



CULTURE AND CAPTURE FISHERY OF BEEL DAKATIA, KHULNA

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Abstract: A survey on culture and capture fishery was conducted at Beel Dakatia of Khulna district. Total area of the Beel Dakatia was 28328 acres and persons were found to live around the beel is about 135,000 of which 3.97% were directly and 19.87% were indirectly involved in aquaculture. While about 0.2% people were directly and about 1% were indirectly involved in the capture fishery. The land use distribution was 52% for aquaculture, 31% for housing, 9.83% for agriculture, 2.56% for capture fishery, 0.61% as marshland and 4% for community utilities. Mainly two culture systems namely integrated culture and poly culture were followed. Of the people involved in aquaculture, 93% farmers practiced integrated culture while 7% practiced poly culture. The average production of prawn and fish in poly culture was found to be 225 and 95 kg/acre, respectively. In integrated culture yields were 198 and 83 kg/acre, respectively. In case of integrated culture, paddy and other vegetables were also produced along with prawn and fishes. Average production of paddy in integrated culture was found to be 1560 kg/acre. Net profits per acre from integrated and poly culture were 59673 and 51022 Tk, respectively. In capture fishery 41 species of fish and 3 species of prawn were harvested. Culture fishery included only 8 species of fish and one species of prawn. Three types of craft (boat, *nouka*; small boat, *donga* and raft, *vella*), five types of gear (cast net, *khapla jal*; drug net, *tana jal*; current net, *current jal*; gill net, *fash jal* and push net, *thela jal*), six types of trap (basket trap, *ghuni*; box trap, *vair*; basket trap, *chonga*, basket trap, *polo*; basket trap, *tubo* and *bitte*) and five types of hook and spear (*chip-borshi*, *borshi*, *fulkuchi*, *jhupi* and *konch*) were used in the capture fishery while only *tana jal* and *khapla jal* were used in aquaculture for harvesting fish. It was revealed that agriculture and capture fishery area is decreasing rapidly with increasing aquaculture activities. Over all livelihood status of the people in Beel Dakatia was observed improving day by day with the increase of aquaculture activities.

Key words: Capture fishery, poly culture, integrated culture, Beel Dakatia, Bangladesh.

Introduction

Beel Dakatia is the second largest beel (smallest depression in floodplain) in Bangladesh with an area of about 28328 acres. It is located in the northeastern part of Khulna district and falls within the Ganges tidal deltaic plain. It lies between longitudes 89°20'E and 89°35'E and latitudes 22°45'N and 23°00'N under the administrative boundaries of dumuria and phultala upazilas of Khulna district (Fig. 1.). The area has experienced water logging problem for more than 15 years as a result of construction of polders ignoring morphological, hydrological and tectonic conditions. Climatologically Beel Dakatia is characterized by sultry summer, moderate winter and heavy

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monsoon rainfall. Peaty clay, clayey peat and peat constitute the major part of the substrates in the area. Water logging has caused serious environmental degradation and sufferings to the people living around the beel. With increased water logging, about 55% of farming families have become fishermen. Before the construction of polders, crop production was reported to be low due to salt intrusion and monsoon flood which occurred after every two or three years. To overcome the problem, polders were constructed by the government in 1959 (Anon., 1989). Rainwater accumulated in the beel from the catchment area could not go out due to polders. As a result, the area under permanent flooding has increased remarkably since early 1980s. The prolonged flooding and continued deterioration in the quality of the stagnant water trapped in the polder have increased the sufferings of the local people (Razi and Hossain, 1992). Allowing tidal circulation by opening partially embankment was perceived as a way to improve water quality by the local people. For the group, interested in shrimp culture, it was an opportunity to promote brackish water shrimp culture. Now, water logging problem is solved by digging a new canal which connects Sandhya Khal to Shulua River. A vast area of the Beel Dakatia basin was raised above flood level after restoration of its connection with the river. As a result, the aquaculture area has been increasing gradually since 1995 and about 52% area was found to be used for aquaculture. Agriculture and socio-economic condition in the area were deteriorating during the water logging period. However, presently scenario is quite different. In this context for the development of the communities living around Beel Dakatia, it is important to assess its resource potential. Evaluation of the fishery status would be the key factor for designing the development strategy of this area, which includes assessment of fish culture system, fish diversity, fishing method and fish marketing system. In this view, an investigation was carried out to observe the present status of aquaculture and capture fishery of the Beel Dakatia.

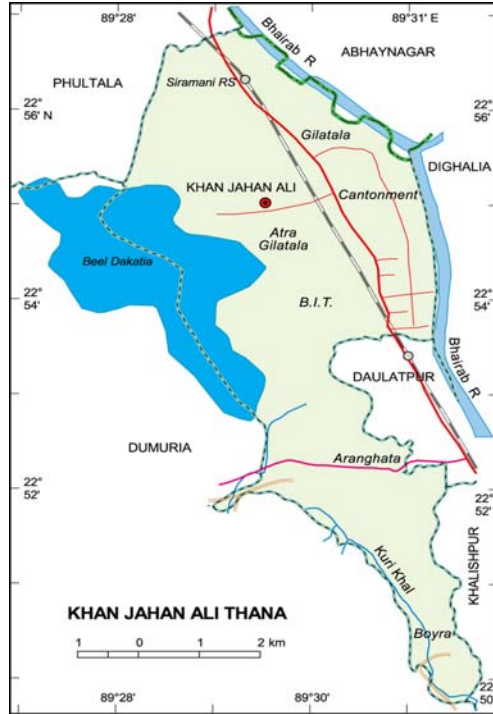


Fig. 1. The map of Beel-Dakatia

Materials and Methods

Ten villages were selected randomly from Beel Dakatia. From each village, 10 household were randomly selected as a unit. A questionnaire was developed to collect necessary information and a total of one hundred households were interviewed. Secondary information was also collected from upazila fisheries, upazila agriculture, upazila land, upazila youth development and upazila statistical and district fisheries offices.

Results

Various land uses of Bell Dakatia are have been

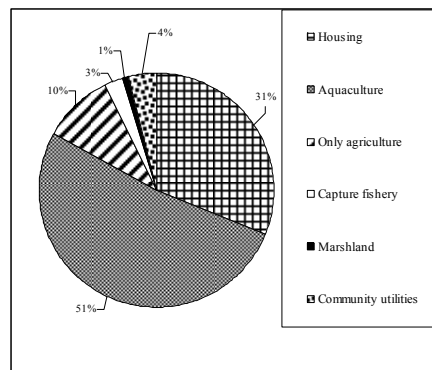


Fig. 2. Area of Beel-Dakatia reported to be used for different activities

presents in Fig. 2. Aquaculture is the most dominant land use in the area followed by housing.

Aquaculture: Aquaculture mainly included poly culture and integrated fish farming, and the latter was more common. In both the systems, farmers were found to culture prawn with different white fishes like silver carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharyngodon idellus*), common carp (*Cyprinus carpio*), Indian major carps (*Catla catla*, *Labeo rohita*, *Cirrhinus cirrhosus*, *Labeo calbasu*) and Thai puti (*Puntius goniontus*). In integrated fish culture, farmers produced paddy and vegetables with fish. It was also observed that farmers used the same land for various aquaculture and agricultural activities depending on season (Table 1.). In aquaculture management systems, Gher practice was found very common in the area of Beel Dakatia.

Table 1. Culture period of different crops in the same gher

Crop	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Golda	→			→	→	→	→	→	→	→	→	→
White fish	→					→	→	→	→	→	→	→
Rice	→	→	→	→								
Vegetable	→			→	→	→	→	→	→	→	→	→
Fruits	→	→	→	→	→	→	→	→	→	→	→	→

Gher preparation: The farmers' involvement in Gher aquaculture was found to vary from 3 to 14 years (average 5.75 years). Among the respondents, 12%, 26%, 40% and 22% farmers' gher size was found to be 0.5-0.75, 0.75-1, 1-1.5 and above 1.5 acre, respectively. Gher preparation usually includes drying, ploughing, liming, fertilizing etc. About 74% farmers were found to follow proper gher preparation practice, 22% farmers followed it partially where the rest did not follow anything (Fig. 3.).

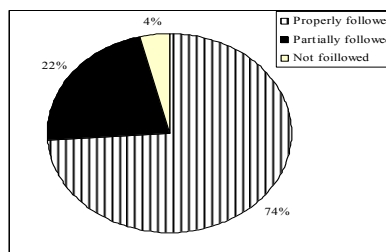


Fig. 3. Gher preparation techniques reported to be followed by the respondent farmers

About 83% farmers did not use pesticide in their ghers. About 96% of the fish farmers were found to apply lime in their ghers. The average use of lime was found 75 kg/acres and 50/ acres in poly and integrated aquaculture systems, respectively. Among the farmers, 71%, 6% and 23% were found to use only organic fertilizer, only inorganic fertilizer and both organic and inorganic fertilizer, respectively.

Source of fry and stocking density: In case of poly culture, all the farmers were found to collect prawn fry from wild sources, where as in integrated aqua culture 94.63% farmers collected prawn fry from the wild source and 5.37% collected prawn fry from both wild and hatchery. But all the farmers were reported to collect fish fry from hatchery for both the culture systems. The stocking

time and the culture period of prawn and white fish in both the systems were observed to be more or less similar (Table 2).

Table 2. Stocking period, stocking density, culture period and survival rate of prawn and white fish.

			Poly culture	Integrated culture
Stocking density (No/acre)	Prawn	Average	7000	6200
		Range	4000-10500	3500-9500
Survival rate (%)	White fish	Average	500	400
	Prawn	Average	66	62
		Range	41-79	44-77
	White fish	Average	75	71
Stocking time	Prawn		March – July	April – July
	White fish		June - August	June – August
Culture period (month)	Prawn		6 -10	6 -10
	White fish		5-8	5 - 8

Feed management, harvesting pattern and marketing system: Most of the farmers were found to use both commercial and prepared feed. Some farmers were found to prepare feed from locally available raw materials (Table. 3).

The peak harvesting period was observed to be November to December. Drug net, *Tana jal* or cast net, *khapla jal* were mainly used for gradual harvesting of prawn and sometimes gill net, *fash jal* was used for harvesting white fish. Labour involvement in harvesting was dependent on the size of the gher. After harvesting, some farmers were found to sell their products to the depot, some sold to the chatal auctioneer and the rest sold their product to the local market and money lender, *dadonder* (Fig. 3).

Table 3. Ingredients of prepared feed

Ingredients	Weight (gm)	Percentage (%)
Fine rice bran	100	10
Fish meal	200	20
Wheat bran	150	15
Wheat flour	200	20
Mustard oil cake	200	20
Snail shell powder	50	5
Molasses	100	10
Total	1000	100

The poor farmers were found to borrow money from the *dadonder* under strong conditions.

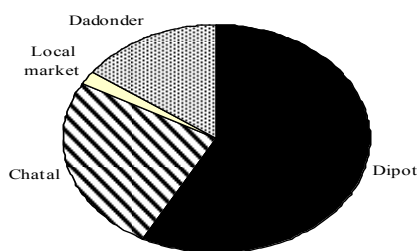


Fig. 4. Marketing system of the harvested fish

Production performance: The average production of prawn and whitefish from both poly culture and integrated aquaculture systems is presented in the Fig. 4. In late winter, about two-third of the fish and prawn were harvested and farmers cultivated paddy in the same gher and vegetables on the dikes. Average production of paddy ranged from 1200 to 1600 kg/acre.

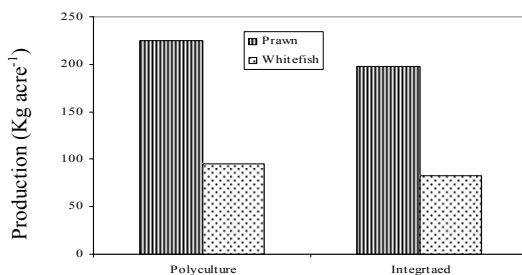


Fig. 5. Production of prawn and white fish from poly culture and integrated aquaculture systems.

Cost benefit analysis: Average fish and prawn production cost for poly and integrated culture systems are shown in the Table 4. The total income was estimated as Tk. 1,08,585 per acre from the integrated culture and Tk. 96,650 per acre from poly culture (Table 5).

Table 4. Fish and prawn production cost (per acre) for poly culture and integrated culture

Cost factors		Poly culture (Taka/acre)	Integrated culture (Taka/acre)
Farm Preparation		3867.50	3149
Fry	Prawn	22500	18600
	whitefish	400	320
Feed	Commercial feed	3000	2000
	others	3000	1500
Lease		8000	8000
Labor		960	720
Harvesting		1000	800
Transport		400	300
Others		2500	2800
Total		45627.50	38189.00

Table 5. Income from poly culture and integrated culture

	Ploy culture (Taka/acre)	Integrated culture (Taka/acre)
White fish	6650	5810
Golda	90000	79200
Paddy	-	18025
Byproduct(paddy)	-	1800
Vegetable	-	3750
Total	96650	108585

Capture fishery status and management: Table 6 and 7 shows 41 different species of fish and 3 species of prawns captured in the study area. Among these, 12 fish species were very common and the others were found seasonally. Three types of craft including *nouka*, *donga* and *vella*, 5 types of gear (*khapla jal*, *tana jal*, *current jal*, *fash jal*, *thela jal*), 6 types of trap (*ghuni*, *vair*, *chonga*, *polo*, *tubo* and *bitte*) and 5 types of hook and spear (*chip borshi*, *borshi*, *fulkuchi*, *jhupi* and *konch*) were found to be commonly used in capture fishery. Choice of gear depended on season, cost, durability and target species.

Discussion

In Beel Dakatia, the land use pattern has changed gradually in the past ten years due to the extension of aquaculture activities. It was observed that the average gher size ranged from 0.75 to 1.5 acre and average tenure of the respondents in aquaculture farming was about 5.75 years. Islam (1999) found 46.87% gher size between 0.52 and 2.1 acre, 28.12% gher below 0.52 acre, 16.62% gher about 1.03-1.56 acre and 9.37 % gher between 1.56 and 2.1 acre in Mollarhat Thana.

However, the differences in gher size observed in the study may be related to the availability of water.

Ahmed (2001) reported that 10.71% prawn farmers started gher farming in or before 1991, 15% farmers started gher farming in 1992, 24.75% in 1993, 31.75% in 1994 and the rest 17.75% in or after 1995. This historical development of gher farming in Bagerhat district is similar to the results obtained in the present study. Almost all interviewed farmers said that the prime reason for converting their agricultural land into aquaculture farm was the higher profitability in aquaculture. Most of the farmers in Beel Dakatia were found to prepare their aquaculture ponds through drying, ploughing, liming, fertilizing etc. during the dry season in the present study. The present findings agree with those of Ahmed (2001) who found that the dry season (February to April) was the peak season for gher preparation. Khanom (1999) found that gher preparation included a series of activities involving drying, repairing, ploughing, liming, manuring and watering. Islam (1999) reported that out of 12.5% gher owners did nothing during pond preparation, only manuring was done by 15.62% and both manuring and liming were done by 71.87% gher owners.

Reasons behind not using pesticides for the eradication of undesirable species in Beel Dakatia were lack of knowledge about the use of pesticide, high price and the unavailability of pesticides. These agrees with that of Khanom (1999) who observed that 6.67% of the gher owners used rotenone to remove undesirable fishes.

Most of the farmers (93%) in Beel Dakatia region found integrated aquaculture more profitable than poly culture. All of the farmers were found to stock hatchery produced fish seeds due to non-availability of wild fry while they preferred to stock wild prawn fry due to its availability. The present findings agree with those of Khanom (1999) who found that all farmers used wild prawn fry for stocking in their gher. In the poly culture the average prawn fry stocking density was 7000 PL/acre and in the integrated culture, it was 6200 PL/acre, which are comparable with the stocking rates of 8,097 PL per acre, suggested by Hoq *et al.* (1996) and 12146 PL per acre reported by Khatun (2000). The average stocking density of white fish was 500/acre in the poly culture and 400/acre in integrated culture. At Beel DFakatia, it was observed that stocking density was fully dependent upon the financial ability of the farmers.

At Beel Dakatia, 71% farmers used organic fertilizer, 6% used inorganic fertilizer and 23% used both organic and inorganic fertilizer in gher. The present findings more or less agree with those of Khanom (1999) who observed 55.56% used organic fertilizer, 11.11% used inorganic fertilizer and the rest 33.33% used both organic and inorganic fertilizer.

Higher prawn production in poly culture (225 kg/acre) than in integrated aquaculture (198kg/acre) observed in the present study is likely similar to the findings by Ahmed (2001) who reported prawn production of 184 kg/acre in Fakirhat and Mollarhat thana, 174 kg/acre in Chitalmari thana, 178 kg/acre in Bagerhat Sadar thana and 164 kg/acre in Kachua thana. The white fish production performance was also found to be higher (95 kg/acre) in poly culture than integrated aquaculture (83 kg/acre) in the present study. Total income from the integrated aquaculture per acre was 1,08,585 Tk and that from poly culture was 96,650 Tk. Net profit from integrated aquaculture was found to be 59,673 Tk, which was higher than that from poly culture (51,022 Tk). Integrated culture system was widely practiced by the farmers because of it is higher profitability which is likely associated with efficient resource uses, production of different crops and their price. The present findings agree with those of DoF (1990; 1993).

Conclusion

Beel Dakatia has tremendous potential for aquaculture and about 52% area of the beel is used for both poly and integrated aquaculture. But most of the farmers are not sound in good aquaculture practice in terms of scientific management approaches such as gher preparation, stocking density and species composition, feeding level, and health management. That is why, necessary information and specific technological knowledge need to be disseminated to the farmers so that they get the optimal outcome. An integration of local knowledge, capacity, interest, and modern ideas and techniques into sustainable resource management by the local resource users is compelled to ensure their improved livelihood patterns.

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