Profitability of the Farming Systems and Contribution of Small-scale Aquaculture in Bangladesh

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INTRODUCTION

This report summarizes the results from monitoring 200 whole-farm system during 1998-99. The sample farms were drawn from among those participating in an ICLARM-sponsored aquaculture demonstration effort representing five different agro-ecological regions. The objective was to better understand how aquaculture fit into the various farming systems and to establish baseline information against which the impact of introducing improved aquaculture technologies could be measured. Income from farming activities has been portioned among land cropping, livestock, fish culture and agro-forestry. Off-farm income also has been surveyed to give an overall view of the total household income.

The study was done under the USAID-funded Research for Development of Sustainable Aquaculture Practices Project. In 1999 the project implemented an expanded aquaculture demonstration effort through cooperating NGOs in which more than 6,000 on-farm aquaculture demonstrations in ponds and rice/fish paddies were conducted around the country. The NGOs received training and financial support for their efforts including small grants for participating farmers doing the actual demonstrations. This outreach effort is continuing and further studies are in progress to further improve the methods and understanding of integrated agriculture-aquaculture farming systems.
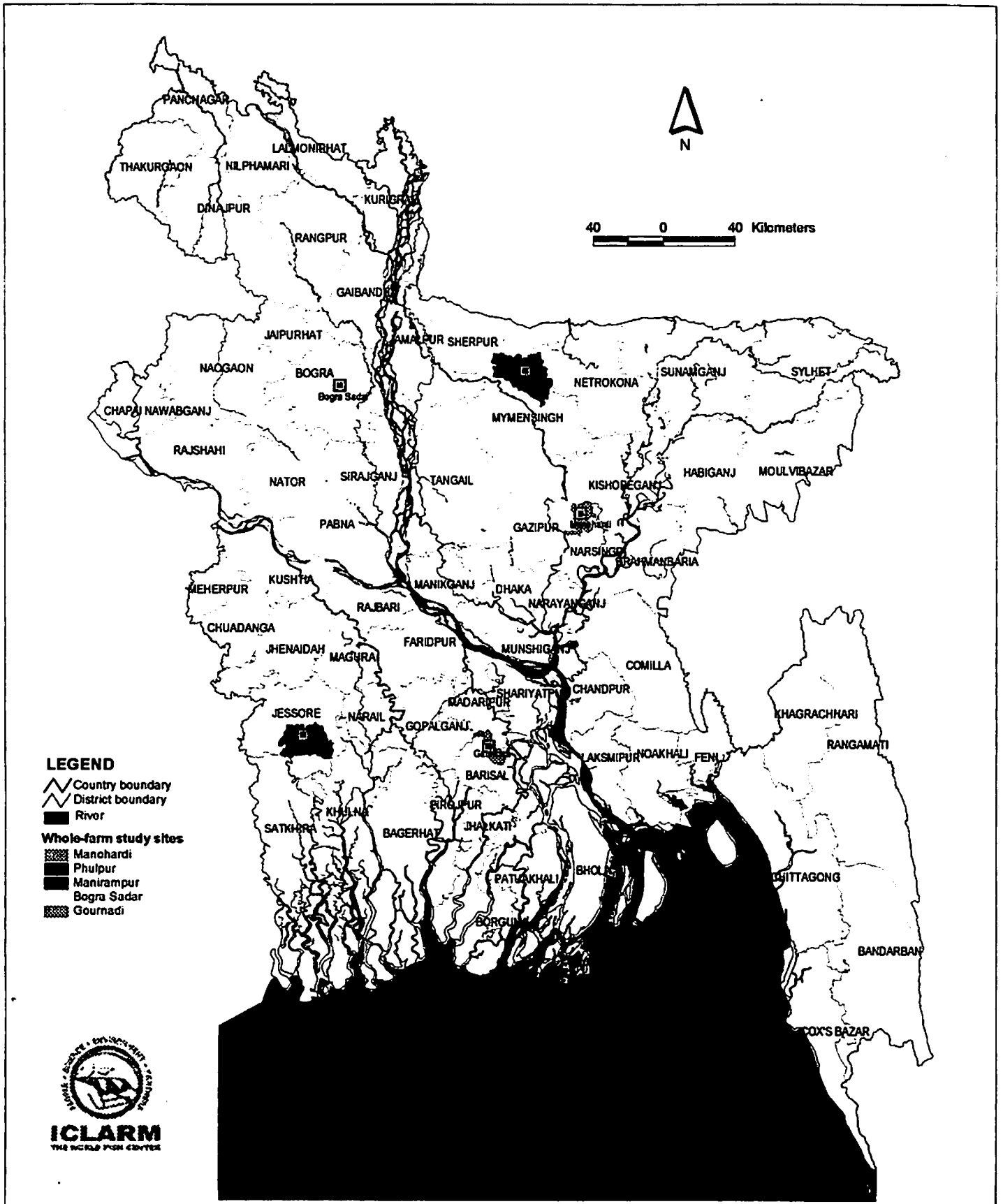
METHODOLOGY
Study sites and data

Table 1. Location and ecological characteristics of the study sites

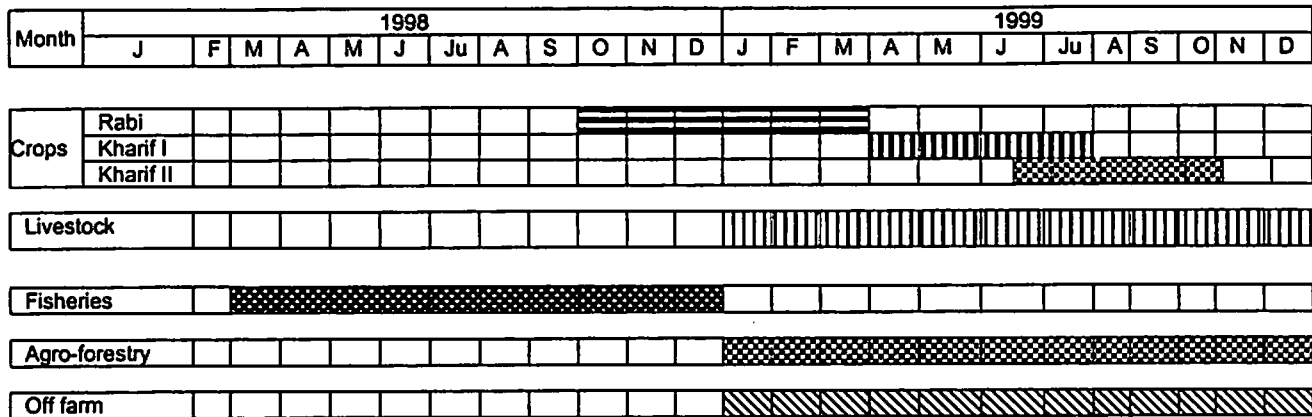| Study site	Region	District	Ecological characters	
			Annual Rainfall (mm)	Soils
Manohardi	Eastern region	Narsingdi	2391	Dark gray clay
Phulpur	Northern region	Mymensingh	2079	Dark gray clay
Manirampur	Southwest region	Jessore	1625	Calcareous clay alluvial
Gaurnadi	Southern region	Barisal	1952	Silt loam and silt clay loam
Bogra Sadar.	Northwest region	Bogra	1500	Madhupur clay

Source: FAO (1988)

Five different study sites representing different agro-ecological regions were selected from among the greater project demonstration areas (Table 1 and Figure 1). Forty households were identified in each site for monitoring their whole-farm operation. Baseline information

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Figure 1. Locations of Whole-farm Study Sites

N

40   0   40 Kilometers

PANCHAGAR

THAKURGAON   NILPHAMARI   LALMONIRHAT

DINAJPUR   KURIGRAM

RANGPUR

GAIBANDA

JAIPURHAT   JAMALPUR SHERPUR   NETROKONA   SUNAMGANJ   SYLHET

NAOGAON   BOGRA   MYMENSINGH

Bogra Sadar

CHAPAI NAWABGANJ

RAJSHAHI   HABIGANJ   MOULVIBAZAR

NATOR   SIRAJGANJ   TANGAIL   KISHOREGANJ

PABNA   GAZIPUR

NARSINGDI

BRAHMANBARIA

MEHERPUR   KUSHTIA   MANIKGANJ   DHAKA

RAJBARI   NARAYANGANJ

CHUADANGA

JHENAIDAH   FARIDPUR   MUNSHIGANJ   COMILLA

MAGURA

JESSORE   NARAIL   SHARIYATPUR   CHANDPUR

MADARIPUR   KHAGRACHHARI

GOPALGANJ   RANGAMATI

LAKSMIPUR NOAKHALI FENI

BARISAL

KHULNA   PIROJPUR

SATKHIRA   JHALKATI   BHOLA   CHITTAGONG

BAGERHAT

PATUAKHALI   BANDARBAN

BORGUNA

COX'S BAZAR

LEGEND
/\/ Country boundary
/\/ District boundary
■ River

Whole-farm study sites
▓ Manohardi
■ Phulpur
■ Manirampur
  Bogra Sadar
▓ Gournadi

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THE WORLD FISH CENTER

was collected by interview for each household and then follow-up data were collected through fortnightly visits by a field monitor recruited from the local community. Data collection period for this study is shown in Figure 2.

Figure 2. Data collection periods for farming systems

Month	1998												1999											
	J	F	M	A	M	J	Ju	A	S	O	N	D	J	F	M	A	M	J	Ju	A	S	O	N	D

Crops	Rabi
	Kharif I
	Kharif II

Livestock

Fisheries

Agro-forestry

Off farm

Analytical techniques

Gross margin or partial budget analysis was followed to determine the profitability of the farming sub-systems. Both quantitative (i.e., mean, percentage, range, ratio, etc.) and qualitative approaches were followed and a simple tabular analysis was done.

The following algebraic equation was used to determine profitability of the sub-systems:

$$\Pi = Q_f P_f - \Sigma X_i P_i$$

Π = Gross margin of the farming sub-systems (Tk/ha or Tk/household)

$Q_f P_f$ = Gross farm income of the farming sub-systems

$\Sigma X_i P_i$ = Variable costs of the farming sub-systems

Q_f = Total quantity of produced crop/livestock and poultry/fish/agroforesty

P_f = Per unit price (Tk) of crop/livestock and poultry/fish/agroforesty

X_i = Total quantities of i the input used for the farming sub-systems

P_i = Per unit price (Tk) of i the input

The whole analysis was done through the Excel program.

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RESULTS

Demographic characteristics of the households

An attempt has been taken in this section to identify the most common and important socioeconomic characteristics of the households. In this study the characteristics taken into consideration were family size, distribution of household members according to male: female, child: adult and dependency ratios and the level of education.

It can be seen from Table 2 that overall family size of the households of the five selected regions varied from 5.38 to 7.50 persons. The average family size of all the study sites was 6.30, which was higher than the national average of 5.60 persons (BBS 1997). The male: female ratios were more or less the same (1.04 to 1.26) for all the families of the selected regions. Children below 5 years of age were 8% to 19% of total family members. About 40% of the family members including male and female, were dependent members (below 18 years and above 60 years of age). This indicated that the sample households had higher number of working members, which constituted 60% of total family members.

Table 2.   Family size and distribution of household members

Site/Region	Average family size (No.)	Male : Female ratio	Child : adult ratio	Dependency ratio[1]
Manohardi-East	7.50	1.12	0.19	0.37
Phulpur-North	7.00	1.13	0.12	0.49
Manirampur-South west	5.90	1.09	0.11	0.34
Gaurnadi-South	5.70	1.04	0.12	0.39
Bogra sadar-Northwest	5.38	1.26	0.08	0.41
All	6.30	1.13	0.12	0.40

Source: Survey data (1999);
Note: [1]Dependency ratio = Dependent household members / total household members

The level of education of the sample pond operators or demo farmers is shown in Table 3. Literacy was defined in this study as the ability to sign the name of the person concerned. Only 4% of the demo farmers were illiterate. Most had some level of formal education, which was higher than the national literacy rate of 57% (BBS 2000).

Table 3.   Distribution of level of education of sample households pond operators

Region	Level of education (% of farmers)			
	Illiterate	Primary	Secondary	above secondary
Manohardi	0	23	35	32
Phulpur	3	56	26	15
Manirampur	3	21	71	5
Gaurnadi	5	55	37	3
Bogra sadar	7	68	12	13
All region	4	48	39	10

Source: Survey data (1999)

Profitability of the farming sub-systems

Crops

The cropping systems that were adopted by the sample farmers were recorded and analyzed in this section. The homestead production systems such as vegetables grown in the backyard, gourd and bean grown on the roof were not included in the analysis.

Uses of the land Resources

Farmers of the study sites employed 74% of their total land for field crop production (Table 4). It implied that share of land resources to crop farming was the highest. The farmers allotted highest proportion of land for crop farming at Manohardi and Phulpur, while relatively less proportion (60% and above) of land was allotted for crop farming at Gaurnadi of Barisal.

Table 4. Land use of the study households 1998-99

Site	Crop Land (ha)	Homestead (ha)	Fish Culture (ha)	Average Farm Size (ha)
Manohardi	1.30 (86) [1]	0.09 (6)	0.114 (8)	1.50
Phulpur	1.06 (84)	0.14 (10)	0.198 (14)	1.40
Manirampur	0.84 (65)	0.11 (9)	0.333 (26)	1.28
Gaurnadi	0.34 (60)	0.09 (15)	0.159 (27)	0.59
Bogra sadar	0.9 (76)	0.05 (5)	0.072 (7)	1.02
All	0.888 (74)	0.096 (8)	0.175 (15)	1.16

Source: Survey data (1999) Note: [1] parentheses indicate the percentage share of land to total land for different activities

Crop diversification

In the study sites crop diversity was found highest in rabi (winter) season than the other two crop seasons (Table 5). In Kharif I and II (early summer and summer), mostly rice crop was grown in the study sites. Diversity of rabi crops was found higher in Manohardi and Phulpur sites compared to other study sites. The land elevation type was "higher" or "medium high" at Manohardi and Phulpur. A good communication network exists with Dhaka city that is a major market for agricultural goods with Phulpur and Manohardi. These factors influenced the farmers to grow more crops at Phulpur and Manohardi. On the other hand, minimum crop diversity was observed at Manirampur, while no diversity was found at Gaurnadi. The

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opportunity for crop diversification at these two sites was limited because of the environmental and ecological conditions, and socio-economic factors of the farmers. The village Kaminidanga of Manirampur was located almost in the center of beels (wet lands). Most of the time that area was inundated by water. Farmers living there depend mostly on aquatic animals such as fish and rice-fish farming for their livelihood rather than other crop farming. The crop fields of Gaurnadi also remained under water for more than 6 months. A communication system along with high and low tides caused low crop intensity at Gaurnadi. The detail of crops grown in the study sites is shown in Table 5.

Table 5. Summary of crops grown in different seasons by the sample households

Cropping season	Crops grown in study regions				
	Manohardi	Phulpur	Manirampur	Gaurnadi	Bogra sadar
Rabi (winter)	Rice Potato Wheat Banana Chili Radish Garlic Bringjal Sweet potato	Rice Potato Wheat Mustard Cabbage Chilli Bringal	Rice	Rice Potato Okra	Potato Wheat Mastard Cabbage Banana Sugarcane
Kharif 1 (early summer)	Rice	Rice Bringal	Rice	Rice	Taro Rice
Kharif 2 (summer)	Rice Jute	Rice	Rice	Rice Jute	Rice Jute

Source: Survey data (1999)

On average farmers of all the study sites used 61% of their available land for farming (Table 6). The land utilization index [1] showed that the farmers of Kaminidanga (Manirampur) used 89% of land in 1998-99 for cropping, which was the highest land use index compared to other study sites. These farmers adopted rice-fish farming (polyculture of carps with prawn) technology. This cultural practice occupied almost 10 months of the year that increased the land use index of Kaminidanga. The details of the land use pattern of crops are shown in Annexes 2-6.

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[1] The land utilization index is determined by number of days the particular land is occupied divided by 365 days. The index shown in this text shows only number of plots occupied for crop farming divided by total plots multiplied by 100.

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Table 6.   Percent of land used for cropping systems

Site	Season			All season
	Winter/rabi	Early summer/ Kharif I	Summer/ kharif II	
Manohardi	52	88	6	49
Phulpur	99	76	22	66
Manirampur	100	70	97	89
Gaurnadi	86	42	7	45
Bogra sadar	24	90	61	58
All	72	73	38	61

Source: Survey data (1999)

Economics of crop sub-system

The gross annual farm income from crop subsystems varied from Tk. 3,646 to Tk. 12,070 with an average income of Tk. 7,416 (Table 7). The farmers of Gaurnadi highest gross margin per hectare from crop farming, while farmers of Manohardi made the lowest. Although, average farm size and land use index of Bogra was smaller compared to Manohardi, Phulpur and Manirampur, the total income and gross margin from crops was highest. Intensive and integrated farming of different crops such as potato and mustard, higher value of crops because the site was close to urban markets were identified as the major reason for high income of Bogra farmers.

The total variable costs included fertilizers, human labor (own or hired), animal labor, power tiller, irrigation and pesticides. On average, farmers spent Tk. 4,021 for crop farming. The highest cost of production was human labor (Tk. 1,942) that included imputed value of family and nominal price of hired labor. The human labor constituted 48% of the total variable cost of crop production. The other costs were fertilizers and irrigation (15-19%) costs. The detail costs of different production inputs are shown in Annex 7-12.

Table 7.   Economic analysis of crop sub-system of the study households

| Variable | Region (Taka/household) | | | | | All |
	Manohardi	Phulpur	Manirampur	Gaumadi	Bogra sadar	
Gross farm income	3,961	9,280	3,646	8,123	12,070	7,416
Total Variable cost	2,083	5,323	1,370	4,259	7,071	4,021
Fertilizer	347	728	201	702	1,847	765
Human labor	1,226	2,420	764	2,306	2,992	1,942
Animal labor	184	98	124	104	429	188
Power tiller	94	939	0.58	416	476	385
Irrigation	158	1,046	274	517	1,021	603
Pesticide	74	92	6	214	306	138
Gross margin Tk/household)	1,878	3,957	2,276	3,864	4,999	3,395
Gross margin (Tk/ha)	1,445	3,733	2,713	11,365	5,554	4,962

Source: Survey data (1999)

Livestock Sub-system
Livestock inventory

The sample households, on average owned two bullocks or cows that was higher than the national average of 1.25 bullocks or cows per household (BBS 2000). The number of ducks and chickens owned by the households also was higher than the national average of 7.1. The cooperator farmers were the beneficiaries of the partner NGOs. The beneficiaries of NGOs mostly represent the small or marginal farmers of the community. The micro credit program of the NGOs enhanced the livelihoods of these farmers through livestock and poultry programs that may account for these numbers.

Table 8.   Distribution of livestock population in the study households

| Site | Average number of livestock/household | | | |
	Cow/bullock	Goat	Duck	Chicken
Manohardi	2	1	4	12
Phulpur	2	1	17	19
Manirampur	2	1	6	8
Gaumadi	1	0	4	4
Bogra sadar	2	1	2	12
All	2	1	7	11

Source: Survey data (1999)

Annual dung production and use

The average annual supply of dung was 3,882 kilograms and varied from 2 to 7 thousands kilograms (Table 9). This implied that about 10.6 kg of dung per day was available for

different uses. The farmers of Manirampur collected the higher quantity of dung although livestock population was similar to other regions.

Table 9.　Distribution of annual dung supply and its use

| Site | Annual dung supply (kg/household) | % of dung use | | | |
		crop	vegetables	fish culture	fuel
Manohardi	3,282	56	-	21	23
Phulpur	3,424	66	4	25	5
Manirampur	7,214	7	3	6	84
Gaurnadi	1,815	28	10	28	34
Bogra sadar	3,676	46	4	27	23
All	3,882	40	4	21	33

Source: Survey data (1999)

Table 9 shows that the farmers used 21% of available dung for fish culture. Farmers used most of the dung in crop farming (41%). The farmers of Manirampur used dung mostly for fuel. The farmers of Phulpur used dung mostly for farming.

Farmer's perception

Table 10.　Farmer's perception of annual dung supply and its use

| Region | Level of farmers perception (%) | | | |
	Very inadequate	inadequate satisfies partially	Sufficient/close to needs	sufficient/ abundant
Manohardi (n=25)	20	68	12	-
Phulpur (n=39)	23	62	15	-
Manirampur (n=40)	35	23	28	14
Gaurnadi (n=40)	35	5	60	-
Bogra sadar (n=39)	33	31	28	8
All region	29.2	37.8	28.6	4.6

Source: Survey data (1999)

Farmers' perception of the adequacy of their supply of available dung is given in Table 10. About two-thirds of the farmers reported that the supply was inadequate.

Perception of dung use for fish culture

Four levels of measurement were adopted for measuring farmers' perception of dung use in fish culture (Table 11). Their perceptions were improved through training received from the project and by the frequent visits of the field staff. About one-third (32%) of sample farmers realized that quantity of dung that was used for fish culture was less than required. It implied that more quantity of dung would give better fish growth for these farmers. Forty-five percent of sample farmers felt that they applied sufficient quantity of dung for fish culture

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Table 11. Farmer's perception of dung use in fish culture practices

Region	Level of perception of dung use in fish culture (%)			
	Use less than required	Use close to required	Used as required	Used more than required
Manohardi (n=25)	8	40	48	4
Phulpur (n=39)	41	44	13	2
Manirampur (n=40)	42	13	40	5
Gaurnadi (n=40)	35	5	60	-
Bogra (n=39)	21	8	67	5
All	32	20	45	3

Source: Survey data (1999)

Economics of livestock sub-system

Table 12. Economics of livestock sub-system of the study households

Variable	Study site (Taka/household)					ALL
	Manohardi	Phulpur	Manirampur	Gaurnadi	Bogra	
Gross income from livestock	**1346**	**2289**	**5642**	**4121**	**2850**	**3250**
Income from Milk	275	1368	2159	3325	1960	1817
Income for Egg	181	564	1806	444	219	643
Income from dung	890	358	1677	351	671	789
Total cash cost	**1940**	**3018**	**981**	**1559**	**203**	**1540**
Wheat bran	670	621	320	727	0	468
Oil cake	468	417	161	698	139	377
Rice bran	633	90	213	0	0	187
Treatment	170	81	288	135	64	147
Hired labor	0	1809	0	0	0	362
Total non cash cost	**3528**	**6136**	**8032**	**5190**	**2632**	**5103**
Straw	1490	750	3479	1956	263	1588
Grass	702	316	1493	325	218	611
Family labor	1336	5070	3060	2909	2151	2905
Total cost	**5468**	**9154**	**9013**	**6749**	**2835**	**6643**
Gross margin	**-594**	**-729**	**4661**	**2562**	**2647**	**1709**

Source: Survey data (1999)

The sources of income from livestock and poultry were selling milk, egg and dung. Table 12 showed that the annual gross income from livestock was Tk 3,250 and the gross margin were Tk 1,709 per household. The farmers of Manirampur (southwest) and Gaurnadi (Barisal) earned higher gross income from the livestock. The major contributor of income from livestock was selling milk. Although, livestock population of Manohardi and Phulpur were almost similar to other sites, the total cost was found higher than the revenue earned.

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The annual costs of livestock production and management system varied from almost Tk. 2,835 to Tk. 9,154 and the average annual costs for all the study sites was Tk 6,643 (Table 12). This implied that each month, farmers spent about Tk. 500 for livestock production and management.

Fish farming sub-System

Ownership of fisheries resources

On an average, 43% of sample farmers own more than one pond or rice-fish plot and allotted 0.175 ha of land for fisheries (Table 13). A large number of farmers owned more than one pond or rice-fish plot at Gaurnadi and Manirampur. On the other hand, 94% of farmers in Bogra owned only one pond.

Table 13.   Distribution of ponds/rice fish plots of sample farmers

Site	Land allotted for fisheries (ha)	No. of fishpond or rice-fish plot/household			Total
		One	Two-Three	More than three	
Manohardi	0.114	35	4	-	39
Phulpur	0.198	10	11	8	29
Manirampur	0.333	18	18	4	40
Gaurnadi	0.159	9	30	-	39
Bogra	0.072	31	2	-	33
All	0.175	20.6	13	2.4	36
percent		(57)	(36)	(7)	(100)

Source: Survey data (1999)

Type of technology

The RDSAP introduced nine aquaculture technologies for pond fisheries and rice-fish farming in 1999. The sample farmers adopted a variety of fish culture systems as shown below:

Region	Technology
Manohardi	• Polyculture of carps in seasonal pond • Polyculture of carps in perennial pond
Phulpur	• Rice-fish (food fish) • Rice-fish (fry to fingerlings) • Taro-fish
Manirampur	• Rice-fish (polyculture of carps in perennial pond)
Gaurnadi	• Polyculture of carps in seasonal pond • Polyculture of carps in perennial pond
Bogra	• Polyculture of carps in seasonal pond • Polyculture of carps in perennial pond

Economic of fish farming system

Table 14 showed that each farmer spent Tk 7,350 for fish culture in 1998-99. The farmers of Kaminidanga spent the highest amount for fish culture (Tk 18,475). This was very likely

because of the nature of fisheries technology adopted by the farmers in Manirampur. Farmers in Manirampur adopted polyculture of carps with prawns in rice fields that required more investment compared to others. The farmers of Bogra sadar spent the lowest cost for fisheries production (Tk 1,676).

Table 14.   Distribution of cost of production of fisheries sub-system of five regions 1998-99

Site	Production cost/household (Tk)			Total
	Pre-stocking	Stocking	Post stocking	
Manohardi	641	1094	2150	3885
Phulpur	566	2192	1947	4795
Manirampur	2894	7428	8153	18475
Gaurnadi	1337	3243	3427	8007
Bogra sadar	270	778	628	1676
All	1142	2947	3261	7350
Percent	(16)	(40)	(44)	-

Source: Survey data (1999)

The share of cost in the production systems suggests that stocking and post stocking management constituted 84% of the total cost while only 16% was for pre-stocking (Table 14). The stocking cost ranged between 30 to 46% of the total cost of production. Because the beneficiaries belong to the small and marginal farmers, strategies should be developed for minimizing cost of stocking in fish farming system. Furthermore, 47% of the total cost constituted the cash cost while the majority of other costs (53%) was non-cash cost. The non-cash costs were family labor, by-products of the other sub-systems such as dung, rice bran, etc. Share of non-cash cost of fisheries sub-systems might be increased if the interaction between sub-systems would have been improved.

Gross margin and profitability

The sample farmers of Manirampur and Phulpur gained the highest benefits from fisheries. The farmers of these two sites adopted a rice-fish farming system. The income of the technology was found higher compare to pond fish farming.

Based on the total cost, sample farmers earned Tk 5,802 from fisheries in 1998-99 (Table 15). However, on cash cost basis, farmers earned Tk. 9,687 from fisheries. The return to every taka invested for fish culture system was found to be Tk 0.98 (total cost basis). This suggested that fish farming was profitable in the study sites.

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Table 15.   Economic efficiency of traditional fishes farming in four regions

Site	Gross margin (Tk/household)	Benefit cost ratio	Gross margin (Tk/ha)
Manohardi	3,421	0.88	30,070
Phulpur	7,720	1.61	38,995
Manirampur	16,931	0.92	50,817
Gaurnadi	-2023	-0.25	-
Bogra	2,959	1.76	41,060
All	5,802	0.98	33,097

Source: Survey data (1999)

Agro-forestry sub-system

Agro-forestry includes trees located in the homestead areas, pond dykes and crop fields. Trees provide traditional medicines as well as basic food commodities, including a variety of proteins, fruits and drinks, which are of nutritional importance for a large number of people, especially in rural areas. Agro-forestry is also a major source of wood and non-wood products, which provide significant household income and appear to be important for local economies. The annual income and expenditure of the agora-forestry sub system of the study households were included in this section.

Gross margin of agro-forestry sub-system

Farmers of the study sites spent about Tk. 540 for the agro-forestry sub-system (Table 16). Half of the total cost incurred for the production and management of the agro-forestry sub-system was non-cash. The annual gross margin was Tk 1981 that was the lowest income compared to the other sub-systems.

Table 16.   Gross margin agro-forestry sub-system of the households, 1998-99

Variable	Gross margin (Taka/household)					All
	Manohardi	Phulpur	Manirampur	Gaurnadi	Bogra	
Gross income	1566	2957	2429	2678	2873	2501
Total variable Costs	409	753	441	353	743	540
Own labor	155	332	167	320	104	215
Hired labor	181	246	272	13	65	155
Fertilizer/dung	74	175	2	20	575	169
Gross margin	1157	2204	1988	2325	2130	1961

Source: Survey data (1999)

The relationship and interactions between agro-forestry and fisheries sub-system were indirect such as leaves and residues generated from agro-forestry system were used as composts, which were used for manuring ponds or rice-fish plots. The tree branches were

used for traditional fishing in open water bodies. However, none mentioned that they sold trees to buy fry and fingerlings for fishpond farming.

Nature and extent of off-farm employment

Sixty-three percent of the farm households in Bangladesh were classified as either small farm and/or absolute landless and owns up to 0.5 acre of land (BBS, 2000). The low farm income and unemployment problems increased the participation of farm households members to off-farm employment's[1]. This part of the report describes nature of off-farm employment of 200 households monitored in 1998-99 in five regions. The households were beneficiaries of the partner NGOs and categorized, as were small, marginal and landless farmers. It was assumed that the total income of the farm households would be largely influenced by the off-farm employment.

Off-farm employment

Over three-fourth (78%) of the total sample households was engaged in some nature of off-farm employment. Almost all the sample households of Barisal, Jessore, and Bogra were engaged in off-farm employment, while about half of the total households were employed in off-farm activities in Manohardi and Phulpur (Table 17).

Table 17. Percent of household engaged in off-farm employment

Region	Total households	Households off-farm employment (No.)	% of household in off-farm employment
Manohardi	40	18	45
Phulpur	39	20	51
Manirampur	40	40	100
Gaurnadi	40	40	100
Bogra	39	37	95
All	40	31	78

Source: Survey data (1999)

Type of off-farm employment

The type of off-farm employment of the sample households was shown in Table 18. The petty business and services in all the sites were the most common off-farm employment. More than 50% members of the household adult members were involved in some nature of petty business such as rice trading, shop keeping, etc. One-forth were involved in either private or public services.

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[1] Off-farm employment refers in this report as to any gainful employment sought by the family labour of the household farm, and includes both agricultural (working as wage labor to other farm) and non-agricultural nature of work

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Table 18.   Type of off-farm employment of the sample households

Region	Type of off-farm employment	% within the region
Manohardi	Service Petty business Wage labor	67 28 5
Phulpur	Petty business Service Petty business & service Wage labor	45 45 5 5
Manirampur	Petty business Service	75 25
Gaurnadi	Petty business	100
Bogra sadar	Petty business Service Petty business & service Wage labor	38 27 32 3

Source: Survey data (1999)

Off-farm income

The average off-farm annual income of the sample household was Tk 26,053, which was higher than income received from other sub-systems of the study households. The farmers of Manirampur earned lowest off-farm income (Tk. 14,518) while farmers of other than Manirampur annually earned Tk. 27, 469 to Tk. 29,754.The seasonality of off-farm income distribution is shown in Table 19.

Table 19.   Monthly average off-farm income of the study households

(Taka/households)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total annual
Manohardi	2089	2283	2125	2322	2389	2322	2350	2381	2303	2419	2222	2264	27469
Phulpur	2251	2341	2471	2538	2886	2881	3166	2746	1908	1886	1916	1816	28801
Manirampur	971	1604	976	1206	1546	1316	1309	1386	1154	1016	1016	1016	14518
Gaurnadi	2430	2564	2710	2478	2368	2393	2315	2458	2563	2488	2526	2463	29754
Bogra	2512	2509	2515	2536	2534	2534	2523	2542	2366	2366	2366	2420	29724
All	2051	2260	2159	2216	2344	2289	2523	2281	2059	2035	2009	1996	26053

Source: Survey data (1999)

Conclusions

The profitability of different components of the farming systems in different agro-ecological zones is described in this study. Table 20 showed that the farmers received profit from all the subsystems and the income from off-farm was the highest (50% of total household income). Among other farming sub-systems, the farmers earned the highest return from the fisheries sub-systems, which was 25% of total households' income.

Table 20. Summary of gross income from farm households in five locations

(Taka/households)

Site	Crops	Fisheries	Livestock	Off-farm	Agro-forestry	Total
Manohardi	3961	7307	1346	27469	1566	41649
Phulpur	9280	12515	2289	28801	2957	55842
Manirampur	3646	35408	5642	14518	2429	61642
Gaurnadi	8123	5984	4121	29754	2678	50660
Bogra Sadar	12070	4634	2850	29724	2873	52152
All Sites	7416	13170	3250	26053	2501	52389
(%)	(14)	(25)	(6)	(50)	(5)	(100)

Source: Survey data (1999)

Table 21 showed that the farmers also incurred higher average gross margin from the fisheries sub-system. The negative gross margin of fisheries subsystem from one of the study site, Gaurnadi was due to the natural calamities. The rice-fish plots were flooded in 1999-2000 that resulted poor harvest at Gaurnadi. Although, the average gross margin of livestock was positive, farmers incurred loss from rearing livestock animals at Manohardi and Phulpur.

Table 21. Summary of gross margin from farm households in five locations

Site	Crop	Livestock	Fisheries	Agro-forestry
Manohardi	1878	-594	3421	1157
Phulpur	3957	-729	7720	2204
Manirampur	2276	4661	16931	1988
Gaurnadi	3864	2562	-2023	2325
Bogra sadar	4999	2647	2959	2130
Average	3395	1709	5802	1961

Source: Survey data (1999)

Based on the above findings it can be recommended that aquaculture might be considered by policy makers as an important sub-sector within the broad agricultural sector. It can contribute substantially to the national food program, if appropriate technology is provided. The higher emphasis needs to be given on the interactions of the farming sub-systems. In other words, farmers need to demonstrate the usefulness of the by-products of other sub-systems such as dung or compost, rice bran, Azolla for maximizing fish production.

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Acknowledgements

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Annex 1.   Total monthly rainfall (mm) in 1999

| Month | Total monthly rainfall(mm) in 1999 | | | | All |
	Phulpur	Manirampur	Bogra sadar	Gaurnadi	
January	0.00	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00	0.00
March	0.00	0.00	0.00	0.00	0.00
April	85.70	9.60	12.00	9.00	29.08
May	420.50	183.30	261.00	245.20	277.50
June	457.20	207.00	283.00	141.00	272.05
July	714.40	481.50	346.00	458.00	499.98
August	685.90	349.3	399.00	277.00	427.80
September	207.20	311.30	116.00	245.00	219.88
October	77.00	135.40	137.00	363.00	178.10
November	183.20	0.00	17.00	22.00	55.55
December	0.00	0.00	0.00	0.00	0.00
Annual (mm)	2831.10	1677.40	1571.00	1760.20	1959.93
Monthly average	235.93	139.78	130.92	146.68	163.33

Annex 2. Total monthly rainfall(mm) in 1998

| Month | Total monthly rainfall(mm) in 1998 | | | | All sites |
	Phulpur	Manirampur	Bogra sadar	Gaurnadi	
July	507.20	209.50	750.00	554.00	505.18
August	488.70	210.90	556.00	280.00	383.90
September	308.70	202.30	285.00	205.00	250.25
October	214.50	89.10	353.00	121.00	194.40
November	53.50	130.20	10.00	141.00	83.68
December	0.00	0.00	0	0	0.00
Annual (mm)	1572.60	842.00	1954.00	1301.00	1417.40
Monthly average	131.05	70.17	162.83	108.42	118.12

Annex 3. Type of crops grown in different cropping seasons at Manohardi,
         Upazilla of Narsingdi

Cropping season	Name of crop	No. of plot	% of total plots
Rabi *(winter)*	Fallow	221	47.52
	Rice	192	41.28
	Potato	3	0.65
	Wheat	3	0.65
	Banana	34	7.31
	Chili	3	0.65
	Radish	3	0.65
	Garlic	2	0.43
	Bringjal	1	0.22
	Sweet potato	3	0.65
	Sub-total	*465*	*100*
Kharif 1 *(early summer)*	Fallow	51	11.94
	Rice	376	88.06
	Sub-total	*427*	*100*
Kharif 2 *(summer)*	Fallow	388	93.95
	Rice	12	2.90
	Jute	13	3.15
	Sub-total	*413*	*100*

Source: Survey data (1999)

Annex 4. Type of crops grown in different cropping seasons Bogra Sadar thana
         of Bogra

Cropping season	Name of crop	No. of plot	% of total plots
Rabi *(winter)*	Fallow	256	75.74
	Potato	69	20.41
	Wheat	2	0.59
	Mastard	3	0.89
	Cabbage	3	0.89
	Banana	4	1.18
	Sugar cane	1	0.30
	Sub-total	*338*	*100*
Kharif 1 *(early summar)*	Fallow	36	10.25
	Taro	50	14.25
	Rice	265	75.50
	Sub-total	*351*	*100*
Kharif 2 *(summar)*	Fallow	135	39.02
	Rice	207	59.82
	Jute	4	1.16
	Sub-total	*346*	*100*

Source: Survey data (1999)

Annex 5.   Type of crops grown in different cropping seasons Gaurnadi
thana of Barisal

Cropping season	Name of crop	No. of plot	% of total plots
Rabi *(winter)*	Fallow	8	13.56
	Rice	48	81.36
	Potato	2	3.39
	Okra	1	1.69
	Sub-total	*59*	*100*
Kharif 1 *(early summar)*	Fallow	36	58.06
	Rice	26	41.94
	Sub-total	*62*	*100*
Kharif 2 *(summar)*	Fallow	55	93.22
	Rice	3	5.08
	Jute	1	1.70
	Sub-total	*59*	*100*

Source: Survey data (1999)

Annex 6.   Type of crops grown in different cropping seasons Phulpur Upazilla of
Mymensingh

Cropping season	Name of crop	No. of plot	% of total plots
Rabi *(winter)*	Fallow	4	1.04
	Rice	282	73.05
	Potato	24	6.22
	Wheat	2	0.52
	Mustard	52	13.46
	Cabbage	2	0.52
	Chilli	16	4.15
	Bringal	4	1.04
	Sub-total	*386*	*100*
Kharif 1 *(early summar)*	Fallow	92	24.15
	Rice	285	74.80
	Bringal	4	1.05
	Sub-total	*381*	*100*
Kharif 2 *(summar)*	Fallow	293	78.34
	Rice	81	21.66
	Sub-total	*374*	*100*

Source: Survey data (1999)

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Annex 7. Type of crops grown in different cropping seasons Manirampur thana of Jessore

Cropping season	Name of crop	No. of plot	% of total plots
Rabi *(winter)*	Fallow	1	0.39
	Rice	257	99.61
	Sub-total	*258*	*100*
Kharif 1 *(early summar)*	Fallow	77	30
	Rice	181	70
	Sub-total	*258*	*100*
Kharif 2 *(summar)*	Fallow	8	3
	Rice	250	97
	Sub-total	*258*	*100*

Source: Survey data (1999)

Annex 8. Economic analysis of crop sub-system of the study households, 1998-99

Variable	Study site (Taka/household)				
	Manohardi	Phulpur	Manirampur	Gaurnadi	Bogra
Gross farm income	3961	9280	3646	8123	12070
Total Variable cost	3291	4810	1429	4819	7248
Fertilizer cost	347	728	201	702	1847
Urea	193	341	81	255	289
Phosphate	135	318	97	302	434
Potash	13	59	17	91	326
Cowdung/compost	5	8	6	54	446
Others	1	2	0.41	0	352
Human labor cost	1226	2992	2306	2420	764
Seed sowing/transplanting	221	561	195	300	627
Fertilizer use	52	25	13	93	244
Weeding	251	430	137	680	653
Irrigation	84	215	18	233	0
Pest control	21	4	0.23	58	58
Harvesting	338	880	282	697	1092
Others	259	305	119	245	318
Animal labor cost	184	98	124	104	429
Own animal labor	109	90	19	0	189
Hired animal labor	75	8	105	104	240
Power tiller cost	94	939	0.58	416	476
Own power tiller	0	0	0.39	0	171
Hired power tiller	94	393	0.19	416	304
Irrigation cost	158	1046	274	517	1021
Pesticide cost	74	92	6	214	306
Gross margin	1878	3957	2276	3864	4999

Source: Survey data (1999)

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Annex 9.   Economic analysis of crop sub-system of the study households, at Manohardi

Variable	Manohardi (Taka/household)		
	Maximum	Minimum	Mean
Gross farm income	15600	80	3961
Total Variable cost	8930	0	2083
Fertilizer cost	1600	0	347
Urea	1500	0	193
Phosphate	1000	0	135
Potash	100	0	13
Cowdung/compost	300	0	5
Others	40	0	1
Human labor cost	6575	0	1226
Seed sowing/transplanting	800	0	221
Fertilizer use	340	0	52
Weeding	1000	0	251
Irrigation	500	0	84
Pest control	135	0	21
Harvesting	4200	0	338
Others	900	30	259
Animal labor cost	700	10	184
Own animal labor	700	0	109
Hired animal labor	420	0	75
Power tiller cost	900	0	94
Own power tiller	0	0	0
Hired power tiller	900	0	94
Irrigation cost	1500	0	158
Pesticide cost	400	0	74
Gross margin	11095	-4325	1878

Source: Survey data (1999)

Annex 10. Economic analysis of crop sub-system of the study households of Phulpur thana at Mymensingh

Variable	Phulpur (Taka/household)		
	Maximum	Minimum	Mean
Gross farm income	85400	300	9280
Total Variable cost	37430	319	5323
Fertilizer cost	7000	0	728
Urea	3000	0	341
Phosphate	3500	0	318
Potash	900	0	59
Cowdung/compost	200	0	8
Others	140	0	2
Human labor cost	17950	194	2420
Seed sowing/transplanting	4200	0	561
Fertilizer use	250	0	25
Weeding	4800	0	430
Irrigation	1500	0	215
Pest control	50	0	4
Harvesting	6000	0	880
Others	2520	10	305
Animal labor cost	1500	0	98
Own animal labor	1500	0	90
Hired animal labor	400	0	8
Power tiller cost	3000	0	939
Own power tiller	0	0	0
Hired power tiller	3000	0	393
Irrigation cost	10000	0	1046
Pesticide cost	1280	0	92
Gross margin	47970	-2707	3957

Source: Survey data (1999)

Annex 11. Economic analysis of crop subsystem of the study household at Manirampur thana of Jessore

Variable	Manirampur (Taka/household)		
	Maximum	Minimum	Mean
Gross farm income	21280	136	3646
Total Variable cost	8570	94	1370
Fertilizer cost	6010	0	201
Urea	6010	0	81
Phosphate	2240	0	97
Potash	640	0	17
Cowdung/compost	200	0	6
Others	30	0	0.41
Human labor cost	6550	50	764
Seed sowing/transplanting	2000	0	195
Fertilizer use	400	0	13
Weeding	900	0	137
Irrigation	2000	0	18
Pest control	50	1	0.23
Harvesting	2000	15	282
Others	50	0	119
Animal labor cost	2000	0	124
Own animal labor	1000	0	19
Hired animal labor	1000	0	105
Power tiller cost	7030	0	0.58
Own power tiller	1000	0	0.39
Hired power tiller	100	0	0.19
Irrigation cost	2000	0	274
Pesticide cost	200	0	6
Gross margin	16580	-1840	2276

Source: Survey data (1999)

Annex 12. Economic analysis of the crop subsystem of the study household at Gaurnadi thana of Barisal

Variable	Gaurnadi (Taka/household)		
	Maximum	Minimum	Mean
Gross farm income	61250	550	8123
Total Variable cost	32030	525	4259
Fertilizer cost	5600	17	702
Urea	2460	0	255
Phosphate	2660	0	302
Potash	480	0	91
Cowdung/compost	400	0	54
Others	0	0	0
Human labor cost	16030	400	2306
Seed sowing/transplanting	2850	0	300
Fertilizer use	450	0	93
Weeding	3850	0	680
Irrigation	950	0	233
Pest control	380	0	58
Harvesting	3050	60	697
Others	1900	25	245
Animal labor cost	1150	0	104
Own animal labor	0	0	0
Hired animal labor	1150	0	104
Power tiller cost	2925	0	416
Own power tiller	0	0	0
Hired power tiller	2925	0	416
Irrigation cost	5000	0	517
Pesticide cost	1325	0	214
Gross margin	51160	-5224	3864

Source: Survey data (1999)

Annex 13.   Economic analysis of crop subsystem of the study households
at Bogra sadar thana of Bogra

Variable	Bogra sadar (Taka/household)		
	Maximum	Minimum	Mean
Gross farm income	57210	1000	12070
Total Variable cost	26811	467	7071
Fertilizer cost	10497	40	1847
Urea	1016	12	289
Phosphate	3536	0	434
Potash	2224	0	326
Cowdung/compost	2555	0	446
Others	1910	0	352
Human labor cost	10750	200	2992
Seed sowing/transplanting	2400	40	627
Fertilizer use	1550	0	244
Weeding	3000	0	653
Irrigation	0	0	0
Pest control	350	0	58
Harvesting	4000	60	1092
Others	6600	20	318
Animal labor cost	3900	0	429
Own animal labor	1360	0	189
Hired animal labor	3900	0	240
Power tiller cost	2289	0	476
Own power tiller	1400	0	171
Hired power tiller	2289	0	304
Irrigation cost	6345	0	1021
Pesticide cost	1880	0	306
Gross margin	30759	70	4999

Source: Survey data (1999)

Annex 14.   Distribution of cow/bullock population in the study households, 1999

Month	Average number of Cow/bullock/household					All
	Manohardi	Phulpur	Manirampur	Gaurnadi	Bogra	
January	2	3	2	1	2	2
February	2	3	2	1	2	2
March	2	3	2	1	2	2
April	2	3	2	1	2	2
May	2	2	2	1	2	2
June	3	2	2	1	2	2
July	2	2	2	1	2	2
August	2	2	2	1	2	2
September	2	2	2	1	2	2
October	2	2	2	1	2	2
November	2	2	2	1	2	2
December	2	0	2	1	2	1

Source: Survey data (1999)

Annex 15.   Distribution of goat population in the study households, 1999

Month	Average number of Goat/household					All
	Manohardi	Phulpur	Manirampur	Gaurnadi	Bogra	
January	1	1	1	0	2	1
February	1	1	1	0	2	1
March	1	1	1	0	2	1
April	1	1	1	0	1	1
May	1	1	1	0	1	1
June	1	2	1	0	1	1
July	1	2	1	0	1	1
August	1	2	1	0	1	1
September	1	1	1	1	1	1
October	1	1	1	1	1	1
November	1	1	1	1	1	1
December	1	0	1	1	1	1

Source: Survey data (1999)

Annex 16. Distribution of duck population in the study households, 1999

| Month | Average number of Duck/household | | | | | All |
	Manohardi	Phulpur	Manirampur	Gaurnadi	Bogra	
January	1	31	6	4	3	9
February	2	32	6	4	3	9
March	2	26	6	4	3	8
April	2	27	6	4	3	8
May	2	24	6	4	2	8
June	2	20	6	4	2	7
July	9	16	6	4	2	7
August	9	11	6	4	2	6
September	6	8	6	3	2	5
October	6	6	6	3	2	5
November	5	6	6	2	2	4
December	5	1	6	2	2	3

Source: Survey data (1999)

Annex 17. Distribution of chicken population in the study households, 1999

| Month | Average number of Chicken/household | | | | | All |
	Manohardi	Phulpur	Manirampur	Gaurnadi	Bogra	
January	5	31	8	4	14	12
February	6	31	8	4	12	12
March	7	31	8	4	14	13
April	7	25	8	4	11	11
May	8	22	8	4	11	11
June	9	19	8	4	11	10
July	9	18	9	4	11	10
August	11	15	9	4	11	10
September	12	15	5	4	14	10
October	25	12	5	4	13	12
November	19	11	7	4	11	10
December	20	0	8	4	11	9

Source: Survey data (1999)

Annex 18. Average value of product of livestock sub-system of study household, 1999

Study site	Average value of product (Tk/household)			Total income
	Milk	Egg	Dung	
Manohardi	275	181	890	1346
Phulpur	1368	564	357	2289
Manirampur	2159	1806	1677	5642
Gaurnadi	3325	444	351	4120
Bogra sadar	1960	219	671	2850
All	1817	643	789	3250

Source: Survey data (1999)

Annex 19. Gross margin analysis of fisheries sub-system of the household study at Manohardi, Narsingdi *(Tk/household)*

Variable	Minimum	Maximum	Mean
Pond area (acre)	0.1	0.6	0.281
Gross income (consumed + sold)	1500	18000	7307
Value of fish consumption	na	na	na
Value of fish sold	na	na	na
Pond preparation cost	0	1000	443
Labor in pond preparation	0	600	272
Dewatering	0	100	5
Pond excavation/netting	0	300	166
Poison	0	0	0
Others	0	0	0
Pre-stocking cost	0	510	198
Labor in pre-stocking	0	100	39
Lime	0	300	110
Oil cake	0	0	0
Urea	0	50	22
TSP & MP	0	60	28
Stocking cost	400	3500	1094
Fingerling	400	3500	1094
Post stocking and management cost	0	5400	2150
Urea	0	150	60
TSP & MP	0	150	77
Labor for fertilizer application	0	100	43
Supplementary feed	0	2500	1166
Labor for netting /management	0	1000	384
Other activity (cowdung)	0	500	147
Other activity (Egg)	na	na	na
Other activity (Flour)	na	na	na
Own labor for harvesting	0	500	33
Hired labor for harvesting	0	500	242
Total cost	400	11010	3885
Gross margin	1100	6990	3421

Source: Survey data (1999)

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Annex 20. Gross margin analysis of fisheries sub-system of the household study at Phulpur, Mymensingh

			(Tk/household)
Variable	**Minimum**	**Maximum**	**Mean**
Pond area (acre)	0.1	4	0.489
Gross income (consumed + sold)	0	85000	12514.79
Value of fish consumption	na	na	na
Value of fish sold	na	na	na
Pond preparation cost	0	2300	217
Labor in pond preparation	0	500	136.49
Dewatering	0	800	42.25
Pond excavation/netting	0	600	15.63
Poison	0	400	22.61
Others	0	0	0
Pre-stocking cost	0	2305	349
Labor in pre-stocking	0	60	17.23
Lime	0	1200	173.61
Oil cake	0	0	0
Urea	0	320	49.19
TSP & MP	0	725	109.11
Stocking cost	250	12200	2192.24
Stocking labour	0	200	62.94
Fingerling	250	12000	2129.3
Post stocking and management cost	0	14095	1947
Urea	0	1200	223.38
TSP & MP	0	3500	354.03
Labor for fertilizer application	0	250	23.38
Supplementary feed	0	6000	975.84
Labor for netting /management	0	450	45.99
Other activity (cowdung)	0	400	42.77
Other activity (Egg)	0	75	6.59
Other activity (Flour)	0	120	8.87
Own labor for harvesting	0	900	54.23
Hired labor for harvesting	0	1200	211.76
Total cost	250	23710	4704.5
Gross margin	-250	54100	7720

Source: Survey data (1999)

Annex 21. Gross margin analysis of fisheries sub-system of the household study at Manirampur , Jessore

Variable	Minimum	Maximum	Mean
			(Tk/household)
Pond area (acre)	0.08	2.62	0.8225
Gross income (consumed + sold)	3186	97008	35408
Value of fish consumption	736	6000	2443
Value of fish sold	2450	91008	32965
Pond preparation cost	0	7100	1535
Labor in pond preparation	0	4200	1065
Dewatering	0	2000	375
Pond excavation/netting	0	500	83
Poison	0	400	12
Others	0	0	0
Pre-stocking cost	0	7354	1359
Labor in pre-stocking	0	300	6
Lime	0	1080	301
Oil cake	0	2254	458
Urea	0	1200	107
TSP & MP	0	2520	487
Stocking cost	300	30000	7429
Fingerling	300	30000	7429
Post stocking and management cost	800	37560	8154
Urea	0	840	73
TSP & MP	0	700	52
Labor for fertilizer application	0	120	33
Supplementary feed	600	30000	6401
Labor for netting /management	0	2500	325
Other activity (cowdung)	0	200	30
Other activity (Egg)	0	0	0
Other activity (Flour)	0	0	0
Own labor for harvesting	0	1200	336
Hired labor for harvesting	200	2000	904
Total cost	1100	82014	18476
Gross margin	2086	14994	16932

Source: Survey data (1999)

Annex 22. Gross margin analysis of fisheries sub-system of the household study at Gaurnadi, Barisal

			(Tk/household)
Variable	**Minimum**	**Maximum**	**Mean**
Pond area (acre)	0.2	1	0.394
Gross income (consumed + sold)	500	20750	5984
Value of fish consumption	500	7565	2082
Value of fish sold	0	19500	3902
Pond preparation cost	0	14055	1043
Labor in pond preparation	0	12025	579
Dewatering	0	950	250
Pond excavation/netting	0	580	200
Poison	0	500	15
Others	0	0	0
Pre-stocking cost	85	630	294
Labor in pre-stocking	30	50	50
Lime	35	350	241
Oil cake	0	0	0
Urea	0	90	1
TSP & MP	0	140	2
Stocking cost	650	19985	3243
Fingerling	650	19985	3243
Post stocking and management cost	886	23175	3427
Urea	0	120	7
TSP & MP	0	210	14
Labor for fertilizer application	0	250	46
Supplementary feed	850	12725	2175
Labor for netting /management	36	7820	735
Other activity (cowdung)	0	350	28
Own labor for harvesting	0	450	218
Hired labor for harvesting	0	1250	204
Total cost	1629	56765	8007
Gross margin	-1121	-37095	-2023

Source: Survey data (1999)

Annex 23.   Gross margin analysis of fisheries sub-system of the household
study at Bogra Sadar, Bogra

| | | (Tk/household) | |
Variable	Minimum	Maximum	Mean
Pond area (acre)	0.03	1	0.178
Gross income (consumed + sold)	0	26000	4634
Value of fish consumption	0	14000	2261
Value of fish sold	0	12000	2373
Pond preparation cost	0	2890	188
Labor in pond preparation	0	1010	98
Dewatering	0	300	29
Pond excavation/netting	0	1000	39
Poison	0	80	6
Others	0	500	16
Pre-stocking cost	0	630	82
Labor in pre-stocking	0	50	10
Lime	0	300	40
Oil cake	0	0	0
Urea	0	200	17
TSP & MP	0	80	14
Stocking cost	90	5000	778
Fingerling	90	5000	778
Post stocking and management cost	0	4265	628
Urea	0	75	9
TSP & MP	0	190	13
Labor for fertilizer application	0	100	8
Supplementary feed	0	1000	286
Labor for netting /management	0	900	102
Other activity (cowdung)	0	0	0
Other activity (Egg)	na	na	na
Other activity (Flour)	na	na	na
Own labor for harvesting	0	500	60
Hired labor for harvesting	0	1500	149
Total cost	90	12785	1675
Gross margin	-90	13215	2959

Source: Survey data (1999)

Annex 24. Monthly average household income of the study households of eastern region, (CRED), 1999

Description statistics	Month (Taka/household)												Monthly average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	2089	2283	2125	2322	2389	2322	2350	2381	2303	2419	2222	2264	2289
Minimum	100	200	150	400	500	100	150	200	300	400	0	0	296
Maximum	4000	4000	4000	4100	4100	4100	4100	4100	4200	4200	4200	4200	4100
Count	18	18	18	18	18	18	18	18	18	18	18	18	18

Annex 25. Monthly average household income of the study households of northern region, (GRAMAUS), 1999

Description statistics	Month (Taka/household)												Monthly average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	2251	2341	2471	2538	2886	2881	3166	2746	1908	1886	1916	1816	2471
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	533
Maximum	5000	6000	7000	9000	8000	6400	8000	6500	6200	5000	5000	5000	5650
Count	20	20	20	20	20	20	20	20	20	20	20	20	20

Source: Survey data (1999)

Annex 26. Monthly average household income of the study households of South-western region, (JC), 1999

Description statistics	Month (Taka/household)												Monthly average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	971	1604	976	1206	1546	1316	1309	1386	1154	1016	1016	1016	1210
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum	5000	16000	5000	8000	20000	6000	5000	5000	6000	6000	6000	6000	5333
Count	40	40	40	40	40	40	40	40	40	40	40	40	40

Annex 27. Monthly average household income of the study households of Southern region, (PROSHIKA) 1999

Description statistics	Month (Taka/household)												Monthly average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	2430	2564	2710	2478	2368	2393	2315	2458	2563	2488	2526	2463	2480
Minimum	1550	1640	1550	1663	1720	1560	1565	1620	1800	1600	1700	1600	1754
Maximum	4850	7962	16890	6325	4370	4960	3735	4467	3500	3850	4230	3590	4068
Count	40	40	40	40	40	40	40	40	40	40	40	40	40

Source: Survey data (1999)

Annex 28. Monthly average household income of the study households of north-western region, (TMSS), 1999

Description statistics	Month (Taka/household)												Monthly Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	2512	2509	2515	2536	2534	2534	2523	2542	2366	2366	2366	2420	2477
Minimum	0	0	100	100	100	0	0	700	0	0	0	0	117
Maximum	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Count	37	37	37	37	37	37	37	37	37	37	37	37	37

Source: Survey data (1999)

Annex 29. Monthly average expenditure of income earned from off-farm source of study households of eastern region, (CRED) 1999

Description statistics	Month (Taka/household)												Monthly Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	1678	1944	1953	1803	1958	2017	1919	1961	2144	2094	1961	1989	1952
Minimum	100	200	150	250	100	200	150	200	300	400	0	0	238
Maximum	4000	4000	4000	4100	4100	4100	4100	4100	4100	4200	4200	4200	4100
Count	18	18	18	18	18	18	18	18	18	18	18	18	18

Annex 30. Monthly average expenditure of income earned from off-farm source of study households of northern region, (GRAMAUS) 1999

Description statistics	Month (Taka/household)												Monthly Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	2368	2413	2453	2466	2768	2898	2988	2766	1861	1933	1983	1943	2583
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	533
Maximum	5000	6000	5500	5000	5000	5500	6000	6500	4860	4860	5000	5000	7638
Count	20	20	20	20	20	20	20	20	19	20	20	20	20

Source: Survey data (1999)

Annex 31. Monthly average expenditure of income earned from off-farm source of study households of southwestern region, (JC) 1999

Description statistics	Month (Taka/household)												Monthly Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	1353	1207	1750	1601	1561	1711	1986	1353	1508	1016	1016	1513	1465
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	425
Maximum	7000	4500	9000	8000	9000	7000	12000	3000	13000	6000	6000	12000	3708
Count	40	40	40	40	40	40	40	40	40	40	40	40	40

Annex 32. Monthly average expenditure of income earned from off-farm source of study households of southern region, (PROSHIKA) 1999

Description statistics	Month (Taka/household)												Monthly Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	2490	3460	3132	3096	3029	2516	2732	2979	2457	2494	2987	2938	2859
Minimum	1480	1570	1520	1510	1645	185	1620	1650	1200	1500	1700	1650	1804
Maximum	6980	30150	14575	20187	18570	7280	12500	20000	3200	3390	13150	12500	6643
Count	40	40	40	40	40	40	40	40	40	40	40	40	40

Annex 33. Monthly average expenditure of income earned from off-farm source of study Households of northwest region, (TMSS) 1999

Description statistics	Month (Taka/household)												Monthly Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean	2517	2754	2329	2582	2579	2579	2568	2588	2407	2393	2282	2463	2503
Minimum	0	0	100	100	100	0	0	700	0	0	0	0	117
Maximum	6000	8500	5000	6000	6000	6000	6000	6000	6000	6000	5700	6000	5642
Count	36	36	36	36	36	36	36	36	36	36	36	36	36

Source: Survey data (1999)