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A STUDY ON THE PRODUCTIVE CONSERVATION OF SMALL INDIGENOUS FISH SPECIES (SIS) OF BANGLADESH ADAPTED FOR DEGRADED NATURAL WATER BODIES

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ABSTRACT

Azam KI, Azad SA, Rahman MS, Rahman MM (2013) A study on the productive conservation of Small Indigenous Fish Species (SIS) of Bangladesh adapted for degraded natural water bodies. *J. Innov. Dev. Strategy.* 7(2), 23-28.

A research program was conducted on the Productive Conservation of Small Indigenous Fish Species (SIS) of Bangladesh Adapted for Degraded Natural Water Bodies. The work was done following a technical procedure of direct field investigation in the project districts, Upazila and local floodplain pond and rivers systems with the objective to know the status of SIS and biotic problems to be solved for successful implementation of the project. The results showed that SIS fishes are now under serious threatened situation. More specifically several sp of pabda namely Modhu pabda and Baus nandina was going to be extinct rapidly followed by calibaus nandina and chanda-chapila varieties/strains. It was found that seasonal water body SIS fishes were going to be extinct rapidly (80%) than that of open water fishes (20%). Exploiratory harvesting at extreme exhaustion played the important role followed by use of micro-fiber single thread net and lack of appropriate shelter/place. The problems were quantitatively assessed and conclusions were made accordingly to improve the situation. However, more field oriented works need to be done to contribute in future development plans.

Key words: *productive conservation, SIS, degraded natural water body, local community*

INTRODUCTION

Role of fisheries is very much significant on the agro-based economy of Bangladesh. It contributes 63% of our total animal protein intake, Providing full time and per time employment to about 12 lacs people (Anon. DOF, 2003). The inland water area of Bangladesh is about 53,32,657 hector out of which 49,20,613 hector are open water, 2,65,500 hector are pond and ditches, 5,488 hector are baors haors (Anon. DOF, 2003). There are more than 260 fresh water fish species in Bangladesh, out of which 34 listed as small fish including *Amblypharyngodon mola, Puntius species, Ostiobrama cutio, Colisa fasciata, Gudusia chapra* etc. The small indigenous species (SIS) are those fish which grow to a length of up to 25 cm at maturity. The SIS fishes contains huge amount of vitamin A, D which are essential for human bodies, teeth, skin and eyes. They also contains good amount of calcium, phosphorus, iron iodine zinc which are required for disease resistance of human. Table 1 given here shows that SIS contained remarkable amount of Ca, P and Iron along with protein (Anon. DOF, 2003).

Table 1. Nutrient contents of some small fishes

Name of SIS fish	Protein (%)	Fat (%)	Calcium (mg/100gm)	Phosphorus (gm/100gm)	Iron (mg/100gm)
Koi (hyb)	14.8	8.8	410	390	135
Lata	19.4	0.6	610	530	130
Baila	14.5	0.6	370	330	104
Singh-magur	22.8	0.6	**650**	**650**	**226**
Bata	14.3	2.48	200	200	1.09
Foli	19.8	1.00	450	450	169
Puti	16.5	9.5	120	120	0.54

Once SIS fishes were abundant in the rivers, beels, canals, baors, haors, streams, ponds and ditches, their contribution was 84% of the total fish production (Haq 2007) caught by the subsistence fisherman and providing a major portion of the protein intake of the rural people. Since 1960s, the production of SIS fishes has been declining despite their ability to reproduce quickly and withstand poor environmental conditions. There has been a major loss in their habitats including their breeding ground due to Change in natural aquatic environment, over fishing, use of fine nets for harvesting, lack of shelter or sanctuary, uncontrolled use of pesticides, piscicides, fertilizers and due to different diseases like ulcerative, gill-rot, Argulosis, white spot etc. Poor fisher groups eradicate small fishes for culturing major carps (Large carps) to get more production and more profit. As a result their fish production increased undoubtedly but fish consumption level specially SIS decreased dramatically which leads them to nutrient deficiency mainly protein, calcium. Phosphorous iodine vitamin A, and D etc. Because the poor people need cash money for the urgency of their rice, clothes and medicine rather than to meet their nutrients demand. So they prefer to sell their large carps for cash money by ignoring their own consumption of SIS. In the past very little effort was given to aquaculture, management and conservation of SIS fishes because of their low market value as well as their abundance. Since the sixties UNICEF tried to attract the

attention of the people to culture SIS in small water bodies (CNRS 1996). But farmers were intended to culture major carps as cash crop and did not pay attention to their family nutrition.

Recognizing the decline in biodiversity of SIS fishes as well as growing attention to the nutritional importance of SIS, some measures had been taken to conserve, manage and culture indigenous fishes by CNRS (Centre for Natural Resource Studies) in 1996 and MACH (Management of Aquatic Ecosystem through Community Husbandry) Project (1998-2003) also intervened to restore three major wetlands habitats, ensure sustainable productivity and improve the livelihoods of the poor who depends on these wetlands, through community based co-management (Anon. 2003). Their result was good but it did not sustain because of their ignorance about the farmers need and they do not felt to aware the fishers community first, recognizing the importance of SIS, it's production, conservation and management. In this context it is imperative necessity to aware the local community about the productive conservation of SIS addressing all natural water bodies specially the degrade water bodies covering low-lying agro-ecological zone of the country (Khan 2008). In the circumstances the present research program was formulated to have findings in the focal line of the specific objectives to know the present status of the SIS in natural water bodies, and to identify the biotic problems of water bodies, as regards fish environment.

MATERIALS AND METHODS

Approach Methodology: The whole program was performed through the following approach methodology including i. technical survey studies using a structured questionnaire; ii. stakeholder sessions using a checklist; and iii. physical natural status documentation of situation for interaction through FGD, as needed.

Water body status: Floodplains, Ponds and Rivers**:** The Physical study sites selected for work are given in the Figs. 1-3. indicating the diversified characteristics of the study site and physiographic features including medium low land of floodplains, Cluster existence of ponds and river water floodplains.

Fig. 1. Flood plain-medium lowland

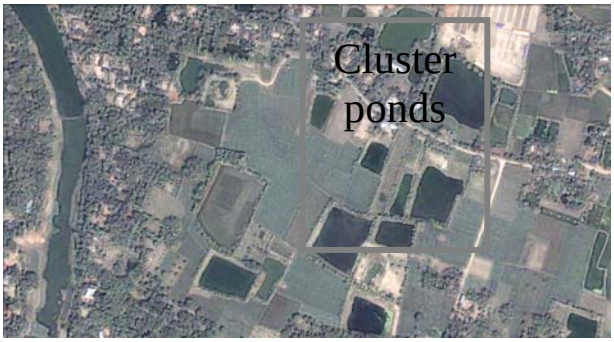


Fig. 2. Pond system medium high land

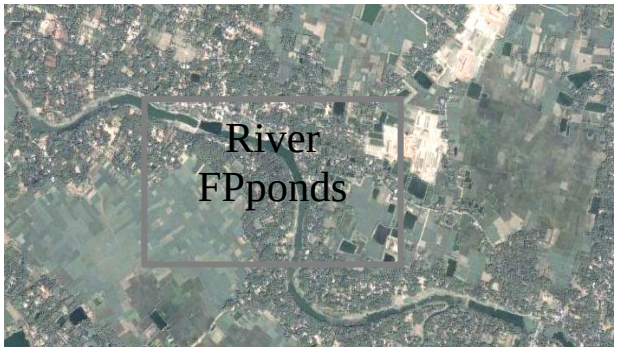


Fig. 3. River system: Medium high, medium low and low land, Boral river

Questionnaire Guidelines: Brief Points

The briefs of the technical survey questionnaire are mentioned below arranging them as per set objectives of the research.

A. Personal and site data:

Name of the respondent -Address-District-Upazila-Age-Profession—

B. Technical and biotic information

1. Name of water body (canal/haor/baor/beel/dead river)
2. Location: District-Upazila-Site-
3. Name of LCBO to which attached (Profile of the LCBO to be attached)
4. Size of the water body (Sq m/km/ha):

Length of the water body (m), Width of the water body (m), Depth of the water body (m)

5. Aquatic vegetation bloom □ High □ Medium □ Low

C. Existing fish species identification

1. Fish species is now at danger due to unfavorable ecological changes-

i. Calibaus nandina, ii. Boal (Patua), iii. Guji aire, iv. Gojar, v. Mola dhela chela, vi. Chanda coloured, vii. Darkina kanpona, viii. Chapila, ix. Pabda, x. Meni vedi, xi. Gulsa tengra, xii. Local Koi, xiii. Khoilsa, xiv. Singh Magur cat fish, xv. Batasi, xvi. Baim (big/small) chikra baim.

2. Biotic problems which cause extinction of SIS-

i. Increased predatory fish population, ii. Complete drying of bottom of water bodies, iii. Lack of appropriate shelter material, iv. Problems with reproduction ecology, v. Use of fine net, vi. Excessive rate harvest.

3. Induced problems retarding the population of SIS-

i. Siltation due to embankments, ii. Unplanned structures and sluices, iii. Use of water for irrigation, iv. Promotion of exotic fishes including predatory and alien fish, v. Use of chemicals and pesticides, vi. Adoption of un-approved methods of fish harvest, vii. Absence or Mismanagement of fish sanctuary.

RESULTS AND DISCUSSION

The results obtained from the studies done in several forms are sequentially mentioned here both as component factors, mean, tables and graphical forms. The sequence of discussion arranged as existing fish species, biotic problems of aquaculture and induced problems with SIS biodiversity. The results in general (Table 1 and Fig. 1) show that mostly all the SIS was reported to be in danger of extinction at various degrees.

Table 2. Fish species on the way of extinction/Extinction vulnerable

Fish species	Scientific name	Open water	Closed water	Seasonal	Mean
i. Calibus Nandina	*Labeo nandina*	53	82	92	75.6
ii. Boal (Patua)	*Wallago attu*	26	73	74	57.6
iii. Guji	*Sperata seenghala*	39	62	68	56.3
iv. Gojar	*Channa marulius*	58	51	45	51.3
v. Mola Dhela Chela	*Amblypharyngodon mola* *Osteobrama cotio* *Chela cachius*	22	31	56	36.3
vi. Chanda Coloured	*Parambassis ranga*	24	42	49	38.3
vii. Darkina kanpona	*Esomus danricus*	21	54	55	43.3
viii. Chapila	*Gudusia chapra*	63	64	67	64.7
ix. Pabda Luli	*Ompok pabo*	76	79	90	81.7
x. Meni, vedi	*Nandus nandus*	36	63	72	57.0
xi. Gulsa tengra	*Mystus vitattus*	42	59	66	55.6
xii. Koi local	*Anabus testudineus*	31	60	75	55.3
xiii. Khoilsa	*Colisa chuna*	28	57	77	54.0
xiv. Singh Magur	*Heteropneustes fossilis* *Clarias batrachus*	31	64	64	53.0
xv. Batasi	*Pseudeutropius atherinoides*	30	57	81	56.0
xvi. Baim (Big) Baim (Small)	*Macrognathus aculeatus* *Mastacembelus armatus*	36	58	73	55.6
Mean		38.5	59.75	69.0	55.8

The analyzed mean result shows that (Table 1 and Fig. 4) pabda fish was in most vulnerable condition followed by calibaus, then chapila. On the other hand mola, dhela, chela were lower as per extinction vulnerability.

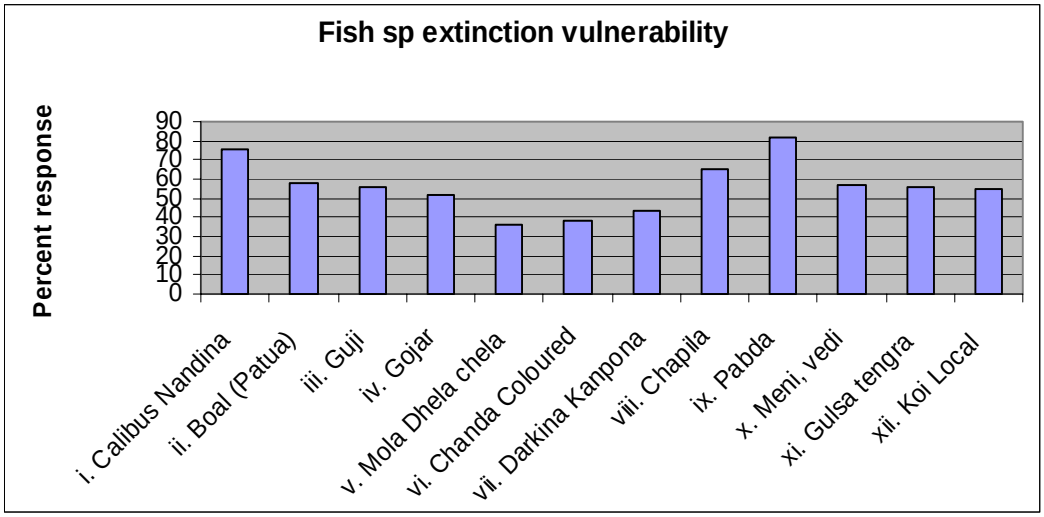


Fig. 4. Indigenous small fish extinction vulnerability

The result shows that pabda fish was in most vulnerable condition followed by calibaus, then chapila. On the other hand mola, dhela, chela were found comparatively slightly less dangered. The endanger situation as per ecology (Fig. 5.) show that seasonal fishes were found to be in more vulnerable condtion followed by closed water body fishes.

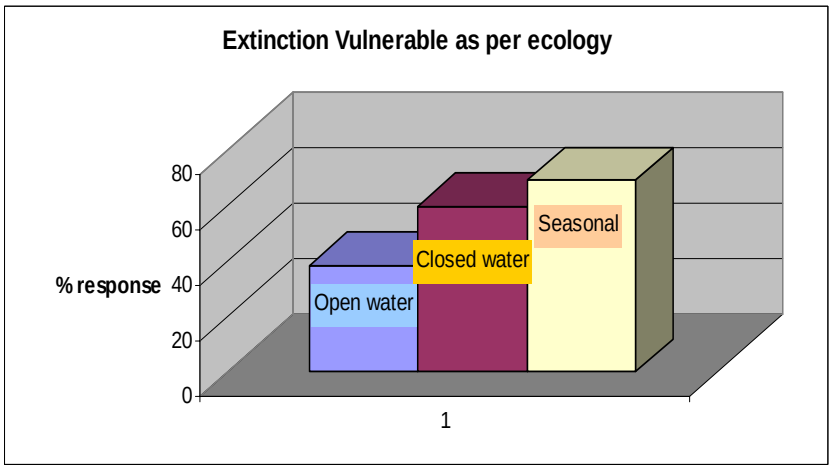


Fig. 5. Indigenous small fish extinction vulnerability as per ecology

The mean findings specifically result shows that seasonal water body fishes were going to be extinct rapidly as responded by 80 percent participants than that of open water fishes (20%).

Table 3. Biotic problems causing extinction of SIS

Parameter	Open water	Closed water	Seasonal	Mean
1. Increased predatory fish population	37	72	79	63
2. Complete drying of bottom of water bodies	37	59	91	62
3. Lack of appropriate shelter material/places	53	73	88	**71**
4. Problems with reproduction ecology	47	71	72	63
5. Use of fine net	68	72	76	**72**
6. Excessive rate harvest	65	83	95	**81**
Mean	51	71	83	68

Extinction of localized eco- strains

The specific studies conducted for identifying the diversity of SIS of chanda, khoilsa, chapila, puti, baims etc. showed a highly variations as to its local strains specially of chanda as given in the Fig. 6.

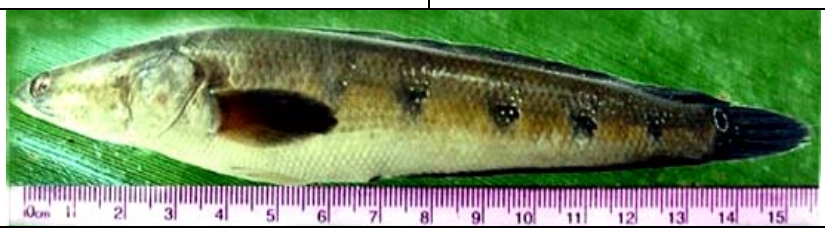
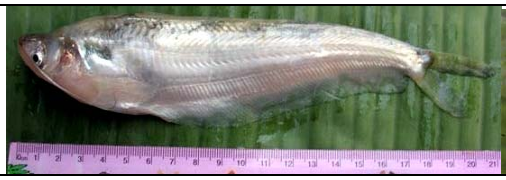
<table>
<tr><th colspan="2">Fishes under threatened condition</th></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Open saline water strains:
Vulnerability low</td><td>Open fresh water strains:
Vulnerability low</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Shallow water Khudi chanda:
Vulnerability very high</td><td>Khudi Chanda:
Vulnerability very high</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Beel mud water Chanda:
Vulnerability high</td><td>Fresh water ornamental Chanda:
Vulnerability high</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Floodplain Chanda:
Vulnerability medium</td><td>Pond water Chanda:
Vulnerability medium</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td colspan="2">Fishes found to be frequently reported as most vulnerable towards extinction: Gazar
Gazar, Great snakehead, *Channa marulius*</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Kani Pabda, *Ompok pabda*</td><td>Madhu Pabda, *Ompok pabda*</td></tr>
</table>

Fig. 6. Diversity of Chanda strains and its degree of extinction vulnerability

Typical species at danger for extinction

It may be clearly seen from the result that the main biotic problem of SIS extinction was excessive harvesting rate. Use of fine micro-fiber net and lack of appropriate shelter materials/place/sanctuary also plays an important role. This was found to be similar for other small fishes like puti (barvs), khoilsa, baims and large benthos.

CONCLUSION

Most of the SIS fishes were found to be under in vulnerable condition, out of which most delicious SIS fish pabda was going to be extinct rapidly followed by calibaus nandina and chapila. Specially the SIS fishes of seasonal water bodies were in most threatened condition. Excessive rate of Harvesting at exploitation level was playing the most important role for the extinction vulnerability of SIS fishes in Bangladesh followed by use of fine net and lack of appropriate shelter/place. It is due to lack of awareness/ignorance about SIS importance and also lack of technical know how for production and conservation of SIS. Awareness building and technical training for the rural community regarding SIS is an imperative necessity for the productive conservation of SIS fishes of Bangladesh. And 'On farm module based ICT digital method of training system' will create positive impact or will be most effective for saving the SIS fishes from endangered condition as well as from extinction.

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