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FISH FARMING SYSTEM COMPONENT FOR INTEGRATION AND TRAINING IN SOUTHERN COASTAL ZONES OF BANGLADESH

M. WAHIDUZZAMAN[1*], M.G. HOSSAIN[2] AND J.M.A. HAQUE[3]

[1]District Fisheries Officer, Barisal, Bangladesh; [2]Project Director, NATP, Department of Fisheries, Matshya Bhaban, Dhaka, Bangladesh; [3]Deputy Director (Finance & Planning), Department of Fisheries, Matshya Bhaban, Dhaka, Bangladesh.

*Corresponding author & address: Md. Wahiduzzaman, E-mail: wahid_riya@yahoo.com
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ABSTRACT

Wahiduzzaman M, Hossain MG, Haque JMA (2015) Fish farming system component for integration and training in southern coastal zones of Bangladesh. *Marine Res. Aqua.* 3(1), 1-5.

A series sequential studies were conducted on the fish farming system component for integration and training in southern zones of Bangladesh. The main objectives of the studies were to identify the agri-component integrations important for the target areas, land and soil water characteristics, and to know the fisheries sub-systems affecting component interactions. The results on the physiographic land and soil characters bed utilization showed that the most of the soils were medium high to medium lowlands. The texture of the soils was silt loam to clay loam and the soil pH or reactions were slightly alkaline or slightly saline. The fish farming systems components were cultivation of fruits and vegetables along with ber fish. Social marketing of fish was the most sensitive component in the system. The soil and water pH was found to be 6.8 to 8.0 and its range was narrower in the upper range starting from Patuakhali to Barisal indicating the need for more lime dressing. It was recommended that the integration of Agriculture and fisheries as to meet the present technical problems, the depth, width and number of bers should be increased.

Key words: *information based communication technology, farming systems research, system components, digital methods of training*

INTRODUCTION

Some of the terms involved in the research are Ber or water ditches: narrow housebound drains filled with natural water. At present similar types of Ber are made house attached lands for rearing seasonal fishes and growing vegetables and small tree fruit plants. This type of system is also practiced in the East Asian countries like Malaysia, Indonesia and Philippines which is known as **SORJAN SYSTEM or BER** in local Bengali language. A vast area of agricultural land exists in the southern districts of coastal areas of Bangladesh where tidal flow of water occurs. In these areas different kinds of local vegetables and fruits like papaya, guava, banana etc. Are grown using a special indigenous technology called BER technology. In the rainy season most of the lands in the coastal areas are lying submerged up to 6 months as reported many workers (CNRS 1996; Anon. 2008). So, farmers can't grow vegetable and fruits like other parts of Bangladesh. So they undertake this ber technology. In this technology, ridge or bed is made by excavating canals or bers. Bed is made one after another where vegetable and fruits are grown and the bers are used for fish culture setting bamboo screen on the open end. Bers are usually found 10/15 meter long and 2 meter wide having 1 meter depth.

According to many workers and reports (Anon. 2008) the lateral overflow of waters from rivers or dhoba bring about changes in the physico-chemical environment that biota react by morphological, anatomical, physiological or ecological adaptations, or by change in community structure. The timing and duration of flooding are highly variable, greatly affecting growth and survival of fish when inundated, the plain contains higher concentration of habitats that provide shelter, breeding, nursery and feeding sites for a variety of fish species. Integrated agriculture helps farmer of the coastal and adjacent areas to improve their nutritional status and livelihood as well.

Very recently several fisheries specialist researchers made detail inventorial works on the fish, prawn, fisher, professional development and recommended for more understanding on the integration of the farming system's components throughout the country (Haque *et al.* 2013; Rahman *et al.* 2013a; and Rahman *et al.* 2013b).

Therefore if the farmers are provided with technical knowledge and skill they will be able to increase more productivity of integrated agriculture leading to the development of nutritional status of the southern coastal areas of Bangladesh. In the context, the present piece of research has been formulated with the following specific objectives to identify the agri-component integrations important for the target areas, land and soil water characteristics, and to know the fisheries sub-systems affecting component interactions.

METHODS AND MATERIALS

The methods and materials used in the studies are briefly presented here, which were formulated as done recommended by Wahiduzzaman *et al.* (2013) and Rashiduzzaman *et al.* (2014). The methods include direct field investigation and chemical analysis of soil and water and land grouping as per Agro-Ecological Zones (AEZ).

Sites sampling – Districts: Barisal, Jhalakati, Patuakhali, Pirojpur: 10 Upazila, 30 sites.
Respondent's Identity was recorded as Name, Upazila, District, Site, Gender, Age, Education, and Homestead size. The respondents were: Fish Farm Owner, Fish Farm Stakeholders, Promoters.

Land soil water analytical data were collected as follows:
i. Depth of water in the Ber during the dry season%
ii. Land elevation of the homestead Ber: Depth of water in cm
iii. Soil and water Reaction pH: Determined by digital methods

Pond information was collected 1. Culture period months: 2. No of Ber/ Sorjan used: 3. Connection of Ber/ 4. Size of Ber/meter (Length x width x Depth of water): 5. Species cultured: 6. Stocking density: 7. Yearly harvest: 8. Fish feed used:

Ber information were collected such as 1. Size of the Bed/ridge (Length m x width m, numbers): 2. Plants on the Bed/ridge: 3. Planting density: 4. Fruit species cultured: 5. Vegetable cultured: 6. Harvest /sq.m/year: 7. Culture period: 8. Fertilizer used:

Component parts of ber/sorjan system facing limitations:
Fish, Fruits, Vegetables, Marketing, Instill disintegration, Non-coop within family, Post- harvest and Environ barriers. i. Available homestead land is now using for ber/sorjan culture%, ii. Ber water may be used for irrigation during the dry season%.

RESULTS AND DISCUSSION

The results obtained from the studies are briefly mentioned here.

The major characteristics of the sites as studies are briefly mentioned here in the Tables 1 to 5 and in the Figs. 1 to 5.

Site land-soil- water characters

The physiographic land and soil characters studied in the research are given in the Table 1. The technological results as regards bed utilization are mentioned in the Tables 2 and 3. The results showed that the most of the soils were medium high to medium lowlands. The texture of the soils was silt loam to clay loam and the soil pH or reactions were slightly alkaline or slightly saline.

Table 1. Bed/ridge or BER utilization technological status

Parameters	Major factor	Percent adopted	Reason
No. of Bed/ridge used: numbers	2-3 numbers	71	Land shortage
Plants on the Bed/ridge	Vegetables	83	Small space
Vegetable species cultured	Fruit /vegetables	79	Family use
Culture period month	6-12 month	46	Increasing

Bed Information

The information on the Ber and the components involved in the studies are mentioned in the Tables 3 and 4. The results show that the number of beds were 2-3. For economic purpose it needs to be increased.

Land and soil and water properties

The results obtained on land elevation of the homestead Ber: Water depth in cm are mentioned in the Table 1 and Fig. 1. The results show that the mean depth of water in the BER ranged from 31 to 119 cm as a function of season, the highest depth being in the Jul Sept months and 31 cm as lowest in the January Mar months. Results as regards study site reveal that the depth was highest in Patuakhali being 74 cm, while it was found to be lowest in Barisal being 52 cm. All these were explained to be due to less active tidal flow and gradual bottom silting of the canals. The results illustrated in the Fig. 1 clearly show the trend of water depth dynamics as per both time and site. However, this sort of water depth indicated non-sustainability of the system for long run maintaining profitable productivity.

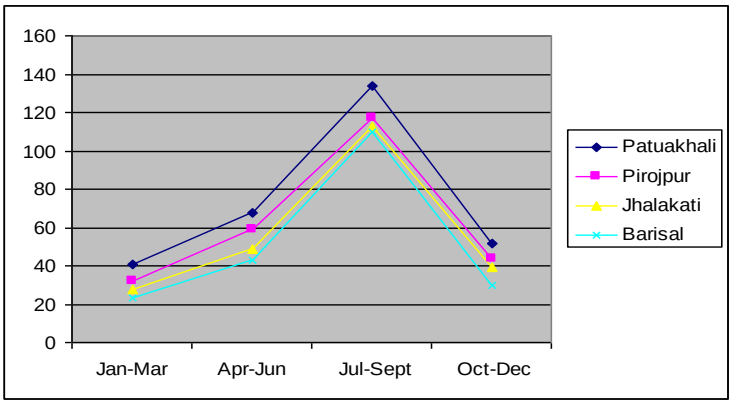

Fig. 1. Water depth in cm as per District site and season

Table 2. Land and water depth as per site and season

	Patuakhali	Pirojpur	Jhalakati	Barisal	Mean
Jan-Mar	41	32	28	23	31.00
Apr-Jun	68	59	49	43	54.75
Jul-Sept	134	117	113	110	118.50
Oct-Dec	52	44	39	30	41.25
Mean	73.75	63.00	57.25	51.50	61.38

Soil and water reaction or pH: The Determined by digital and colorimetric methods are presented in the Table 2 and 3and Figs. 2 and 3. The mean results given in Table 1 on soil reaction expressed as pH show that its range was 6.8 to 7.5. Thus the soil was found to be near neutral to slightly alkaline being highest in the Patuakhali district for Jan-March season, and being lowest in Barisal in the Jul-Sept season. According these results the soil need lime dressing initially from lower to medium doses. As the Fig. 2 show the trend, the situation may stated to be clear about soil reaction over time and geographical site. The pH of ber water reaction was determined by digital and colorimetric methods and the results are presented in the Table 3 and Fig. 3. The results showed similar trend as with pH but the mean pH values were higher by up to about 0.5 units as time and site. This was probably due to its higher redox-potential of the soil-water system.

Table 3. Soil pH of the study areas

	Patuakhali	Pirojpur	Jhalakati	Barisal
Jan-Mar	7.5	7.1	7.0	6.9
Apr-Jun	7.3	7.1	7.0	7.0
Jul-Sept	7.1	7.0	6.9	6.8
Oct-Dec	7.2	7.0	7.1	6.9

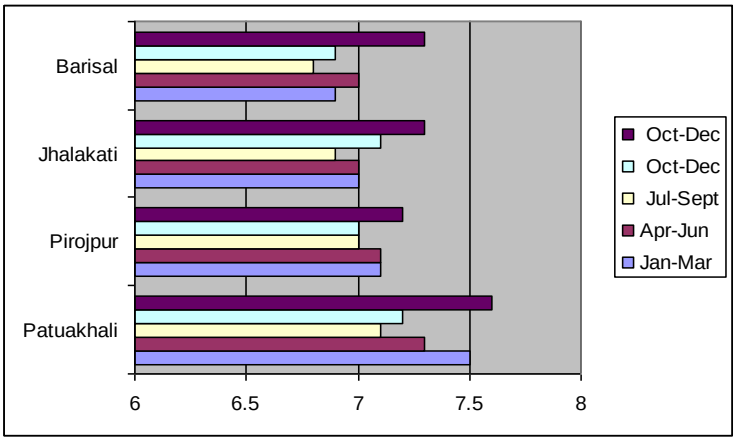

Fig. 2. Soil reaction (pH) as per season

Table 4. Water pH of the study areas as per time

	Patuakhali	Pirojpur	Jhalakati	Barisal
Jan-Mar	8.0	7.9	7.8	7.6
Apr-Jun	7.7	7.5	7.3	7.3
Jul-Sept	7.3	7.1	7.1	7.4
Oct-Dec	7.6	7.2	7.3	7.3

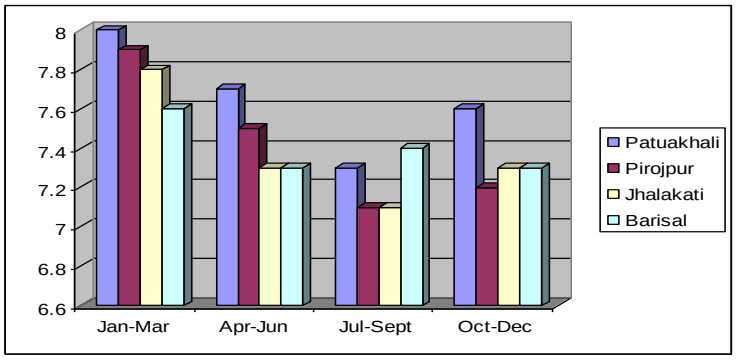

Fig. 3. Water pH of the study areas as per time

Fish Farming Systems Components

The fish farming systems components working in the areas as per persons and sectors are mentioned in the Table 4 and /Figs. 4 to 5. the results show that the main components as responded by 62 and 71 percent were the fish processing and cultivation of fruits and vegetables respectively. About 60 percent respondent told social marketing of fish was the most sensitive component in the system.

Table 5. Component parts of Ber response for limiting factors

Parameters	Fish Farm Owner	Fish Farm Stakeholders	Fish Farm Promoters	Remarks
Fisheries	36	69	45	Cat fish/ Tilapia
Fruits vegetables	52	62	51	Nutrition
Social marketing	68	54	60	Sensitive
Process and environ	71	43	41	Short term staorage

The result shows that horticulture crops are cultivated for nutrition. Fingerlings of Catfish/ Tilapia should be made available to the farmers. Marketing of the products in the local society create fame problems specially for women. Small scale group marketing may be encouraged to improve the situation. The dominant components as illustrated in Fig. 4 show that fruits and vegetables along with ber fish resulted higher score as a productive component in the study areas. However, it is clear from the results given in the 5 that most of the components were equally integrated which indicate that no single component survive alone, rather it is an interplay of 2-3 components adopted at a time in a compatible way. The present findings mostly support the previous similar recommendations done (Hossain *et al.* 2014 and Azad *et al.* 2014). However, further studies are required with more specific technical extension strategies on different gender and integration factors covering the skill on land soil and water properties as a natural resource.

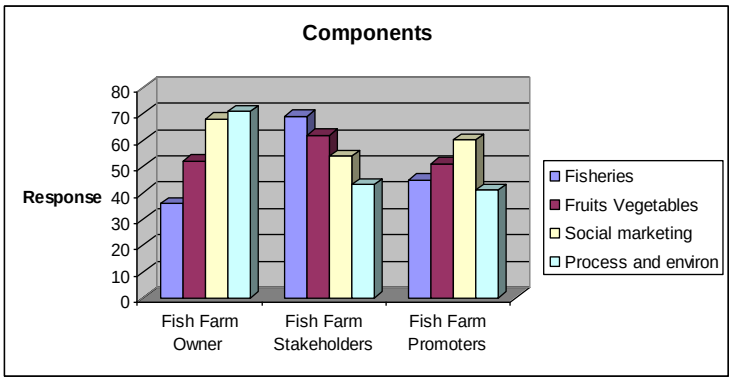

Fig. 4. Dominant Component dominance of fish farming systems as per persons

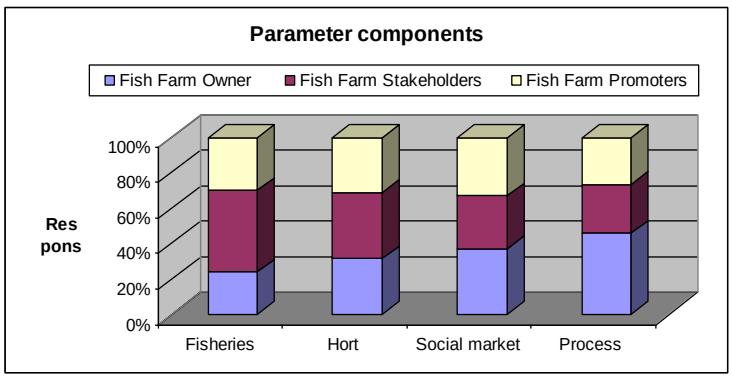

Fig. 5. Dominant Component dominance of fish farming systems as per sectors

CONCLUSION

The results obtained on the physiographic land and soil characters bed utilization showed that the most of the soils were medium high to medium lowlands. The texture of the soils was silt loam to clay loam and the soil pH or reactions were slightly alkaline or slightly saline. The fish farming systems components working in the areas as per persons and sectors show that the main components were processing and cultivation of fruits and vegetables respectively. Social marketing of fish was the most sensitive component in the system. The soil and water pH was found to be 6.9 to 8.0 and its range was narrower in the upper range starting from Patuakhali to Barisal indicating the need for more lime dressing due to shortage of land, may be allotted for them for this specific purpose of business ensuring extension promoters. It may briefly be concluded that the integration of Agriculture and fisheries department at Upazila level should be strengthened to develop integrated agricultural

productivity. Inputs should be made available to the farmers specially fish seeds by establishing hatchery and nursery at the locality. As to meet the present technical problems, the depth, width and number of bers should be increased and the Khas lands should be allotted to the farmer for bers/ bed culture. It may also be concluded as per HRD which has been prioritized by respondents that well organized need based technical training should be conducted for the fisher farmers.

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