

Reprint

ISSN 2076-3913 (Web Version)

# Marine Resources and Aquaculture (MRA)

(*Marine Res. Aqua.*)

---

**Volume: 2**

**Issue: 1**

**November 2014**

---

*Marine Res. Aqua. 2(1): 24-31 (November 2014)*

**STATUS OF FRESH WATER INDIGENOUS FISHES AND ITS DEVELOPMENT NEEDS IN  
THE BENGAL BASIN**

T.K. PAUL, M.R. ISLAM, M. HOSSAIN AND M. RASHIDUZZAMAN



An International Scientific Research Publisher

**Green Global Foundation<sup>®</sup>**

Web address: <http://ggfjournals.com/e-journals archive>

E-mails: [editor@ggfjournals.com](mailto:editor@ggfjournals.com) and [editor.int.correspondence@ggfjournals.com](mailto:editor.int.correspondence@ggfjournals.com)



## STATUS OF FRESH WATER INDIGENOUS FISHES AND ITS DEVELOPMENT NEEDS IN THE BENGAL BASIN

T.K. PAUL<sup>1\*</sup>, M.R. ISLAM<sup>2</sup>, M. HOSSAIN<sup>3</sup> AND M. RASHIDUZZAMAN<sup>4</sup>

<sup>1</sup>Project Director, Aquaculture and Fisheries Management Project in Haor Areas. Matshya Bhaban, Department of Fisheries (DoF), Ministry of Fisheries and Livestock (MOFL), <sup>2</sup>Project Director, Fresh Water Prawn Culture and Extension Project. Matshya Bhaban, DoF, MOFL,

<sup>3</sup>District Fisheries Officer DoF, MOFL, <sup>4</sup>Deputy Director, Palli Daridro Bimochon Foundation (PDBF) Netrakona, Bangladesh.

\*Corresponding author & address: Tapan Kumar Paul, E-mail: tapanpddf@gmail.com

Accepted for publication on 28 October 2014

### ABSTRACT

Paul TK, Islam MR, Hossain M, Rashiduzzaman M (2014) Status of fresh water indigenous fishes and its development needs in the Bengal basin. *Marine Res. Aqua.* 2(1), 24-31.

A study was conducted to identify the status of fresh water indigenous fishes and its development needs in the Bengal Basin and to prioritize the potentialities. The study was implemented through technical survey covering the respective basin related agroecological zones and sub-zones of Bangladesh. Localized SIS of Bengal Basin were affected in the entire Agro-Ecological Zones. Among them of the pabda-tengra group were most affected in all Agro-Ecological Zones specially Arial Beel AEZ 15 of Dhaka and Munsiganj, Syllhet Basin and Eastern Surma Kushiara Floodplain having year round water though at minimal level showed comparatively less vulnerability towards extinction fate. To overcome the situation technical extension and promotion package involving the life cycle based cultural system of SIS giving modular training and campaign. The stakeholders and poor fisher's sole dependants on Bengal Basin Haor areas need to be taken in to account as they are concerned for the livelihood. Habitat restoration is essential for SIS production, conservation and sustainable management. It is imperative necessity to aware the local community about the productive conservation of SIS addressing all natural water bodies, specially degraded water bodies. Sanctuary's should be established in every possible water bodies for SIS emphasizing on Pabda-Tengra groups.

**Key words:** *indigenous fish, Bengal Basin, fresh water, fish sanctuary*

### 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. 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 (BBS 2011). There are more than 260 fresh water fish species in Bangladesh (Rahman 1989) out of which 34 listed as small fish including *Amblypharyngodon mola*, *Puntius* species, *Ostiostrum 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 (Talwar and Jhingran, 1991). 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. Current findings show that SIS contained remarkable amount of Ca, P and Iron along with protein. 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 major wetlands habitats, ensure sustainable productivity and improve the livelihoods of the poor fishers who depends on these wetlands, through community based co-management. Their result was good but it did not sustain because they did not feel to aware the fishers community to recognize 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 (DoF 2008). In the circumstances the present research program was formulated 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.

The past decade has seen growing recognition of the crisis facing the world's water resources and the need for concerted action to use these more efficiently. The efficiency of water use (or water productivity) can be increased by producing more output per unit of water used, or by reducing water losses, or by a combination of both. So far, strategies for increasing output have been limited to crop cultivation only. Water productivity at several organizational levels can be increased further by integrating fish and other living aquatic resources into the existing water use systems. Such opportunities of integration include community-based fish culture in irrigation schemes and seasonal floodplains. A variety of studies show that reservoirs and canals of irrigation systems continue to yield substantial fish harvests, which are important sources of protein and livelihoods for the poor and landless households. Yet the current use of irrigation systems and floodplains for fish production falls far short of potential. In seasonal floodplains, fish production essentially emanates from capture activities by seasonal or part-time fisher-farmers where wild fish enter, reproduce and are harvested from the flooded fields. In Cambodian floodplains, the value of fish caught through trap ponds within rice fields reaches 37 to 42 percent of that of rice production (Gregory and Guttman, 1996).

A number of studies have been conducted in the 1980s to test the technical feasibility of culturing fish in seasonally flooded rice fields in India Bangladesh (Ali *et al.* 1993, Cambodia (Gregory and Guttman, 1996), These studies show that fish production can be increased by more than 1tonne/ha/year by stocking flooded rice fields with fish (i.e. individual farmers fencing their plots and stocking fish during the flood season). In addition, the culture of fish within rice fields can increase rice yields, especially on poorer soils and in unfertilized crops where the fertilizing effect of fish is greatest. Savings of pesticides and earnings from fish sales lead to increased yields and result in net incomes that are 7 to 65percent higher than for rice monoculture. But the adoption of this technology by farmers has been very low due to the high cost of fencing individual plots. According to Rahman (1989), there are 260 species of freshwater indigenous fish in Bangladesh. Among them, which grow to a size of 25 cm or 9 inches in mature or adult stage in their lifecycle are known as SIS (Small Indigenous Species). However there is some sort of contradiction exist in the above definition because there are some fishes in Bangladesh such as *Puntius sarana*, *Clarias batrachus*, *Channa barca*, *Xenentodon cancila*, *Heteropneustes fossilis* etc. which are considered as SIS but their size exceeds the limit mentioned in the definition (25 cm). SIS, including 18 species of carps and 9 each of cat fishes perches and other groups as SIS. SIS was sub-categorized into three main groups- species which reach a maximum length up to 7.5 cm; species which reach a maximum length up to 15 cm; and the species which reach a maximum length up to 25 cm. Ali *et al.* (1993) listed 143 species of SIS in Bangladesh. Selected list of small indigenous fish species of Bangladesh are listed as mentioned in Table here.

Table 1. List of indigenous fishes

Scientific name	Bengali name	Fishbase name
<i>Ailia coila</i>	Kajuli, Baspata	Gangetic ailia
<i>Amblypharyngodon mola</i>	Mola, Moa	Mola carplet
<i>Anabas testudineus</i>	Koi	Climbing perch
<i>Aspidoparia morar</i>	Pioly	Pioly
<i>Badis badis</i>	Napit koi	Badis
<i>Botia dario</i>	Bou, Rani	Bengal loach
<i>Botia lohachata</i>	Bou, Rani	Reticulate loach
<i>Chanda nama</i>	Nama chanda	Elongate glass-perchlet
<i>Chanda ranga</i>	Chanda	Indian glassy fish
<i>Channa orientalis</i>	Gachua	Walking snakehead
<i>Channa punctatus</i>	Taki	Spotted snakehead
<i>Clarias batrachus</i>	Magur	Walking catfish
<i>Colisa fasciata</i>	Khalisa	Banded gourami
<i>Colisa lalia</i>	Lal khalisha	Dwarf gourami
<i>Corica soborna</i>	Kachki	Ganges river sprat
<i>Danio devario</i>	Chap chela	Dind danio
<i>Esomus danricus</i>	Darkina	Flying barb
<i>Glossogobius giuris</i>	Bele	Tank goby
<i>Gudusia chapra</i>	Chapila	Indian rivershad
<i>Heteropneustes fossilis</i>	Shingi	Stinging catfish
<i>Labeo bata</i>	Bata	Bata
<i>Lepidocephalus guntea</i>	Gutum	Guntea loach
<i>Macrogathus aculeatus</i>	Tara Baim	Lesser spiny eel
<i>Mastacembelus pancalus</i>	Guchi	Barred spiny eel
<i>Mystus tengara</i>	Tengra	-
<i>Mystus vittatus</i>	Tengra	Striped dwarf catfish
<i>Nandus nandus</i>	Meni	Gangetic leafish
<i>Notopterus notopterus</i>	Pholi	Bronze featherback
<i>Ompok pabda</i>	Pabda	Pabdah catfish
<i>Parambassis lala</i>	Lal chanda	Highfin glassy perchlet
<i>Puntius conchoniuis</i>	Kanchan punti	Rosy barb
<i>Puntius phutunio</i>	Phutani punti	Spottedsail barb
<i>Puntius sarana</i>	Sarpunti	Olive barb
<i>Puntius sophore</i>	Jat punti	Pool barb
<i>Puntius ticto</i>	Tit Punti	Ticto barb
<i>Rohtee cotio</i>	Dhela	Dhela
<i>Salmostoma bacaila</i>	Chela	Large razorbelly minnow
<i>Salmostoma phulo</i>	Ful chela	Finescale razorbelly
<i>Securicula gora</i>	Ghoro chela	Chela
<i>Xenentodon cancila</i>	Kakila	Freshwater garfish

**Present Status of SIS in Different Water Bodies of Bangladesh**

Chalan Beel a total of 121 species of SIS are found including 41 riverine species, 29 migratory species, and 51 flood plain species. In Padma river this number (SIS) is 119 consisting of 45 riverine, 25 migratory, and 44 flood plain species. In Tanguar Haor, 123 SIS are recorded of which 33 riverine species, 29 migratory species, and 61 flood plain species. Also recorded 145 SIS from Baraindra Tract region and a total of 129 SIS from Chittagong region (Uddin 2002; and Amin *et al.* 2009). In the context of the above situation the present piece of research was under taken with the objective to identify i. the occurrence of localized fish spp. in the typical Bengal Basin Haor sites, ii. the problems controlling open water fisheries population dynamics, and iii. the priorities for developing the system.

**MATERIALS AND METHODS**

**Methodological approach:** 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: Haor basins and Floodplains:**

The Physical study sites selected for work as per Agro-Ecological Zones are given in the figures 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.

The methods to be used in the study are i. Field level survey investigation ii. Focus Group Discussion (FGD) iii. Case and Situation Studies.

**Materials:** Questionnaire, Guidelines and statistical package.

**Sites of Work: Districts:** Dhaka, Netrakona, Kishoreganj, Sunamganj, Natore, and Gopalganj

Agro-Ecological Zones (AEZ) to be covered: AEZ 5: Atrai Basin; AEZ 14: Gopalganj Khulna Peat Basin; AEZ 15: Atrial Beel; AEZ 20: Eastern Surma Kusiara Floodplain Basins; AEZ 21: Sylhet Basin.

**Sites sampling – Districts and Upazila:** Dhaka- Nowabganj, Dohar, Dhamrai; Netrakona- Kalmakanda, Mohanganj, Khaliajuri; Sylhet- Golapganj, Biswanath, Companyganj; Sunamganj- Dharmapasha, Dherai, Sulla Natore- gurdaspur, Singra, Baraigram; Kishoreganj: Itna, Mithamoin, Austogram; Gopalganj- Muksudpur, Kotalipara and Kasiani.

**A. Respondent's Identity/Information**

1. Name.....Address: ..... Upazila.....  
District..... Site.....
2. Gender: .....Age: .....  
.....Education: .....
3. Professions: Fisher /Fish business/Consumer/Fisheries field staff/Officer/Researcher.

**B. Major AEZ characteristics of the site:**

- a. Land type-Lowland /Very lowland/Waterbodies
- b. Soil-Acidic/Alkaline/Neutral reaction
- c. Flash flood occurrence - High /Low
- d. Risk of bottom drying – High /Low
- e. Area of the site Increasing /Decreasing

**C. Fish farm information:**

1. Size of the site:- i) <50 acre ii) 50-500 acre iii) 500-1000 acre iv) >1000 acre
2. Nature of the site:- i) Seasonal ii) perennial iii) mixed
3. Vegetation of the site:- i) Seasonal crop ii) Perennial aquatic grasses iii) Aquatic broadleaf plants

**D. Research Questions:**

**1. What is the quantitative status of fish spp in the area by diversity?**

- (a) Small Fish: < 100 gram per fish: i) < 10% ii) 10-20% iii) 20-30% iv) 30-40% v) >40%
- (b) Medium fish 100-300 grams : i) < 10% ii) 10-20% iii) 20-30% iv) 30-40% v) >40%
- (c) Fish large > 300grams : i) < 10% ii) 10-20% iii) 20-30% iv) 30-40% v) >40%



Fig. 1. Agro-Ecological Zones of Bangladesh

**2. What are the problems in fisheries conservation faced by fishers?**

- i) Most fisheries technologies are species independent
- ii) Insecurity of water bodies regarding harvest
- iii) Lack of Legal matters
- iv) Raising of the basin bottoms
- v) Lack of awareness
- vi) Lack of land ownership

**3. What should be the priority sector for enhancing sp protection?**

- i) Extension of basin management technology package
- ii) Establishing certified fish market
- iii. Extending bio-environmental education
- iv. Arrangement of subsistence program
- v. Training on aquaculture
- vi. Campaigning



Fig. 2. AEZ 20, AEZ 21 Sylhet



Fig. 3. AEZ 5 Atrai Basin



Fig. 4. AEZ 9, AEZ 20, AEZ 21



Fig. 5. AEZ 15 Arial Beel



Fig. 6. AEZ 14 Gopalganj Khulna Peat Basin



**RESULTS AND DISCUSSION**

**Species Distribution Status**

The results obtained from the studies done in several forms are sequentially mentioned here in the Table 2 and Table 3 and Fig. 7 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 show that mostly all the studied species were reported to be in danger of extinction at various degrees. Similar findings and thus indications were also reported by Chowdhury (1986).

Table 2. Localized fish species in the typical Bengal Basin Haor sites

Site	AEZ	Mola– dhela group	Pabda-tengra group	Chanda group	Misc group
Dhaka	AEZ 15: Arial Beel	41	6	28	25
Netrakona	AEZ 21: Sylhet Basin	33	10	26	31
Sylhet	AEZ 21: Sylhet Basin	25	17	29	29
Sunamganj	AEZ 20: Eastern SK Floodplain	21	26	36	25
Natore	AEZ 5 : Atrai Basin	37	5	32	26
Kishoreganj	AEZ 20: Eastern S K Floodplain	25	17	29	29
Gopalganj	AEZ 14: Gopalganj Khulna Peat Basin	16	11	32	41
Mean		28	13	30	29

The results obtained from the studies as presented here show that:

- The haor based wild mixed small fishes were most affected in all the sites the lowest being of 25% in Arial Beel and Eastern Surma Kusiara Floodplain.
- As per fish groups Pabda tengra group was most affected in all the sites & the lowest in the Atrai basin is only 5.

Table 3. Mean Results of the abundance of SIS in Bengal Basin

Site	Mola– dhela group	Pabda-tengra group	Chanda group	Misc group
Dhaka	41	6	28	25
Netrakona	33	10	26	31
Sylhet	25	17	29	29
Sunamganj	21	26	36	25
Natore	37	5	32	26
Kishoreganj	25	17	29	29
Gopalganj	16	11	32	41
Mean	28	13	30	29

The results obtained from the table show that: the valuable pabda-tengra group is mostly affected SIS group in all the sites of Bengal Basin. Other three groups are comparatively less vulnerable.

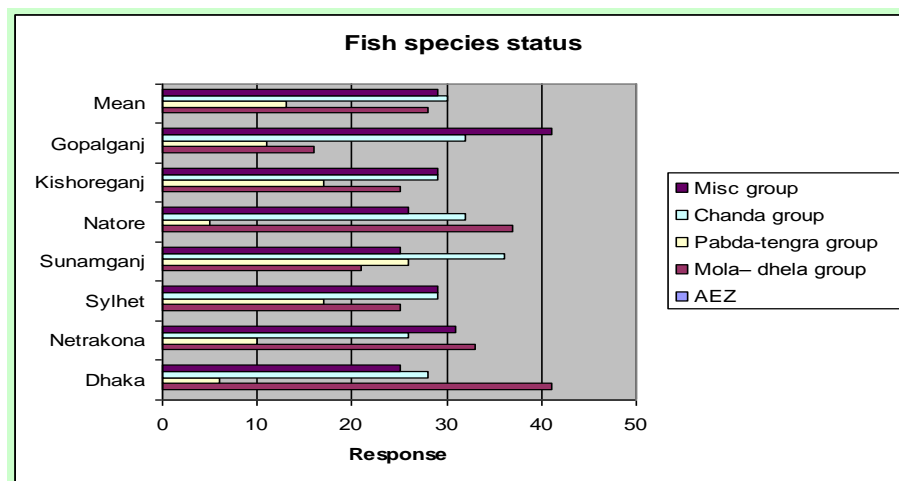


Fig. 7. Status of indigenous fish species in the study areas

**Problems controlling open water fisheries**

The results obtained and mentioned in the Tables 4 and 5 and Fig. 8 on the problems controlling open water fisheries of the studied area are mentioned in the Table 4. The results show that Arial Beel (AEZ-15), Dhaka is facing comparatively more ecological problems as responded by 58% respondents while AEZ-20 (Eastern

Surma Kushiara Floodplain) showed comparatively less stress situation. The reason may be such that the floodplain rapid lands raise due to human intervention and developmental structures changing the water regime as regards depth and duration.

Table 4. Main factor based problems as per Agro-ecological Zones

Site	Sp based techs	Unsecured water	Weak Legislation	Raising of basin	Less aware and land	Mean
Dhaka AEZ 15: Arial Beel	61	53	63	71	42	58
Netrakona AEZ 20: Surma Kushiara Floodplain	59	47	27	44	27	41
Sylhet AEZ 21: Sylhet Basin	74	33	28	36	35	41
Sunamganj AEZ 20: Eastern Surma Kushiara Floodplain	71	25	41	54	39	46
Natore AEZ 5: Atrai Basin	56	38	28	69	37	45
Kishoreganj AEZ 20: Eastern Surma Kushiara Floodplain	62	29	48	41	22	40
Gopalganj AEZ 14: Gopalganj Khulna Peat Basin	62	37	42	38	36	43
Mean	64	37	40	50	34	45

#### Priorities for developing the system

The results obtained on the priority setting parameters on the fisheries farming system of the studied area are mentioned in the Table 5 and the Fig. 8 and Fig. 9. The results show that extension technical package responded by 67% is the first priority and the second one is training and campaign responded by 52% in all AEZ of Bengal Basin for developing the system. It was found as mean value being 40% as lowest in the Gopalganj AEZ 14: Gopalganj Khulna Peat Basin. It clearly indicates the weakness of fisheries farming system skills in the area which need to be improved giving intensive modular based training.

Table 5. Response in favor of the priorities

Site	Ext tech package	Unsecured water	Weak Legislation	Raising of basin	Training and Campaign	Mean
Dhaka AEZ 15: Arial Beel	61	43	23	46	72	49
Netrakona AEZ 20: Eastern Surma Kushiara Floodplain	73	41	27	44	56	48
Sylhet AEZ 21: Sylhet Basin	74	33	28	56	65	51
Sunamganj AEZ 20: Eastern Surma Kushiara Floodplain	78	25	27	34	39	40
Natore AEZ 5: Atrai Basin	56	38	28	39	51	42
Kishoreganj AEZ 20: Eastern Surma Kushiara Floodplain	62	29	32	41	45	42
Gopalganj AEZ 14: Gopalganj Khulna Peat Basin	68	37	23	38	36	40
Mean	67	35	27	43	52	45

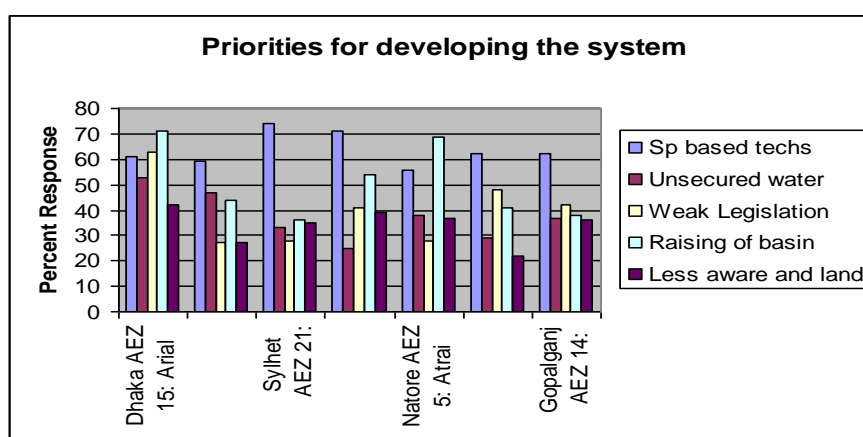


Fig. 8. Priorities for developing the fish system as per parameters

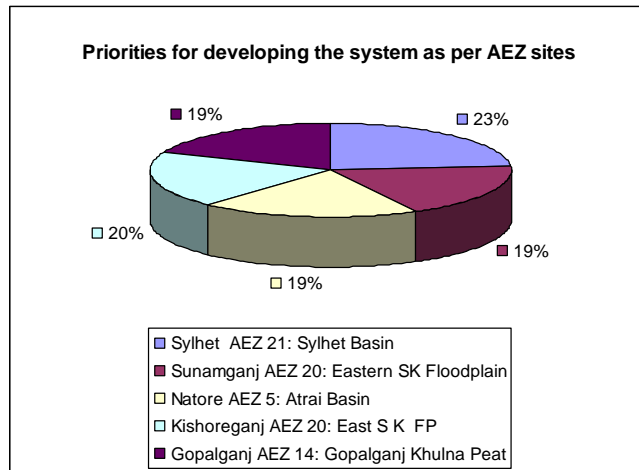
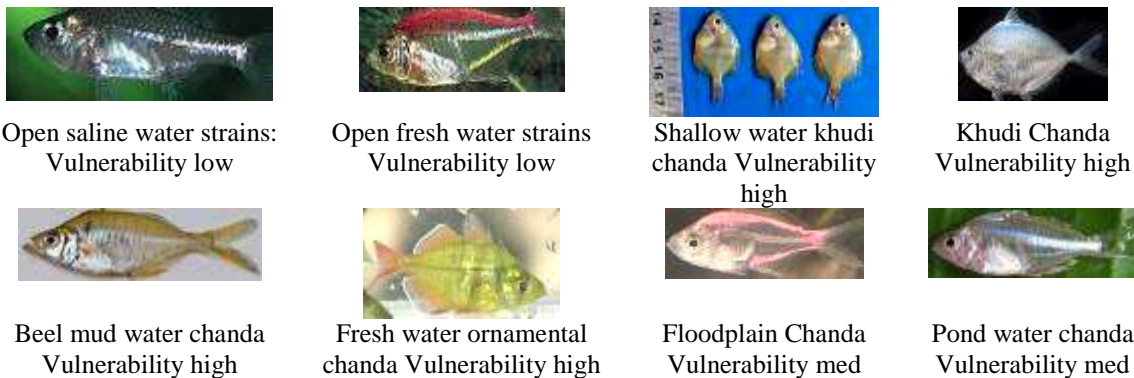


Fig. 9. Priorities for developing the system as per AEZ sites

**Diversity of studied fish strains**

The diversity of the SIS were found very narrow. However the Chanda and the puti group and also pabda-gulsha group in some places showed serious vulnerability towards extinction, the example data are given in the Fig. 10.

**Chanda group**



**Mola Puti and others group**

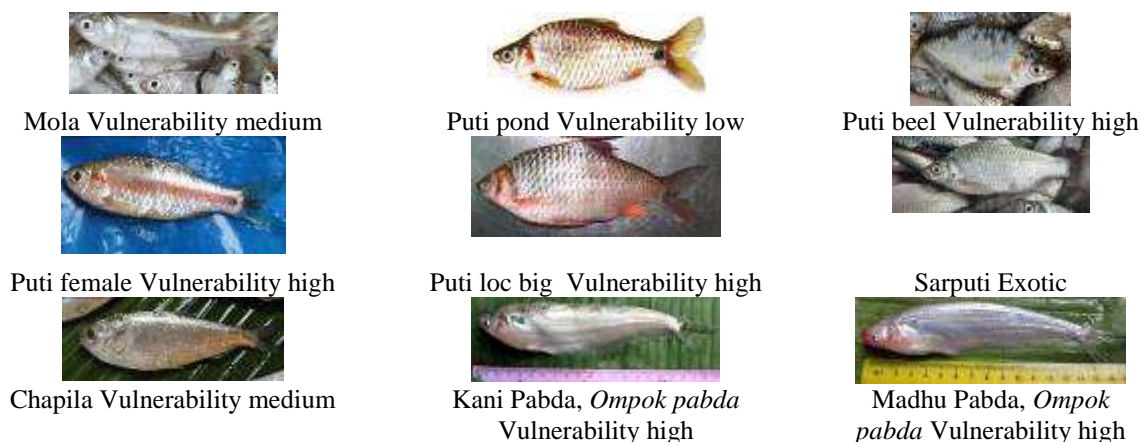


Fig. 10. Diversity of studied fish strains and its degree of extinction vulnerability

**CONCLUSION**

The localized fish species designated as Small Indigenous Species (SIS) of Bengal Basin were affected in the entire Agro-Ecological Zones. Among them of the pabda-tengra group were most affected in all side. Agro-Ecological Zone-15, Arial Beel, Dhaka is facing comparably more ecological problem. On the other hand Sylhet Basin and Eastern Surma Kushiara Floodplain showed fewer problems. To over come the situation extension technical package and culture system of vulnerable SIS species should be introduced as well as training and campaign should be properly addressed to the stake holders who are solely depends on Bengal Basin Haor side for the livelihood. Habited restoration is essential for SIS production, conservation and sustainable management.



It is imperative necessity to aware the local community about the productive conservation of SIS addressing all natural water bodies, specially degraded water bodies covering all AEZ of the country. Sanctuary's should be established in every appropriate water bodies of SIS species, giving priority emphasis on pabda, tengra groups. SIS fry realize activities should be prioritized.

## REFERENCES

- Ali MH, Miah MNI, Ahmed NU (1993) Experiences in deepwater rice-fish culture. *Bangladesh Rice Research Institute Publication* No. 107, Gazipur, Bangladesh. pp. 28.
- Amin AKMR, Parvez I, Zaman MB, Amin HA (2009) Study of the present tatus of endangered small Indigenous species (SIS) of Fish in the Natural Waters of the North-West Part of Bangladesh, *J. Environ. Sci. & Natural Resources*, 2(2), 163-168.
- BBS (2011) Statistical yearbook. Bangladesh Bureau of Statistics, Statistical division, Government of the people's republic of Bangladesh, Dhaka. pp. 660.
- Chowdhury AQ (1986) Fishers' community and development of close water fishery in Bangladesh. Presented at the seminar on world Food day; organized by the ministry of Agriculture, Government of Bangladesh and FAO, 16th October, 1986: pp. 1-22.
- DoF (2008) Annual Report 2006-2007, Department of Fisheries, Ministry of Fisheries and Livestock, Dhaka, Bangladesh. pp. 5-33.
- Gregory R, Guttman H (1996) Management of rice field fisheries in South East Asia: capture or culture? *ILEIA Newsletter* 12(2), 20-21.
- Rahman AKA (1989) The small scale marine fisheries of Bangladesh. In: Socio-economic issues in coastal fisheries management. Proceedings of the IPFC Symposium, Bangkok, Thailand, 8, 295-314.
- Talwar PK, Jhingran AG (1991) Inland fishes of India and adjacent countries, Vol. 1 and 2, Oxford & IBH Publishing Company Pvt. Ltd., New Delhi, pp.1158.
- Uddin MJ (2002) The Agricultural potentiality of wetlands: A case study of the Chalan Beel Areas of Bangladesh. Dhaka Univ. *J. Biol. Sci.* 11(2), 139-145.