaka University, July 2-3, pp. 24-30.
- Hossain, M.A. 1997b. Various aspects of small indigenous species (SIS) of fish in Bangladesh. Proc. Nat. Workshop on SIS culture in Bangladesh, December 12, 1996, key note speech, IFADEP SP-2, PP. 16-30.
- Hossain, M. A., 1992. Role of biologists in sustainable development and biological resource management. Souvenir, 8th National Conference of Zoological Society of Bangladesh, Rajshahi University, January 29-31, pp. 22-32.
- Hossain, M.A.R., M. Z. Ali., M.N.A. Khanam., S. Devnath, and A.K.M. R. Amin. 2002. Participatory rural appraisal with small indigenous species of fish (SIS) retailers in two fish markets. Progress. Agric. 13(1 and 2): 133-138.
- Jhingran A. G., and Talwar, P. K. 1991. Inland Fishes of India and Adjacent Countries, Vol. I.&2. 1158 p. Oxford and HIB Publishing Co., Pvt. Ltd., New Delhi, India.
- Rahman, A. K. A., 2005. Fresh water fishes of Bangladesh. 2 nd edn. Zoological Society of Bangladesh, Dhaka, Bangladesh, 71-310 p.
- Thilsted, S.H., N. Roos, and N. Hasan, 1997. The role of small indigenous fish species in food and nutrition security in Bangladesh. NAGA- The ICLARM Quarterly, July-Dec. 13-15.
- ICLARM, 1991. Socioeconomic impact of fish culture extension programme. Annual progress report, ICLARM, Dhaka.
- IUCN, 2001. Red book of threatened fishes of Bangladesh. IUCN- The world Conservation Union. 116 pp.
- Khanam, M.N.A., Ali. M.B., Ali, M. M., and Hossain, M. A. R. 2003. Supply and marketing channel of small indigenous species of fish and livelihood strategy of the retailers in a peri- urban fish market. Technical proc. of BAU-DANIDA. Workshop on potentials of SIS in Aquaculture and Rice- field stocking for improved food nutrition security in Bangladesh. PP. 135-142.
- Froese R. and Pauly. 2007. Fish Base. Available from URL:[http://www.fishbase.org/Country/Country Checklist. php](http://www.fishbase.org/Country/Country%20Checklist.php).
- SAARC, 1994. Proc. SAARC Workshop on fisheries socioeconomics and marketing. Bangladesh Agricultural Research council (BARC), Dhaka.
- Wahab, M. A. 2003. Small indigenous fish species of Bangladesh: Potentials for culture and conservation. Technical Proc. of BAU-EENRECA/DANIDA Workshop on Potentials of SIS in Aquaculture and rice-field stocking for improved food of nutrition security in Bangladesh. 30-31 October 2002, BAU, Mymensingh, 1-12.

(Received for publication 28 September; The date of publication 01 April 2010)