

FARMING PRACTICES AND LIVELIHOOD OF THE COASTAL PEOPLE OF BANGLADESH

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ABSTRACT

The present study was designed to assess the farming patterns and farmers' livelihood in coastal regions of Bangladesh. Three coastal districts namely, Khulna, Satkhira and Bagerhat located in the southwest of Bangladesh were selected to conduct the study. Fifty shrimp farmers from each district (a total of 150 farmers) were selected for necessary data collection on the basis of farm size category (i.e., small, medium and large) following stratified random sampling technique. Descriptive statistics like sum, average, percentages, etc. were derived and calculated for analyzing the data. It was found that the farming system of coastal region was mainly shrimp based. The amount of land devoted to agricultural crop cultivation was declined due to shrimp cultivation for all categories of farmers. Number of livestock except poultry and duck was decreasing due to shortage of feed. Native fish species in fresh and open water bodies were also disappearing gradually. Lower crop production was observed through surveyed region due to lower productivity of land caused by salinity. However, shrimp cultivation opened up new avenues for employment for the local people especially for women. Small farmers get higher proportion of income (75.0% of total farm income) from shrimp farming than medium (67.4%) and large farmers (73.6%). On an average, farmers' income was increased which enhanced overall socioeconomic condition and livelihood status. In spite of various adverse impacts of shrimp farming, it can be recommended that proper planning, regulation and motivation of the farmers are needed to develop an environment friendly shrimp farming as well as to maintain sustainable agricultural production practices in the coastal regions of Bangladesh.

Key Words: Coastal, Salinity, Farming practices, Livelihood

INTRODUCTION

Agriculture is the mainstay of the economy of Bangladesh. The economic development is inextricably linked with the performance of this sector. It is the most important livelihood option for the coastal people of Bangladesh (GoB and UNDP, 2009). About 40 million people of the coastal areas of Bangladesh depend on agriculture (BBS, 2011). It has been identified as being of prime importance for achieving development goals in coastal areas (BPRSP, 2005). Along with disasters, the agriculture practices of these areas are always under threat. The coastal agriculture is transforming recently (Islam, 2006). Due to the

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effects of frequent cyclones and storm surges and poor management, coastal areas have become water logged and saline (Rahman, 1995). Farmers started commercial shrimp cultivation to mitigate the loss in traditional agriculture to maintain their livelihood in the 1970s (Karim, 1986). From 1980s to the present, shrimp cultivation has created a substantial economic and social transformation in those coastal areas. Furthermore, in recent years, shrimp has become a significant foreign exchange earner for Bangladesh (DoF, 2010). Shrimp (both brackish water and freshwater) is the second largest foreign exchange earner after garments, and the largest agro-export earner in Bangladesh, although Bangladesh is a small player in terms of the international market (i.e. 4.2 *Per cent* of world production of farmed shrimp) (Uddin, 2009).

However, shrimp farming is a subject of criticism since it can damage the local ecology by increasing the salinity of the water and soil, change the composition of the soil and bring about rapid changes in land use and land cover (Haque, 2004). This can also lead to disintegration of economic and social conditions of coastal rural communities (Ali, 2006). Because of environmental and social impacts associated with shrimp cultivation, farmers of the coastal areas are incorporating vegetables and domestic animals into existing farming practices, integrating shrimp or prawn and fish with rice and vegetables. As a whole, the people of the coastal areas are trying different agricultural practices to cope with the changing environment (Mahmood, 2006). In view of these facts, the present study has been designed to assess the farming patterns and farmer's livelihood in coastal regions of Bangladesh. The specific objectives of the study were (i) to identify the current farming patterns and agricultural production; (ii) to assess the impact of on-going farming practices on employment creation, income generation and livelihood of the farmers and (iii) to suggest remedial measures and strategies for future sustainable agricultural production.

RESEARCH METHODS

Study areas were selected purposively mainly from three coastal districts namely, Dumuria Upazila under Khulna district, Shymnagar Upazila under Satkhira and Bagerhat Sadar Upazila under Bagerhat district located in the southwest of Bangladesh. Fifty farmers from each district (a total of 150 farmers) were selected for necessary data collection on the basis of farm size category (i.e., small, medium and large) following stratified random sampling technique. Data were collected from respondents by using structured questionnaire and conducting FGD (Focus Group Discussion) for group information. In addition to field level primary data for this study, secondary information having relevance with this study were also discussed which were collected from different handouts, reports, published and unpublished documents of the Government of Bangladesh (GOB) and its different organizations and agencies such as Statistical Yearbook of Bangladesh, Bangladesh Economic Review, various journals, newspaper, notifications, etc. For analyzing the data, mainly descriptive statistics such as sum, average, ratio, percentages, etc. were derived and calculated to present the results.

RESULTS AND DISCUSSION

Average land holding of farmers

Average land holding of small and medium farmers in Bagerhat (0.89 and 1.74 ha, respectively) is slightly higher than the other areas. On the other hand, large farmers in Khulna had a higher average land holding (3.97 ha) comparative to other region. Farmers having less than 1.0 hectare land were small farmers, 1.1 to 3.0 hectare land were medium farmers and more than 3.0 hectare land were identified as large farmers (*Zaman et al., 2010*).

Table 1. Average land holding of coastal farmers

Types of land	Small		Medium		Large	
	Area (ha)	Per cent	Area (ha)	Per cent	Area (ha)	Per cent
Khulna						
Homestead Area	0.06	9.09	0.08	2.91	0.11	1.58
Owned cultivable land	0.33	50.00	0.25	34.55	1.21	17.36
Rented/mortgaged/leased-in land	0.29	43.94	0.63	33.09	1.34	47.92
Rented/mortgaged/leased-out land	0.06	9.09	0.00	0.00	0.00	0.00
Area under pond	0.04	6.06	0.41	29.45	1.31	33.14
Pasture land	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.66	100.00	1.37	100.00	3.97	100.00
Bagerhat						
Homestead Area	0.14	15.73	0.23	13.22	0.14	1.66
Owned cultivable land	0.17	19.10	0.21	12.07	1.26	14.95
Rented/mortgaged/leased-in land	0.24	26.97	1.02	58.62	1.87	51.84
Rented/mortgaged/leased-out land	0.00	0.00	0.63	36.21	1.21	14.35
Area under pond	0.34	38.20	0.91	52.30	1.77	45.91
Pasture land	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.89	100.00	1.74	100.00	3.83	100.00
Satkhira						
Homestead Area	0.05	5.75	0.09	5.77	0.11	1.50
Owned cultivable land	0.47	54.02	1.18	75.64	2.16	81.20
Rented/mortgaged/leased-in land	0.28	32.18	0.41	26.28	1.11	15.12
Rented/mortgaged/leased-out land	0.00	0.00	0.24	15.38	0.00	0.00
Area under pond	0.07	8.05	0.11	7.05	0.15	2.04
Pasture land	0.00	0.00	0.01	0.64	0.01	0.14
Total	0.87	100.00	1.56	100.00	3.54	100.00

Source: Field Survey, 2011

Farming pattern and agricultural production in coastal region

The farming system of coastal region is generally shrimp based. Shrimp farming has adversely affected the potential farming pattern as well as cropping pattern. Farmers cultivate both local and HYV *aman* rice in kharif-II season. During kharif-I and rabi seasons, the salinity intensity becomes higher and most of the farmers grow vegetables in their homestead for their own consumption. Fruit trees like mango, jackfruit, black berry, battle nut, date palm, etc. are disappearing gradually. Number of livestock is also decreasing due to lack of grazing lands, shortage of feed, e.g. forage, straw, etc. However, the number of poultry and duck is increasing. Some trees like *babla*, raintree and fruits like *sofeda* are growing satisfactorily. Native fish species in fresh and open water bodies are also disappearing gradually.

The farming pattern is revealed for Khulna, Bagerhat and Satkhira in Tables 2, 3 and 4, respectively. The amount of land devoted to agricultural crop cultivation has been declined except for *sofeda* due to shrimp cultivation for all categories of farmers. In Khulna, mainly tomato and brinjal are grown in homestead area whereas in Bagerhat, tomato, bean and pumpkin are grown. Brinjal, cabbage and cucumber represent the main homestead vegetables in Satkhira. Among the livestock enterprises, dairy cattle and poultry have been declined in number. However, ducks were found to increase in number due to shrimp farming.

Table 2. Farming pattern of sampled farmers, Khulna

Name	Small	Medium	Large	Average
Crop (decimal)				
<i>Aman</i>	81.5	214.7	498.9	265.0
Homestead vegetables (decimal)				
Tomato	8.7	15.3	19.6	14.5
Brinjal	12.6	20.4	24.4	19.1
Spices (Chilli)	4.3	6.2	5.4	5.3
Fruits (decimal)				
Mango	5.6	6.4	6.8	6.3
<i>Sofeda</i>	8.7	8.8	8.0	8.5
Shrimp (decimal)	116.0	404.8	1095.6	538.8
Livestock (Number)				
Dairy cattle	0.9	1.7	1.9	1.5
Poultry	7.1	7.8	8.3	7.7
Duck	7.9	8.2	7.6	7.9

Source: Field Survey, 2011

Table 3. Farming pattern of sampled farmers, Bagerhat

Name	Small	Medium	Large	Average
Crop (decimal)				
<i>Aman</i>	65.1	151.9	811.2	342.7
Homestead vegetables (decimal)				
Tomato	7.3	13.4	11.2	10.6
Bean	2.0	3.7	4.7	3.5
Pumpkin	5.2	9.6	6.6	7.1
Spices (Chilli)	3.1	5.5	7.1	5.2
Fruits (decimal)				
Mango	10.9	58.1	81.4	50.1
<i>Sofeda</i>	15.8	27.1	45.8	29.6
Shrimp (decimal)	120.3	316.7	1435.3	624.1
Livestock (Number)				
Dairy cattle	1.1	1.9	1.8	1.6
Poultry	9.4	8.9	8.3	8.9
Duck	13.7	17.5	12.4	14.5

Source: Field Survey, 2011

Table 4. Farming pattern of sampled farmers, Satkhira

Name	Small	Medium	Large	Average
Crop (decimal)				
<i>Aman</i>	76.5	128.4	541.2	248.7
Homestead vegetables (decimal)				
Brinjal	7.2	12.7	25.7	15.2
Cabbage	3.4	5.1	11.9	6.8
Cucumber	4.1	2.7	8.4	5.1
Spices (Chilli)	5.4	4.7	6.4	5.5
Fruits (decimal)				
Mango	6.5	5.8	8.9	7.1
Banana	2.1	2.7	5.0	3.3
<i>Sofeda</i>	8.1	10.0	12.3	10.1
Shrimp (decimal)	116.9	271.5	1172.1	520.2
Livestock (Number)				
Dairy cattle	0.8	2.1	3.0	2.0
Poultry	7.2	6.7	8.6	7.5
Duck	10.9	9.4	14.7	11.7

Source: Field Survey, 2011

Lower crop production was observed due to lower productivity of land caused by salinity. Crop yield has been reduced in all the regions. During kharif-II season, farmers usually cultivate BR-23 rice (salinity tolerant variety) and sometimes vegetables. In addition, spices are cultivated in rabi season. Overall production of fruit, vegetables, spices, etc. was gradually declining due to shrimp farming. Vegetation, crops, fish and livestock are seriously damaged by the processes of shrimp cultivation. However, shrimp production was increasing year by year. Small farmers were cultivating their land more efficiently than medium farmers. As a result, they were getting more production in many cases (Table 5).

Table 5. Agricultural production in coastal regions

Name	Small	Medium	Large	Average
Khulna				
Kharif-II season				
Rice (Kg)	1484.8	3911.6	9089.3	4828.6
Vegetable (Kg)	17.2	33.7	53.2	34.7
Rabi season				
Vegetable (Kg)	20.7	40.5	59.7	40.3
Spices (Chilli) (Kg)	10.2	21.4	16.4	16.0
Fruits (Kg)	22.0	42.5	48.2	37.6
Shrimp (Kg)	179.8	245.8	665.3	363.6
Bagerhat				
Kharif-II season				
Rice (Kg)	1186.3	2766.9	13778.9	5910.7
Vegetable (Kg)	13.8	33.0	26.5	24.4
Rabi season				
Vegetable (Kg)	21.7	47.6	39.5	36.3
Spices (Chilli) (Kg)	8.2	7.5	14.2	10.0
Fruits (Kg)	36.0	51.4	68.2	51.9
Shrimp (Kg)	182.8	192.3	871.6	415.6
Satkhira				
Kharif-II season				
Rice (Kg)	1393.7	2339.3	9859.1	4530.7
Vegetable (Kg)	15.4	23.4	31.6	23.5
Rabi season				
Vegetable (Kg)	16.5	26.1	35.0	25.9
Spices (Chilli) (Kg)	11.5	13.0	14.3	12.9
Fruits (Kg)	39.0	40.2	59.7	46.3
Shrimp (Kg)	178.1	164.9	711.8	351.6

Source: Field Survey, 2011

Employment status in coastal region

Shrimp farming is the major source of employment for people in coastal regions. Shrimp farms require labour for various activities such as *gher* preparation (drying, clearing, leveling of land, canal preparation, liming, manuring, etc.), carrying and releasing of post larvae, weeding, guarding farms, harvesting, transporting and marketing of shrimp and fish. Shrimp cultivation has opened up new avenues of employment for the local people especially for women. Women get involved in shrimp fry collection. It was found that around 40 % of total labourer was women who were involved in fry collection in the coastal regions. They also worked as labourers in shrimp fields. After shrimp cultivation, most of them were found to be working in shrimp related processing activities. Children are also involved in shrimp culture to some extent. However, this is the fact only for small farmers. In case of medium and large farmers, women are least involved in these activities.

Average labour hour spent (man-days) was comparatively lower in Rabi season in case of both male and female labourers because the scope for labour selling was only for shrimp production during this season. Whereas labours were employed for rice cultivation, canal preparation, shrimp cultivation, etc, in kharif-II season. As a result, they spent more hours on these activities.

Table 6. Labour utilization in coastal regions

Particulars	Small		Medium		Large	
	Male	Female	Male	Female	Male	Female
Kharif-II season						
Working hours/day	7.8	5.6	7.3	3.2	6.7	1.8
Duration (man-days)	115.9	93.8	112.5	65.7	90.9	33.7
Wage/day	200.0	133.3	200.0	133.3	200.0	133.3
Rabi season						
Working hours/day	7.2	4.8	6.7	2.6	6.0	1.4
Duration (man-days)	106.3	84.4	102.6	49.3	79.7	25.7
Wage/day	206.7	110.0	206.7	110.0	206.7	110.0

Source: Field Survey, 2011

Annual income of farmers in coastal regions

There are two main sources of income for the farmers: farm income and non-farm income. Shrimp farming is the largest source of farm income for all categories of farmers in coastal regions. Income from all other sources is declining. Next to shrimp farming, crop cultivation is the major source of farm income for the farmers. However, small farmers get higher proportion of income from shrimp farming than medium and large farmers. Shrimp farming generated about 75.0% of total farm income for small farmers, 67.4 for medium farmers and 73.6% for large farmers. Total income from shrimp farming as percentage of total income was 72.3%, 60.0% and 56.9% for small, medium and large farmers, respectively (Table 7).

Table 7. Average annual income of farmers in coastal region

Particulars	Small	Medium	Large
Total farm income (Tk.)	273053.0	338301.0	420633.0
Total non farm income (Tk.)	9679.0	42695.0	114125.0
Total income (Tk.)	282732.0	380996.0	534758.0
Income from shrimp farming as percentage of total farm income	75.0	67.4	73.6
Income from shrimp farming as percentage of total income	72.3	60.0	56.9

Source: Field Survey, 2011

Livelihood status of coastal people

The farmers' overall livelihood status was assessed on the basis of asset pentagon which is composed of five types of capitals namely human capital, social capital, natural capital, physical capital and financial capital (DFID, 2000). Farmers' income was increased which enhanced overall socioeconomic condition and livelihood status. Their technical knowledge, social network, housing and sanitation facilities, communication facilities, cash income and savings, managerial capacities, etc. were improved. However, farmers' health condition was deteriorated to some extent due to disease outbreak, scarcity of safe drinking water, etc. Majority of the respondents had decreased access to forest resources due to increasing salinity impacts of shrimp farming. Educational status of majority of the respondents was enhanced. Household asset possession was increased. The number of dwelling houses, household furnitures, luxury items like mobile phone, TV, fan, refrigerators, etc. was increased (Table 8).

Table 8. Perceived livelihood status of farmers in the coastal regions

(Percentages of farm household reported)

Asset category	Responses		
	Increase	Decrease	Constant
Human capital			
Health	34	40	26
Education	71	5	24
Training	19	10	71
Knowledge/Efficiency	73	-	27
Access to information	23	15	62
Social capital			
Involved in social group	15	62	23
Political involvement	70	9	21
Self managerial capability	78	7	15
Social access/network	64	6	30

Asset category	Responses		
	Increase	Decrease	Constant
Natural capital			
Cultivable land	7	10	83
Using open water resources	4	20	76
Forests	7	53	40
Physical capital			
Building	13	7	80
Tin roof	57	5	38
Tube well	69	5	26
Paka toilet	52	7	41
Electric fan	80	2	18
Bicycle/Motorcycle	67	5	28
Radio/TV	70	3	27
Cot/ Chair/Table	85	2	13
Mobile phone	81	2	17
Refrigerator	22	3	75
Shop	13	29	59
Financial capital			
Cash in hand	79	5	16
Cash at bank/ Liquid assets/ Saving	45	13	42
Remittances/ Donation/Grant/Aid	7	5	88

Source: Field Survey, 2011

Problems faced by the coastal farmers and probable suggestions

Various problems were faced by the farmers in coastal regions. Some of the major problems as revealed during the field survey are mentioned in Table 8. Ranking of the problems and solutions was done on the basis of farmer's responses. An individual reported more than one problem. So, addition of percentages will not necessarily equal to 100.

- i) Agricultural crop production was mostly affected by shrimp farming as its effects reflected on land fertility. Cultivation of shrimp needs storage of saline water for a long period which results in percolation of salt. Moreover, shrimp producers keep on adding extra salt into the water to ensure better growth of shrimp during monsoon. The extra salt gets stored in the field and adds to the salinity level further. Thus, shrimp farming increases soil salinity in non-saline area that hampers crop cultivation seriously. Crop and vegetable yield reduces in shrimp prone areas due to lack of salt tolerant varieties. In the study area the fruit tree like jackfruit, date, palms, etc. were reducing gradually.

- ii) Soils in the coastal regions contain high acidity which causes cultured shrimps vulnerable to diseases. In addition, shrimp production mainly depends on good quality of shrimp fry. Lack of good quality of shrimp fry was another major problem as reported by the respondents in the coastal regions of Bangladesh.
- iii) Moreover, higher prices of inputs, financial constraints, inadequate marketing facilities such as, storage and transport facilities, theft of shrimp from the field etc., were some of the more common problems in the coastal regions.

Table 9. Major problems faced by the respondents and their probable solutions

Major problems faced by the respondents	Per cent of responses	Rank	Probable solutions	Rank	Per cent of responses
Decreasing agricultural production	78	1	Switching facility of public dam	1	71
Shortage of fresh water	48	2	Zoning of coastal regions	2	39
Outbreak of viral diseases	41	3	Precautions for viral diseases	3	35
Lack of good quality of shrimp fry	25	4	Technical support to ensure quality shrimp fry	4	24

Source: Field Survey, 2011

In spite of various adverse impacts, economic benefit of shrimp farming cannot be overlooked for a developing country like Bangladesh. Shrimp farming has a great potential in the country. In order to ensure a sustainable agricultural production including shrimp production in coastal regions, the following suggestions were given:

- i) Zoning of coastal regions on the basis of ecological conditions, soil and water quality may be implemented. Shrimp cultivation can be restricted only where the salinity level is high so that surrounding agricultural production is not hampered.
- ii) Facility of public dam maintaining a minimum water depth should be ensured so that salinity level does not increase in the surrounding area of shrimp *ghers*. Infrastructure facilities for different types of farming should be developed.
- iii) Precautions for viral diseases should be undertaken. The scientific use of chemicals should be ensured.
- iv) Technical support to ensure quality shrimp fry should be provided.
- v) Efficient transport and marketing system should be developed.

CONCLUSION

This study assessed the farming patterns and farmers' livelihood in coastal regions of Bangladesh. The farming system of coastal region is generally shrimp based. The major field crop was rice (i.e., *Aman*). During kharif-I and rabi season, the salinity intensity becomes higher and farmers do not cultivate aus and boro rice in the coastal regions. Fruit trees like

mango, jackfruit, black berry, bettle nut, date palm, etc. were disappearing gradually. Number of livestock was also decreasing due to shortage of feed and fresh water. However, the number of poultry and duck was increasing. Native fish species in fresh and open water bodies were also disappearing gradually. Lower crop production was observed through surveyed regions due to lower productivity of land caused by salinity. Vegetation, crops, fish and livestock were seriously damaged by the processes of shrimp cultivation. The labour hour spent by both men and women has increased for shrimp cultivation in coastal regions. Small farmers get higher proportion of income from shrimp farming than medium and large farmers as they were cultivating their land more efficiently and getting more production in many cases. Although increased income enhances overall socioeconomic condition and livelihood status of the farmers, their health condition was deteriorated to some extent due to disease outbreak, scarcity of safe drinking water, etc. In spite of various adverse impacts, shrimp farming has a great potential in a developing country like Bangladesh. Good management practice (GMP) can ensure a sustainable growth and return from agricultural production. Finally, it can be recommended that proper planning, regulation and motivation of the farmers are needed to develop environment friendly shrimp farming as well as to maintain sustainable agricultural production practices in the coastal belt of Bangladesh.

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