Reprint

# Journal of Innovation & Development Strategy (JIDS)

(J. Innov. Dev. Strategy)

Volume: 7

Issue: 3

December 2013

J. Innov. Dev. Strategy 7(3): 42-47 (December 2013)

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## POTENTIALS AND PROBLEMS OF FRESHWATER PRAWN CULTURE IN THE NORTHERN FISHERIES ZONES OF BANGLADESH

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#### ABSTRACT

Haque JMA, Hossain MG, Wahiduzzaman M (2013) Potentials and problems of freshwater prawn culture in the northern fisheries zones of Bangladesh. J. Innov. Dev. Strategy. 7(3), 42-47.

Studies were conducted Potentials and problems of freshwater prawn culture in the northern fisheries zones of Bangladesh with objectives of knowing the present status of prawn culture, identifying the problems of prawn culture and to prioritize the major potential technologies to be used for production improvement. The studies were covering 9 Agro-Ecological Zones of 6 Districts of Rajshahi and Rangpur Divisions. The methods included technical survey, group discussions and case studies. The results showed that the status of the ponds, water bodies as per prawn culture potentially have problems involving both technical and extension reducing the production up to 40% of the expected potential. Rajshahi ponds had more calcareous (69% response), silty clay loam soils (58% response), while the Rangpur ponds had acidic soils (62% response), having sandy loam soils (61% response). Higher scores were given for production and marketing of post larva (PL) and juvenile seeds. For such reasons mean while 20-40% farmers discontinuing their farms of which 46% due to input factor i. e. seed non-availability along with its higher prices. It was concluded more liming should be done to keep the water condition favorable specially in the Rangpur division for prawn culture. Hatcheries should be established and DOF extension support should be increased to the prawn farmers. Steps should be taken to reduce price of prawn seed and quality feed. Existing hatchery's prawn production should be increased providing technicians. Local depot owner (Aratdar) should be established in local prawn cultivation supplying PL and feed through market chain.

Key words: prawn culture, fresh water fish, northern fisheries zones

# INTRODUCTION

Giant freshwater prawn is the high valued cultured species, because of its wide acceptance due to delicate taste, easy culture technique and export prospective. Most of the freshwater Prawns have wide range of environmental tolerance; especially *Macrobrachium rosenbergii* can grow well in fresh water to saline water up to 15 ppt and up to 2-5 ppt in cage, in ponds and in a wide range of temperature (Whangchai *et al.* 2006). Bangladesh is considered one of the suitable countries in the world for giant freshwater prawn, *M. rosenbergii* farming, because of its favorable resources and agro-climatic conditions (Ahmed *et al.* 2008ab).

Prawns are found almost every places of inland open water bodies of Bangladesh principally including Gomuti and Kathalia river of Daudkandi, Halda, Karnafuli and Matamuhiri rivers of Chittagong, Dakatia and Meghna rivers of Chandpur, Brahmaputra of Mymensingh, Daratana river of Bagerhat, offshore of Sundarbans, Barisal, Patuakhali, Khulna, Narashingdi, Aidpur, Kakshiali river of Satkhira and Jessore districts (Paul 2008).

In Bangladesh there are about 24 species of freshwater prawn including 10 species of Macobrachium spp. (Ahmed and Hasan, 1992)). Among these giant freshwater prawn, M. rosenbergii and monsoon river prawn, M. malcomsonii are the two commercially important species (Williams and Khan, 2003). In Bangladesh freshwater prawn farming first started in the southwest region in the early 1970s (Mazid and Mahmud, 1992). After the independence in 1971, locals learnt to catch prawn fry from people on the other side of the Ichamati River, on the boarder between Bangladesh and India, at Debhhata in the Satkhira District. Around a few rich local farmers in the Fakirhat area of Bagherhat District began to experiment with stocking prawn post larvae in carp ponds. These innovators experimented with construction design, feeding, stocking and other technical aspects and profited well (Kendrick 1994). In the late 1980s, this farming practice began to be adopted widely in the original location in Fakirhat area, where prawns were grown along with carps and rice. By around 1987, a few local farmers first converted their low lying lands and rice fields into Gher (Prawn farms are locally known as gher) for prawn cultivation (Kendrick 1994). At present, in Bangladesh, area of shrimp/prawn farms is 2.76 Lakh hectare, prawn farmers 8.33 lakh and total annual catch of shrimp/prawn in 2011-12 is 1.96 Lakh MT (FRSS, DOF 2013). In the Northern Zones of Bangladesh now few farmers are involved in prawn culture. Prawn culture was started in northern zone since about 2000-2001, from that time; still prawn farming is not extended satisfactorily. Rather, most of the farmers discontinued their prawn farming due to different factors. So, in the context the present piece of research are undertaken to know the present status, problems and what recommendation should be taken for sustainable prawn culture in northern Zone of Bangladesh. In light of the situations depicting the problems and potentials of fresh water prawn culture in the fisheries based Agro-Ecological Zones (AEZ) of Bangladesh the present piece of research was undertaken with the main objectives of knowing the present state of the art of prawn culture, identifying the problems of prawn culture and to prioritize the major potential technologies to be used for skill training.

# MATERIALS AND METHODS

The main methods followed in the research included i. Technical survey and field study using a questionnaire guideline, ii. Conducting discussion sessions with stakeholders, iii. Other field level studies including case

studies and elite farmer level interpretation. The methodological guidelines implemented in these studies were formulated as proposed and recommended by many researchers including Haq (2007), Hohowskyj *et al.* (1996) and Hossain (2009) specially for sub tropic humid Agro-Ecological Zones (Anon. 2001; BARC 2005).

# Sites sampling

The studies were conducted taking random samples from 6 Districts of which 3 from Rangpur Division (AEZ 1 and AEZ 27 Dinajpur, AEZ 2 and AEZ 3 Lalmonirhat, AEZ 4 and AEZ 7 Gaibanda); and 3 from Rajshahi Division (AEZ 10 and AEZ 11. Rajshahi, AEZ 5 and AEZ 12. Pabna, AEZ 25 and AEZ 26 Naogaon). The studies were conducted using specific questionnaires for technical survey and questionnaire based guidelines and checklists for other studies. The whole database was made collecting data in 3 separate parts for the ease of analysis and interpretation of the findings.

Part I. Respondent's Identity

Name: ... Upazila.... District.... Site.... Gender: ... Age: ... Qualification: ... Duration of farming...... Site Characteristics.....

Agro-Ecological Zones (AEZ)...... Land type- HL, MHL, MLL, LL, VLL, water body

Soil pH: Acidic, neutral, alkaline, Soil texture: Sandy soil, Loamy soil, silt/clayey soil.

Water characteristics: pH, hardness, Present status of farming: Reasons for change.....

Pond area: < 2acre. 2-5 acre, > 5 acre, Seed population now using: Sub-optimal, optimum, high density Feed used: Local, mill feed, mixed, Production -profit status: Poor, medium, good

Category of respondents: Fish pond farm owner, Pond businessman, Close beneficiaries/stakeholders Part II. Pond/farms related information:

1. Pond farmers discontinued fish farming by last 3 yrs: i) <10% ii) 10-20% iii) 20-40% iv) >40%

2. Main reason- Lack of i) profit ii) Input non-availability iii) Extension support iv) Skill training

3. Pond farmers increased fish farming by last 3 yrs i) <10% ii) 10-20% iii) 20-40% iv) >40%

4. Reasons for increasing? i) High profit ii) Input avail iii) DOF extension support iv) Training and skill dev

5. Type of seed is used i) Egg ii) Post larva (PL) iii) Juvenile iv) Post juvenile

6. Seeds are collected from : i) DOF hatch/nurseris ii) Private hatch/nurseries iii) Foria iv) NGO supplies

Part III. Prawn culture techniques

1. Prawn spp cultivated: Galda rosenbergii G. maclcomsoni Local m mixed with bagha, chaka, tara.

2. Negative factors: Lack of i. Seed and Feed ii. Tech training iii. Pest treatment iv. Post harvest facilities

3. Prioritizing potentialities i. Local production of seed ii. Estab hatch iii. Training, iv. Tech service

v. High price of Artimia vi. Post harvest facilities – processing, storage and marketing.

# **RESULTS AND DISCUSSION**

The results obtained from the studies are given in both tabular and illustrated formats in the sequence such as Characteristics of study area, Soil and land status: Farms information, Prawn seed type and sources of seed, Potentials factors.

#### Study areas (site) characteristics

The study area's features as characterized show that Rajshahi region environment consisted medium highlands with hard water while the Rangpur region mostly possessed medium low land with acidic soil and water.

Site	AEZ Physiographic features	Land level	Soil colour and texture	Water	Community	Status % of the potential
AEZ 1 and AEZ 27 Dinajpur	Fig 1	High and medium	Deep grey to light brown, sandy clay	Acidic	Medium	44
AEZ 2 and AEZ 3 Lalmonirhat Rangpur	Fig 2	Medium low	Light grey, sandy loam	Acidic to neutral	Medium low	36
AEZ 4 and AEZ 7 Gaibandha	Fig 3	Medium	Gray to light grey, sandy loam	Neutral	Low	57
AEZ 10 and AEZ 11 Rajshahi	Fig 4	Medium high	Gray, loamy	Calcareous hard	Low	32
AEZ 5 and AEZ 12 Pabna	Fig 5	Medium low	Gray, clay loam and silt	Alkaline hard	Medium	61
AEZ 25 and AEZ 26 Naogaon	Fig 6	Medium low	Brown to light brown, silty loam	Acidic	Medium low	42
Mean						40

Table 1. Study Areas Characterization

# Notes:

AEZ 1: Old Himalayan Piedmont Plain, AEZ 2: Active Tista Floodplain; AEZ 3: Tista Meander Floodplain; AEZ 4: Korotoa Bangali Floodplain; AEZ 5: Atrai Basin AEZ 7: Active Brahmaputra Floodplain; AEZ 10: Active Ganges Floodplain; AEZ 11: High Ganges Floodplain; AEZ 12: Lower Ganges Floodplain; AEZ 25: and AEZ 26 AEZ 27: Northern and Eastern Barind.



Fig. 1. AEZ 1 and 27: Old Himalayan Piedmont Plain and Northern and Eastern Barind. Dinajpur ponds extending to crop fields



Fig. 2. AEZ 2 and 3: Active Tista and Tista Meander Floodplain, Lalmonirhat and Rangpur cluster ponds attached to homesteads



Fig. 3. AEZ 4 and 7: Korotoa Bangali Floodplain and Active Brahmaputra Floodplain Gaibandha few ponds and semi-open water bodies, char canal water irregular long ponds



Fig. 4. AEZ 10 and 11: Rajshahi Ganges Floodplains, Rajshahi shallow water new ponds in open fields



Fig. 5. AEZ 5 and 12: Pabna Atrai and Ganges Floodplain Pabna medium low and low lands



Fig. 6. AEZ 25 and 26: Barind Tract Naogaon culture ponds at different elevation of lands

The results given in the Table 1 and the illustrated Fig. 1 to 6, the practical resource analysis information show that the overall status of the ponds, water bodies as per prawn culture potentially have problems reducing the production up to 40% of the expected potential.

# Soil and land characteristic status: (percent response)

The result shows that the regions were significantly different in terms of soil texture and soil reaction.

According to the results it was told the Rajshahi ponds had more calcareous (69% response), silty clay loam soils (58% response), while the Rangpur ponds had acidic soils (62% response), having sandy loam soils (61% response). As the cultivation of prawns were reported and known to be dependent (DOF 2011; Duzgunes and Erdogan, 2008) on soil land and water characters, the ecological environment should be improved using appropriate technologies available with Department of Fisheries, Fisheries Research Institutes and other research bodies.

Table 2. Soil and land characteristic Status

Percent loam soils				
Particulars	Rajshahi zones	Rangpur zones		
Soil texture	About 58% mentioned silt & clay loam	61% reported sandy loam		
Soil reaction: pH	69% mentioned alkaline or neutral	62% reported acidic		

#### **Pond related information (Percent Response)**

The results (Table 3) show that the regions were significantly different in terms of pond area and seed stocking rate. In the Rajshahi zone 48% respondents told that the size of the pond is 2-5 acre while in the Rangpur zone 58% told it. The seed stocking rate was optimal according to 41% and 47% for Rajshahi and Rangpur Respectively.

Table 5. Fond culture information	Table 3.	Pond	culture	information
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Particulars	Rajshahi zones	Rangpur zones		
Pond area	48% mentioned 2-5 acre	58% mentioned 2-5 acre		
Seed stocking rate	41% mentioned Optimal	47% mentioned optimal		
(PL and juvenile)	30% mentioned Sub-optimal	29% mentioned Sub-optimal		

# Prawn Farms related information (Percent Response)

The results given in the Table 4 and Fig. 7 shows 55% respondents reported that 20-40% farmers discontinued or reduced their prawn culture activities and 23% respondents reported that only 10-20% farms continued their

farms. Among the main reasons lack of extension service and training was reported by 59% respondents as highest.

Division	% of Discontinued or decreased (20-40%)	% of continued or increased (10-20%)	Main reasons (Extension & training)	Input factors (Seed, availability, price)
Rajshahi: Calcareous AEZ soils	57	21	66	39
Rangpur: Acidic AEZ soils	54	25	52	53
Mean	55	23	59	46





#### Status

Fig. 7. Prawn Farms related information (Percent Response)

As per responses made on the problems and potentials of prawn culture and reported in the Table 3 and 4 and Fig. 7, it may be stated that higher scores were given for production and marketing of seeds such as post larva (PL) and Juvenile. For such reasons mean while 20-40% farmers discontinuing their farms of which 46% due to input factor i.e. seed non-availability along with its higher prices.

# CONCLUSION

It may be concluded as per the objectives and findings of the research that status of the present status of prawn culture in the northern Agro-Ecological Zones of Bangladesh is less optimal due to higher acidity of water and stocking density. More liming with appropriate methods should be done to keep the water condition favorable (pH and hardness of water) specially in the Rangpur for prawn culture. More hatcheries should be established in Govt. sector and private sector. As per status it may be found that prawn culture needs based technology development activities should be increased nearer to the ecological sub-zones and at the door steps of the fish farmers. DOF extension support should be increased to the prawn farmers. Marketing channel for quality seeds should be Develop to the culture area. Action should be taken to reduce price of prawn seed and quality feed. Existing DOF hatchery's prawn production should be increased as per present physical facilities providing skilled technicians. Local depot owner (Aratdar) should be established in local prawn cultivation supplying PL and feed on credit as a part of the development of sustainable market chain.

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