Asian Journal of Agricultural Extension, Economics & Sociology
13(2): 1-12, 2016; Article no.AJAEES.28454
ISSN: 2320-7027

SCIENCEDOMAIN *international*
www.sciencedomain.org

Coping Strategies of the Resource Poor during Natural Hazards: A Case of Polder No. 29 under Dumuria Upazila of Khulna District in Bangladesh

Afsana Zaman[1] and Maksuda Mannaf[2*]

[1]Centre for Agriresearch and Sustainable Environment & Entrepreneurship Development (CASEED), Dhaka, Bangladesh (Retd.).
[2]Department of Agricultural Economics and Policy, Sylhet Agricultural University, Sylhet, Bangladesh.

Authors' contributions

The entire research work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2016/28454
Editor(s):
(1) Hossein Azadi, Department of Geography, Ghent University, Belgium.
Reviewers:
(1) Hoang Trung Thanh, Vietnam Institute of Meteorology, Hydrology and Climate Change, Vietnam.
(2) Neha Bansal, APIED, Sardar Patel University, India.
(3) Sailesh Samanta, Png University of Technology, Papua New Guinea.
Complete Peer review History: http://www.sciencedomain.org/review-history/16370

Original Research Article

Received 20th July 2016
Accepted 22nd September 2016
Published 28th September 2016

ABSTRACT

The study was conducted to compare the livelihood adaptation of the disadvantaged people living in Polder No. 29 and LGED-managed sub-polder (Latabunia) in Dumuria Upazila in Khulna district of Bangladesh. Six villages under the Upazila were selected purposively. In total 120 respondents, in which 65 from Polder 29 and 55 from Latabunia Sub-polder were selected randomly. Slight differences were observed among the major socioeconomic characteristics of the disadvantaged people living in Polder No. 29 and Latabunia. There was also a variation in the sources of household income and income generating activities of the disadvantaged people in Polder No. 29 and LGED-managed sub-polder (Latabunia). No disadvantaged people in Latabunia were found to be involved in small trading and livestock keeping whereas it was common in Polder 29. It was also found that the disadvantaged people living in Polder 29 were affected less by different natural hazards than the disadvantaged people in Latabunia. As a result livelihood of disadvantaged people in Latabunia is more vulnerable than the livelihood of disadvantaged

**Corresponding author: E-mail: maksuda_mannaf@yahoo.com;*

people inside Polder 29. So, Latabunia should be taken under BWDB polder area for protecting them from natural hazards.

Keywords: Coping strategies; livelihood; income; expenditure and natural hazards.

1. INTRODUCTION

As one of the least developed countries (LDCs) of the World, Bangladesh has currently been suffering from climate change. Almost every year, the country faces floods, cyclones, storms, tornadoes, drought, river erosion, earthquakes, arsenic contamination of ground water sources and environmental pollution [1]. As a result, people in this region particularly the disadvantaged people have to suffer terribly. They suffered from lack of nutrition, Medicare, water and sanitation, shelter and other basic needs for survival due to frequent occurrences of natural hazards. This leads to loss of life and property as well as severe impacts on their livelihoods. In the 1950s–1960s, existing embankments in the coastal areas deteriorated for lack of proper maintenance so that salinity intrusion and tidal surges caused routine crop damage. Crop failures caused by saline inundation or monsoon flooding were reported in most areas once every 3 years [2]. Hence, the government recognized the need for protection of the coastal areas and construction and development of embankments started in 1961 through the predecessor of the Bangladesh Water Development Board (BWDB). The term 'Polder' was used to designate areas that are surrounded by dykes or embankments, separating them hydrologically from the main river system and offering protection against tidal floods, salinity intrusion and sedimentation. The embankments include regulators and other structures to control water intake and drainage of the polderized area. In fact, Polder 29 was established in 1961. The coastal region of Bangladesh has 123 embanked polders, which were constructed to protect the land from saline water and to increase the successful agricultural crop production as well as to improve the livelihood of the poor people. The general perception of the people about the polder is very positive. According to them the polder changed their lives and improved socioeconomic situation.

From this study, the following positive changes were observed in the polder area such as- improved security to crops and livestock; better conditions for new crops and livestock production (Boro paddy and betel leaf); improved year-round road networks leading to access to city centres, markets, educational institutions, and new avenues for self-employment such as transport workers, *Van* pullers, shop keepers and higher enrollment of boys and girls as well as higher attendance in educational institutions. Despite of some advantages of having polders in the coastal areas, a few disadvantages were also noticed. These were- restricted water flow in the internal channels leading to stagnant water and breeding grounds for mosquitoes; scarcity of water in dry season, particularly for domestic use; loss of capture fisheries; homestead gardening and the cultivation of local fruits and vegetables as well as livestock production has drastically reduced in some polder areas due to Bagda farming.

Considering the changes of socioeconomic condition of smallholders with the development and construction of embankment, several studies have been conducted to determine the effects of such changes in this particular area. Kabir [3] carried out a study on the improvement of livelihood patterns through cereal crop production in some selected char areas of Jamalpur district. Miah et al. [4] performed a study on livelihood adaptation of disadvantaged people of Bangladesh to determine economic volatility and other shocks. Nyborg et al. [5] conducted a study on exploring rural livelihoods in Afghanistan to gain an in-depth understanding of the livelihood of 10 selected villages in Dai Kundi, Afghanistan. Ali et al. [6] studied on assessment of the livelihood status of the fish farmers in some selected areas of Bagmaraupazila under Rajshahi district. Sultana [7] performed a study on labour migration and impact of remittances on livelihood pattern in some selected areas of Tangail district. Yasmin [8] conducted a study on the profitability of milk production and livelihood pattern of livestock farmers. Nuorteva et al. [9] conducted a study on Water, livelihoods and climate change adaptation in the Tonle Sap Lake area. Saha [10] performed a study on climate change, livelihood and human rights: a case study. Khalequzzaman [11] performed a study on Flood Control in Bangladesh through Best Management Practices. It was found from the study that that most of the flood control embankments experienced breaching since their completion,

and are not very effective in reducing the damage to the environment, economy, and property. Sharmin [12] conducted a study on the socioeconomic impact of developing shrimp industry on improving livelihoods of stakeholders and women involved in shrimp industry in Bangladesh. She found that for developing shrimp industry most of the selected stakeholders (60-80%) changed their principal occupation from farming to shrimp related activities and number of occupations has increased up to 6 especially for the labourers and workers involved in different sub-sectors of shrimp industry. Findings of the study also indicated that intergenerational changes occurred regarding literacy rate, family size, kinship trend, social power and status of stakeholders. Accordingly, the specific objectives of this study were to document the socioeconomic profile, to identify the sources of household income and income generating activities and to assess the major effects of natural hazards (Aila and flood) on household income and employment of family members and coping strategies adapted by the selected disadvantaged smallholders living in Polder No. 29 and LGED-managed sub-polder (Latabunia) in Khulna district of Bangladesh.

Map 1. Geo Map of Dumuria Upazila of Bangladesh (Study area)

2. METHODOLOGY OF THE STUDY

Village Latabunia in Shahosh union in Dumuria Upazila (which is LGED-managed sub-polder and from Polder number 29, two villages namely Shorafpur and Mallopara in Shorafpur Union and three villages namely Kanchannagor, Khoribunia and Telikhali in Vandarpara Union under Dumuria Upazila of Khulna District were selected purposively. A stratified random sampling technique was followed for selecting sample respondents. In total 120 respondents, in which 65 from in Polder 29 and 55 from Latabunia were selected randomly. It may be noted here that the disadvantaged people in this study have been considered as those persons who have less than 50 decimals of cultivable land. The disadvantaged people in the study area have broadly been classified into two categories such as- wage labourers, whose main source of income for livelihood entirely depends on wage-earning as day labourers; and marginal farmers who are resource-poor people but they might have a small piece of owned land (less than 50 decimals of cultivable land) or rented in around 50 decimals of cultivable land from the local landlords and/or rich people for the cultivation of crops. Wage labourers, of course, again classified into two categories- male wage labourers; and female wage labourers. It may be noted that no female marginal farmers was found in the study area. Thus, 30 male wage labourers, 20 female wage labourers and 70 marginal farmers were selected for the study. The data were collected for the whole year of 2011. However, the formal data for the study were collected during February 2012. The study followed the survey method. The data and information so collected were recorded to tabular form which included classification of tables into meaningful results by using descriptive statistics say, arithmetic mean, percentage and ratios, figures and diagrams. In order to assess the effects of natural hazards on household income and employment of family members, 'before' and 'after' comparison was made. In fact, this comparison was done to estimate the impact of Cyclone Aila on household income.

3. RESULTS AND DISCUSSION

3.1 Socioeconomic Profile of the Disadvantaged People

Table 1 reveals the age distribution of the family members of the disadvantaged people living People in Polder 29 and Latabunia sub-polder. It shows that in Polder 29, about 32.52 percent and 21.54 percent of family members of the respondents fell into the age bracket of 15.00 years and 15.01-30.00 years of age groups, respectively whereas in Latabunia, about 25.13 percent and 28.27 percent of family members of the respondents fell into the age bracket of 15.00 years, and 15.01-30.00 years of age groups, respectively. About 28.05 percent and 11.38 percent of family members of the respondents fell into the groups of 30.01-45.00 years and 45.01-55.00 years, respectively in Polder 29 while it was 26.70 percent and 13.61 percent, respectively in Latabunia. About 6.50 percent of family members of the respondents in Polder 29 fell into above 55.00 years while 6.28 percent of family members of the respondents in Latabunia fell into above 55.00 years of age group.

The composition of family members by age and sex in sample is represented in the Table 2. Table 2 reveals that the average size of the family was 3.78 in Polder 29 and 3.47 in Latabunia. Both in Polder 29 and Latabunia, average family size is much lower than the national average size (4.8) of the family (BBS 2010). The male-female ratio was 110:100 in Polder 29 and 108:100 in Latabunia, which is higher than the national average of 106:100 (see [13]). That means the number of male is higher than the number of female in the study area.

Table 1. Age distribution of the family members of disadvantage people in Polder 29 and Latabunia Sub-polder

Age (Years)	In Polder 29		In Latabunia	
	Total	% of total	Total	% of total
Up to 15.00	80	32.52	48	25.13
15.01-30.00	53	21.54	54	28.27
30.01-45.00	69	28.05	51	26.70
45.01-55.00	28	11.38	26	13.61
Above 55.00	16	6.50	12	6.28
All age	246	100.00	191	100.00

Source: Field survey

Table 3 shows that 39.02 percent and 51.83 percent of the disadvantaged people were illiterate in Polder No. 29 and Latabunia sub-polder, respectively. In Polder 29, about 10.57 and 29.27 percent of the disadvantage people had a capability to sign and primary level of education, respectively, whereas in Latabunia about 5.24 and 27.23 percent of the disadvantage people had a capability to sign and primary level of education, respectively. It can also be seen from the table that 16.67 percent of the disadvantaged people had secondary and 4.47 percent of the disadvantage people had above secondary level of education while in Latabunia 10.99 percent of the disadvantaged people had secondary and 4.71 percent of the disadvantaged people had above secondary level of education.

Table 2. Average family compositions of the respondents

Gender category	In Polder 29				In Latabunia			
	Marginal farmers (n_1=40)	Wage labourers		Total (N_1= 65)	Marginal farmers (n_1=30)	Wage labourers		Total (N_2= 55)
		Male (n_2=15)	Female (n_3=10)			Male (n_2=15)	Female (n_3=10)	
Male (No.)	77	33	19	129	62	23	14	99
Female (No.)	75	26	16	117	47	28	17	92
Total (No.)	152	59	35	246	109	51	31	191
Average family size	3.80	3.93	3.50	3.78	3.63	3.40	3.10	3.47
Male–female ratio	103:100	127:100	119:100	110:100	132:100	82:100	82:100	108:100

Source: Field survey

Table 3. Literacy status of the disadvantaged people

Level of education	In Polder 29				In Latabunia			
	Marginal farmers (n_1=40)	Wage labourers		Total respondents (N_1= 65)	Marginal farmers (n_1=40)	Wage labourers		Total respondents (N_1= 65)
		Male (n_2=15)	Female (n_3=10)			Male (n_2=15)	Female (n_3=10)	
	%	%	%	%	%	%	%	%
Illiterate	36.42	38.98	48.57	39.02	51.38	56.86	45.16	51.83
Able to sign only	11.92	8.47	8.57	10.57	4.59	5.88	6.45	5.24
Up to primary level	27.15	37.29	25.71	29.27	25.88	27.45	32.26	27.23
Secondary level	17.22	15.25	17.14	16.67	12.84	5.88	12.90	10.99
Above secondary level	7.28	-	-	4.47	5.50	3.92	3.23	4.71
Total	100	100	100	100	100	100	100	100

Source: Field survey

Table 4. Occupational status of the disadvantaged people living in Polder 29 and Latabunia

Types of occupation	In Polder 29		In Latabunia	
	Number of respondents	% of total	Number of respondents	% of total
Farmers	40	61.54	30	54.55
-Farming and labour selling	19 (47.50%)		21 (70%)	
-Farming and small trading	6 (15.00%)		-	
-Farming	15 (37.50%)		9 (30%)	
Wage labourers	25	38.46	25	45.45
Total	65	100	55	100

Source: Field survey

Since these people were resource-poor and most of them low educated, they did not have any specialized profession. In fact, the selected respondents of the study area were engaged in various occupations along with crop (rice/shrimp/) cultivation. Among 120 respondents, 58.33 percent were engaged in agriculture. It is noted that agriculture was the main occupation of them. Some were also engaged in small trading and labour selling. Table 4 reveals that among 65 respondents that there were 61.54 percent marginal farmers and 38.46 percent wage labourers in Polder 29 and 54.55 percent marginal farmers and 45.45 percent wage labourers in Latabunia. Among the 40 marginal farmers, 47.5 percent were engaged in both farming and labour selling and 15 percent were engaged in small business along with agriculture and 37.50 percent were engaged only in farming. However, no disadvantaged people in Latabunia were found to be engaged in small trading due to lack of financial capital.

Table 5 shows that the average farm size of marginal farmers and wage labourers were 0.225 ha and 0.035 ha, respectively in Polder 29 whereas the average farm size of farmers and wage labourers were 0.224 and 0.05 ha, respectively in Latabunia.

3.2 Annual Household Income

In Bangladesh, generally adult male members of the households earn money and other family members depend on them for their livelihoods more particularly in rural areas. Some female members (10 female labourers inside Polder 29 and 10 female labourers outside Polder 29), however, were involved in income earning activities but the amount of earnings was not so substantial. In Polder 29, average annual household income for the marginal farmers was Tk 55,319.00 whereas it was Tk 45,635.00 in Latabunia. Average annual household income for the male and female wage labourers were Tk 41,972.00 and 17,555.00, respectively in Polder 29 whereas in Latabunia, average annual household income for the male and female wage labourers were Tk 36,355.00 and 10,520.00, respectively (Table 6).

3.3 Income Generating Activities

It was observed that farming has been the most common work although these selected respondents had very tiny plots to do farming. The sample households were involved in various types of income generating activities. The respondent households in Polder 29 were involved in farming, farm and non-farm labour selling, small trading, livestock keeping, etc. but in Latabunia, the selected respondents were engaged in farming activities and farm and non-farm labour selling as there is no other employment opportunity in Latabunia. Most of them had a good employment opportunity in the peak period of the most common crop growing seasons commonly in the months of January, May, August, September and December. The rural women had very limited scope to access the market and to be employed in non-farm activities due to traditional social customs and also due to lack of proper training facilities for women of rural Bangladesh. However, women in Polder 29 had better empowerment opportunity to work than the women of Latabunia because sometimes they had to go to Polder 29 to get work.

3.4 Patterns of Household Expenditure

Household expenditure spent by the disadvanaged people on different heads such as food, clothing, health, education, housing and farming are presented in Table 7. It reveals that the highest expenditure was made for food. On an average annual household expenditure of the farmers in Polder 29 and Latabunia were Tk 49,640.00 and 39,459.00, respectively. Average annual household expenditure of male and female wage labourers in Polder 29 was Tk 47,084.00 and 42,500.00, respectively, whereas average annual household expenditure of male and female wage labouerers in Latabunia were Tk 30,884.00 and 32,572.00, respectively.

3.5 Number of Disadvantaged People Affected by Natural Hazards

On 25 May 2009 Cyclone Aila hit South-western part of Bangladesh. Disadvantaged people of Polder 29 were not much affected by Aila. On the other hand, the disadvantaged people in Latabunia were highly affected by Cyclone Aila. Only 12 percent of the selected disadvantaged people were affected by Aila in Polder 29 whereas 100 percent of the disadvantaged people were affected by Aila in Latabunia. About 71 percent of the respondents in Polder 29 were affected by flood in 2010 whereas 100 percent of the respondents in Latabunia were affected by flood in 2010. Sometimes people in Polder 29 and Latabunia were affected by water logging because of improper drainage system because of having relatively lower land (Table 8).

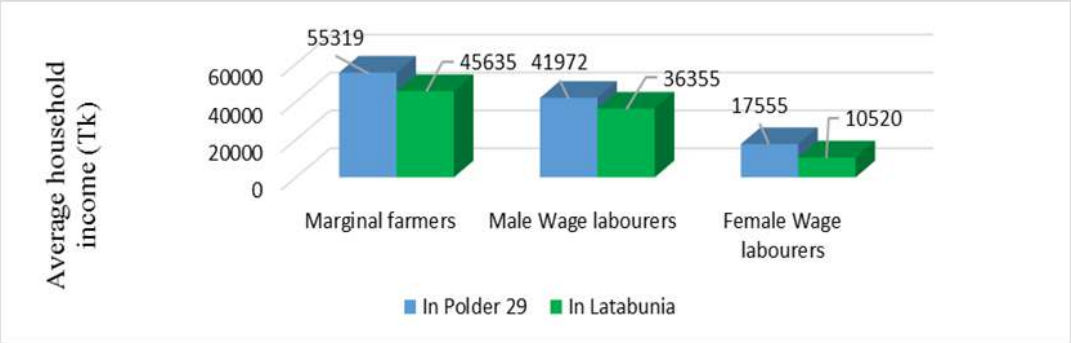

Fig. 1. Average household income of the disadvantaged people

Table 5. Average land distribution of the respondents in Polder 29 and Latabunia

Land holding		Marginal farmers		Wage labourer					
				Male		Female		Total	
		Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
In polder 29	Homestead area	0.036	16.00	0.034	100	0.036	100	0.035	100
	Owned land	0.140	62.22	-	-	-	-	-	-
	Rented in land	0.049	21.78	-	-	-	-	-	-
	Rented out land	-	-	-	-	-	-	-	-
	Total	0.225	100	0.034	100	0.036	100	0.035	100
In latabunia	Homestead area	0.027	12.05	0.046	100	0.056	100	0.050	100
	Own cultivated land	0.19	84.82	-	-	-	-	-	-
	Leased in land	0.007	3.13	-	-	-	-	-	-
	Leased out land	-	-	-	-	-	-	-	-
	Total	0.224	100	0.046	100	0.056	100	0.050	100

Source: Field survey.

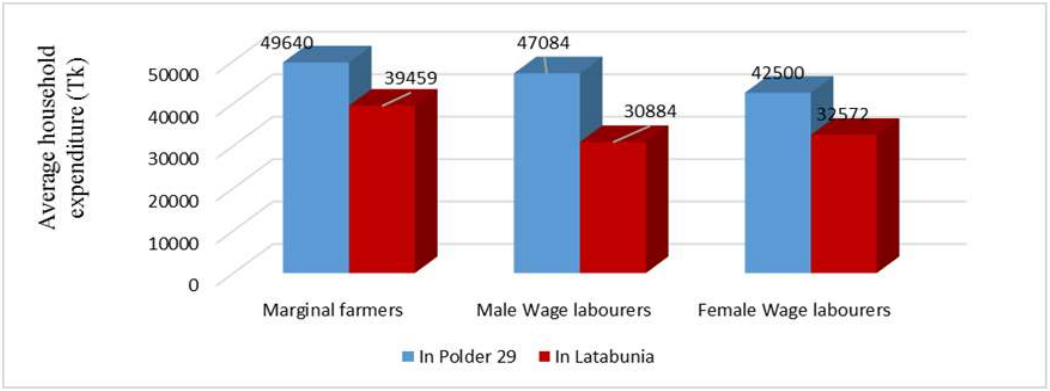

Fig. 2. Annual household expenditure of the disadvantaged people in Polder No. 29 and Latabunia Sub-Polder

Table 6. Average household incomes of the disadvantaged people with their sources

Income sources		In Polder 29			In Latabunia		
		Marginal farmers (Tk)	Wage labourers (Tk)		Marginal farmers (Tk)	Wage labourers (Tk)	
			Male	Female		Male	Female
Paddy production	T. Aman paddy	13585 (100)	-	-	10197 (100)	-	-
	Boro paddy	16790 (38)	-	-	-	-	-
Bagda cultivation		29604 (62)	-	-	23877 (100)	-	-
Labour selling		20829 (47.50)	41972	16145	16517 (70)	36355	10520
Small trading		35300 (15)	-	-	-	-	-
Livestock keeping		5373 (40)	-	4700	-	-	
All average		55319	41972	17555	45635	36355	10520

Source: Field survey.

Note: Figures within the parentheses indicate percentage of the respondents

Table 7. Annual household expenditure of the disadvantaged people in polder No. 29 and Latabunia Sub-Polder

Items of expenditure		In polder 29			In Latabunia		
		Marginal farmers (Tk)	Wage labourers (Tk)		Marginal farmers (Tk)	Wage labourers (Tk)	
			Male	Female		Male	Female
Food	Food grain (rice)	21786	23320	19305	18137	16868	16935
	Vegetables	9975	11520	12270	5665	6287	7192
	Fish and livestock	3408	3750	3170	2839	2513	2660
	Others (Oil, spices, fruits, betel leaf, etc.)	1521	2027	1810	871	880	930
Non-food	Clothing	2076	2480	2360	1790	1503	1355
	Housing and sanitation	728	667	521	473	730	925
	Health	519	647	480	617	463	410
	Education	1532	720	444	1520	680	1180
	Others (kerosene oil, *biri*/smoking, soap, coconut oil, etc.)	1468	1953	2140	963	960	985
	Farming	6627	-	-	6574	-	-
All average		49640	47084	42500	39459	30884	32572

Source: Field survey

3.6 Impact of Natural Hazards on the Livelihood of the Disadvantaged People

Natural hazards caused a lot of damage of the properties of the people of all walks of life including disadvantaged people. GaldaGher of 3.00 percent respondents in Polder 29 was flooded. It was observed that at present they did not cultivate Galda. About 69.00 percent of the respondents in Polder 29 and almost 100.00 percent of the disadvantaged people in Latabunia reported that their movement was restricted during the rainy season due to flood waters. Table 9 reveals that about 51.00 percent of the respondents in Polder 29 reported that they had lost their wage income during the flood period and 84.00 percent of the respondents in Latabunia were deprived of wage-earning income. About 11.00 percent and 36.00 percent of the sample respondents in Polder 29 and Latabunia, respectively were affected by certain

diseases (for example, diarrhea) due to flood. About 100.00 percent marginal farmers in Latabunia were lost their crop and 100.00 percent of the respondents were lost their houses and 49.00 percent of the disadvantaged people were lost their kitchen in Latabunia due to Aila. Fresh water availability of 42 percent of the respondents is decreased due to Aila.

3.7 Effects of Natural Hazards on Household Income of the Disadvantaged People Residual Effects of Aila on Household Income

Effects of Cyclone Aila on household income of the farmers of Latabunia were very high. Aila caused higher salinity intrusion in this area whereas household income of the farmers of Polder 29 was not affected by Aila. Aila affected a lot on T. Aman production of the farmers in Latabunia. They could not get their T. Aman paddy production for last two years. Before Aila, farmers of Latabunia got 4123 kg/ha from their T. Aman production. But after Aila, they get 2987 kg/ha from their T. Aman production. The production of T. Aman paddy reduced due to salinity problem caused by Aila. If the farmers in Latabunia would get the same production as before Aila then their average gross return from T. Aman production would be 65986 Tk/ha. But at present they earn only 47792 Tk/ha due to cyclone Aila (Table 11).

Table 8. Number of disadvantaged people affected by natural hazards during the last years (2009 to 2011)

Natural hazards	In Polder 29				In Latabunia			
	Marginal farmers (n_1=40)	Wage labourer (n_2=25)	Total (N_1 =65)	%	Farmers (n_1=30)	Wage labourer (n_2=25)	Total (N_2= 55)	%
Aila	4	4	8	12	30	25	55	100
Flood	28	18	46	71	30	25	55	100
Drought	5	-	5	8	7	-	7	13
Storm	4	2	6	9	12	7	19	35
Water logging	2	1	3	5	6	3	9	16

Source: Field survey

Table 9. Impact of natural hazards on the livelihood of disadvantaged people

Parameters	In polder 29				In latabunia			
	Marginal Farmers (40)	Wage labourer (25)	Total	%	Marginal Farmers (30)	Wage labourer (25)	Total	%
Flooded GaldaGher	2	-	2	3	-	-		
Broke house	2	2	4	6	30	25	55	100
Broke kitchen	2	2	4	6	15	12	27	49
Movement restricted	28	25	53	82	30	25	55	100
Loss of wage income	13	20	33	51	21	25	46	84
Loss of poultry	-	-	-	-	18	15	33	60
Loss of livestock	-	-	-	-	14	8	22	40
Eat less during natural hazards	20	25	45	69	30	25	55	100
Disease (Diarrhea)	4	3	7	11	10	10	20	36
Increased salinity level	-	-	-	-	30	25	55	100
Loss of trees	2	2	4	6	30	25	55	100
Decrease fresh water availability	-	-	-	-	14	9	23	42

Source: Field survey

3.8 Wage Income Lost Due to Natural Hazards (Aila and Flood)

As the LGED embankment was narrower and less high than the BWDB embankments; flood water came over the embankment in Latabunia in rainy season very easily and comparatively last more days than in Polder 29. Wage labourer in Polder 29 did not get any work for 10 to 12 days and wage labourer in Latabunia did not get any work for 16 to 18 days during natural hazards. After Aila, wage labourer in Latabunia lost their wage income by Tk 2000 and Tk 4000 due to flood while wage labourer in Polder 29 lost their wage income by Tk 2500 due to flood. Wage labourers in Latabunia lost more wage income because they suffered more days for natural hazards (Table 11).

3.9 Other Income Lost by the Disadvantaged People Due to Natural Hazards

The respondents also lost some income due to other damage caused by Aila. About 40.00 percent of the respondents in Latabunia lost Tk 15000.00 for the death of their livestock and 60.00 percent of the respondents lost Tk 1000.00 for the death of their poultry. About 6 percent of the respondents in Polder 29 had to spend Tk 3000.00 for repairing broken houses whereas 100.00 percent of the respondents in Latabunia had to spend Tk 6000.00. The respondents in Latabunia had to spent more money because the houses were more damaged than the houses of the respondents in Polder 29. The damage for trees of the respondents in Polder 29 and Latabunia were same, which was Tk 1500 for the respondents (Table 12).

3.10 Adaptation to Natural Hazards and Coping Strategies of the Disadvantaged People

There are two types of coping strategies adapted by the disadvantaged people during natural hazards such as:

i) Food consumption related coping strategies; and ii) Livelihood related coping strategies.

Table 10. Comparison of per hectare yield and income from T. Aman paddy of the farmers in Latabunia before and after Aila

Items	Before Aila	After Aila	Difference
Output (kg/ha)	4123	2987	1136
Gross return (Tk/ha)	65986	47792	18176

Source: Field survey

Table 11. Wage income lost by the wage labourer due to Aila and flood

Natural hazards	Wage income lost in Polder 29 (Tk/year)	Wage income lost in Latabunia (Tk/year)
Aila	-	2000
Flood	2500	4000

Source: Field survey.

Table 12. Average household income lost of the disadvantaged people for other damages caused by Aila and flood in Polder 29 and Latabunia Sub-polder

Particulars	In Polder 29 (Tk/year)	In Latabunia (Tk/year)
Loss for death of livestock	-	15000 (40)
Loss for flooded Gagdagher	12000 (3)	-
Loss for death of poultry	-	1000 (60)
Loss for houses broken	3000 (6)	6000 (100)
Loss for uprooted trees	1500 (3)	1500 (100)

Source: Field survey.

Note: Figures in the parentheses show the percentages of the affected disadvantaged people

Table 13. Coping strategies adapted by the disadvantaged people during natural hazards

Coping strategies	In Polder 29		In Latabunia	
	Number of household	%	Number of household	%
i) Related to food consumption				
Reduce quantity and quality of meal	28	43.00	55	100
Eat less preferred food, especially the road side vegetables and dry food	20	30.77	35	63.64
Adult members reduced their food consumption in order to feed children	15	23.00	40	72.72
Send children to neighbours and the homes of relatives to eat	5	7.69	30	54.55
ii) Related to livelihoods				
Take shelter in Union Council	-	-	55	100
Advanced labour selling	13	20.00	30	54.55
Borrowing money	18	27.69	35	63.64
Selling of assets like livestock, poultry, tree, household utensils	2	3.08	3	5.45
Send children to low paid works in the shops and as assistance to the rickshaw van pullers	1	1.54	2	3.64

Source: Field survey

Table 13 reveals that food consumption related coping strategies adapted by the disadvantaged people reduced both quantity and quality of meal, eat less preferred food, especially the road side vegetables and dry food, adult members reduced their food consumption in order to feed children, send children to neighbours and the homes of relatives to eat, etc. and livelihood related coping strategies had to take shelter in Union Council, borrowing money, selling of assets like livestock, poultry, tree, household utensils and send children to low paid works in the shops and as assistance to the rickshaw van pullers.

4. CONCLUSION

The findings of the present study clearly indicate that there are some slight differences among the major socioeconomic characteristics of the disadvantaged people living in Polder 29 and Latabunia Sub-polder area. There are also variations in the sources of household income and income generating activities of the disadvantaged people living in Polder 29 and Latabunia Sub-polder. No disadvantaged people in Latabunia were found to be involved in small trading and livestock keeping whereas it was common in Polder 29. The disadvantaged people in Polder 29 were less affected by different natural hazards than the disadvantaged people in Latabunia. As a result livelihood of disadvantaged people in Latabunia is more vulnerable than those of disadvantaged people in Polder 29. So, Latabunia should be taken under Bangladesh BWDB polder area for protecting them from natural hazards.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Chowdhury A. Disasters: Issues and responses, in Gain, P. (ed.). Bangladesh Environment: Facing 21st Century. Dhaka: Society for Environment and Human Development (SHED). 1998;203-220.
2. Nishat A. Review of present activities and state of art of the coastal areas of Bangladesh. In: Coastal Area Resource Development and Management. Part II. Coastal Area Resource Development and Management Association (CARDMA), Dhaka, Bangladesh; 1988.
3. Kabir A. Improvement of livelihood patterns through cereal crop production in some selected char areas of Jamalpur district. MS Ag Econ Thesis. Bangladesh Agricultural University, Mymensingh; 2009.
4. Miah TH, Mandal MAS, Haque MM, Palash MS. Livelihood adaptation of disadvantaged people of Bangladesh to economic volatility and other shocks. Final Report PR 4/08. National Food Policy Capacity Strengthening Programme. Food

and Agriculture Organization of the United Nations (FAO), Dhaka; 2010.

5. Nyborg I, Akramy J, Gotehus A. Exploring rural livelihoods in Afghanistan: A study of 10 villages in Dai Kundi Province. Department of International Environment and Development Studies, Noragric. Norwegian University of Life Sciences. N-1432 Aas, Norway, Noragric, Report. 2008;40.
6. Ali MH, Hossain MD, Hasan ANGM, Bashar MA. Assessment of the livelihood status of the fish farmers in some selected areas of Bagmara Upazila under Rajshahi District. Journal of Bangladesh Agricultural University. 2008;6(2):367–74.
7. Sultana R. Labour migration and impact of remittances on livelihood pattern in some selected areas of Tangail District. MS Ag Econ Thesis. Bangladesh Agricultural University, Mymensingh; 2009.
8. Yasmin S. A study on profitability of milk production and livelihood pattern of livestock farmers in selected areas of Mymensingh District. MS Ag Econ Thesis. Bangladesh Agricultural University, Mymensingh; 2011.
9. Nuorteva P, Keskinen M, Varis O. Water, livelihoods and climate change adaptation in the Tonle Sap Lake area, Cambodia: learning from the past to understand the future. M.Ec. Dissertation, Aalto University, Finland; 2010.
10. Saha S. Climate change, livelihood and human rights: A case study. MSc. Thesis, Norwegian University of Science and Technology (NTNU), Trondheim, Norway; 2009.
11. Khalequzzaman. Flood control in Bangladesh through best management practices. M.Ec. Dissertation, Georgia Southwestern State University, USA; 2005.
12. Sharmin S. Socioeconomic impact of developing shrimp industry on livelihoods stakeholders and women in Bangladesh. MS Ag Econ Thesis. Bangladesh Agricultural University, Mymensingh; 2006.
13. BBS. Statistical yearbook of Bangladesh. Bangladesh Bureau of Statistics. Ministry of Planning, Government of People's Republic of Bangladesh, Dhaka; 2010.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/16370