

**EFFECTS OF LAND USE CHANGES ON LIVELIHOOD
PATTERN OF SMALL FARMERS**
A case study of Madertala village under Dumuria upazila in Khulna District

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ABSTRACT

In Bangladesh, the livelihood of rural people is dependent largely on agricultural activities but only the paddy production in small pieces of land is not sufficient to satisfy the needs for survival of the small farmers. So they started thinking about the alternative use of lands in order to get increased output from these small pieces of land and found a new way of using their scarce resource in mixed nature. As the same piece of land is used for two or more different productive purposes in a single year these changes in land use have effects on livelihood pattern largely in employment pattern, income, seasonality, social identity etc. This study identified the issues on how the livelihood pattern of the small farmers has changed with the changes of land use.

Keywords: Land use, livelihood, small farmer, crop-agriculture, agri-shrimp culture

INTRODUCTION

In the course of time, the land use pattern has been changing in Bangladesh. These changes have impacts on livelihood pattern of the people who are dependent on land directly or indirectly. Most of the land in rural areas is used for agricultural purpose. The productivity of land in Bangladesh is comparatively low in comparison to the counterpart in the world (Hossain, 1984 in Kabir, 1995) and for this, the poor people of rural area suffered very much. Rice, jute, sugarcane, tea etc. are mainly grown in the cultivable land. The poor people of the rural areas have been struggling to break down the vicious circle of the poverty. Khulna lies in the southern part of Bangladesh where cultivable land use pattern has been changing in last few decades very drastically. This type of changes has been occurring mainly for shrimp culture. The people of this area tried to seek alternative strategies to cope with the poverty. As a result, they found a new way of using their scarce resources in mixed nature. This mixed use of land includes the cultivation of rice and shrimp culture on the same parcel of land which creates an ample scope of work. As a result, its effect on rural economy is very much significant and the livelihood pattern has been changing over the year in this region due to these changes of land use. After identifying constraints on people's livelihoods, it can suggest which kinds of rights are

most important for a particular group at a particular time (Conway, et al. 2003). This study identified those effects and the resulting consequences including the parameters such as employment pattern, production, cropping intensity, housing type, seasonality, marketing system, migration, food intake etc.

OBJECTIVES

- To delineate the present and past land use pattern of the study area
- To identify the changes in livelihood pattern of the small farmer with the changes in land use of the study area

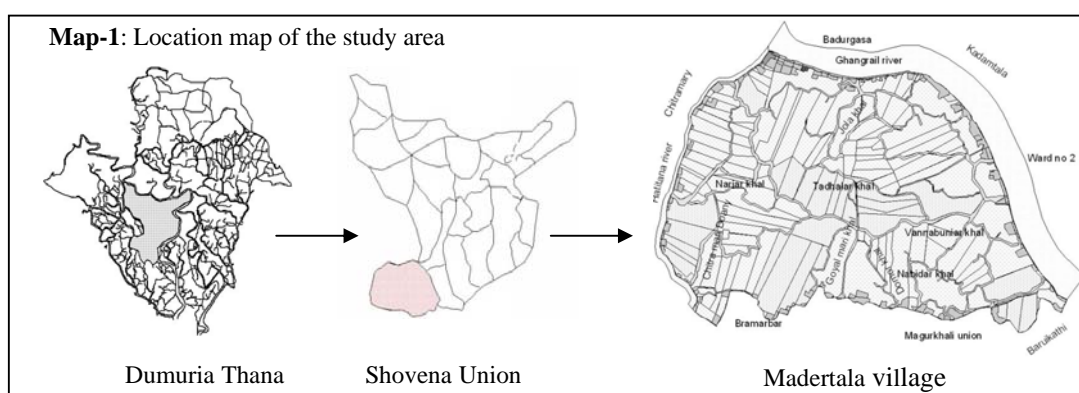
METHODOLOGY

This systematic methodology started through problem identification and ended by explaining the effects of land use changes on livelihood pattern of small farmer. Primary data were collected through a intensive plot-to-plot land use survey to identify the land usages for various purposes such as agriculture production, only shrimp production, both agriculture and shrimp production and lastly agriculture, shrimp and others production. Again, a detailed household survey was carried out to collect information on employment, income, expenditure, occupational seasonality, education, food intake, social identity of the household. Focus

group discussion was conducted with different categories of people *i.e.* day laborers, shrimp cultivators, landowners, village leaders. Secondary data were collected from secondary sources such as- Government Organizations, relevant books or journals, published and unpublished documents, and newspapers. In this study, the households owning homestead only and equal or less than 1-acre land termed as small farmer.

Madertala village was selected as study area because there exists a notable number of mixed land use plots and represent a chronological change

in land use pattern in Khulna region. The shape of Madertala village is half circle type and along the circumference surrounded by Ghangrail River (with tide) and Hatitana River (no tide). It is located within polder no 28 (Khulna) of Water Development Board. So the area is protected from high tide of river and flood. The study area comprises a total area about 362.5 acres. Most of the lands is used for production of agro-products and shrimp cultivation. The soil is mainly flat alluvial sediments that consist mainly silt clay and free from stones and lumps. The fertility of soil is not high.



TREND OF LAND USE TRANSFORMATION

Long-term land use changes are associated with secure land tenure, labour availability, proximity to the farmstead and learning opportunities (Beyene, 2003). Comparing the present land use information with those of the previous condition for a selected area it is possible to determine how effectively the potential land in that area is being used. An attempt was taken to analyze the pattern of land use

changes in the study area during the study period (1970-2006). For this purpose, the following major land use categories are identified in the area. In general, the area under settlements, ponds, institutions, fisheries and agri-fisheries land have increased. On the other hand, crop agriculture and canal have decreased during the same period. The land under road and commercial uses remain unchanged during this period.

Table-1: land use of the study area in 1970, 1990 and 2006 (unit in acres)

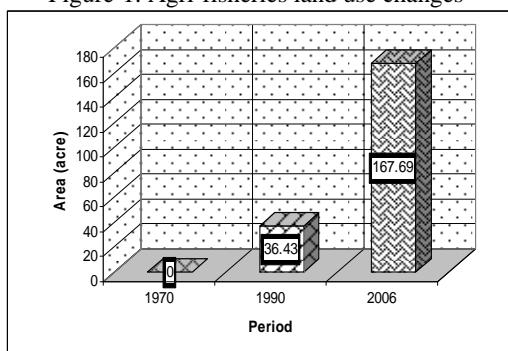
Category		1970 (A)	%	1990 (B)	%	2006 (C)	%	B-A	C-B	C-A
Settlement		18.96	5.23	29.44	8.12	33.82	9.33	10.48	4.38	14.86
Crop agriculture		276.84	76.37	225.51	62.21	79.13	21.83	-51.33	-146.38	-197.71
Water body	Pond	11.89	3.28	13.95	3.85	17.05	4.71	2.06	3.1	5.16
	Canal	26.57	7.33	25.19	6.95	19.06	5.26	-1.38	-6.13	-7.51
Fisheries		5.6	1.55	8.44	2.33	18.89	5.21	2.84	10.45	13.29
Agri-fisheries				36.43	10.05	167.69	46.26	36.43	131.26	167.69
Road		15.5	4.27	15.5	4.27	15.5	4.27	0	0	0
Commercial		5.33	1.47	5.33	1.47	5.67	1.56	0	0.34	0.34
Institution	Religious	1.8	0.5	1.8	0.5	1.8	0.5	0	0	0
	Educational	0.0	0.0	0.92	0.25	3.12	0.84	0.92	2.2	3.12
	Others	0.0	0.0	0.0	0.0	0.75	0.21	0.0	0.0	0.75

Source: Field survey, 2006

Agri-fisheries Land

In 1970's there had no agri-fisheries land in the study area. But with the passes of time the agri-fisheries land has covered in significant amount. In 1988, a landowner first started this use of land in his own farmland. Then it introduced as a profit maximization process to all and they started to adoption this kind use of land. The agri-fisheries land has covered 36.43 acres and 167.69 acres being 10.05 percent and 46.26 percent during 1990's and 2006's respectively. During 1970 to 1990's and 1990's to 2006's 36.43 acre and 131.26 acre land has come under agri-fisheries land. In Figure-1, the bar chart of agri-fisheries land indicates that the agri-fisheries land has increased faster rate during 1990's to 2006's than 1970 to 1990's.

Figure-1: Agri-fisheries land use changes

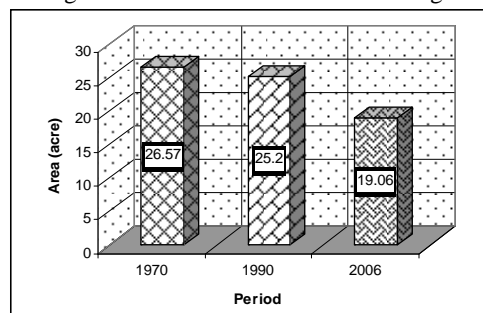


Source: Field survey, 2006

Canal

In the study area, there are eight canals. During the study period, it was found that the land under canal has decreased. In 1970's and 1990's the total land under canal was 26.57 acres and 25.19 acres, which is about 7.33 and 6.95 percent of total land. But during 1990's to 2006's the land under canal has decreased significantly and at present it is 19.06 acres, which is only 5.26 percent of the total land. The land under canal converted into 'Khas land' which is used as agri-fisheries land. On the other hand, these changes of land use decreased the irrigation facilities in dry season as well as decreased the scope of boating facilities in monsoon. But any agricultural land will be more productive if there has a canal around the land for irrigation (Biswas, 2000).

Figure-2: Canal water bodies use changes

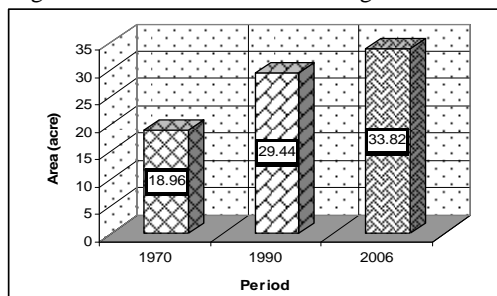


Source: Field survey, 2006

Settlements

Figure-3 shows that a significant expansion of settlement has occurred during the study period. In 1970 the settlement was 18.96 acres. In 1990's, 10.48 acres have added with settlements from the other land uses, where as, in the year 2006's, 4.38 acres land added with settlements from the other land uses. It indicates that the transformation of land into settlements from other land uses (mainly agriculture land) occurred faster rate in 1970-90's than 1990-2006's as the population increases day by day.

Figure-3: Settlement land use changes



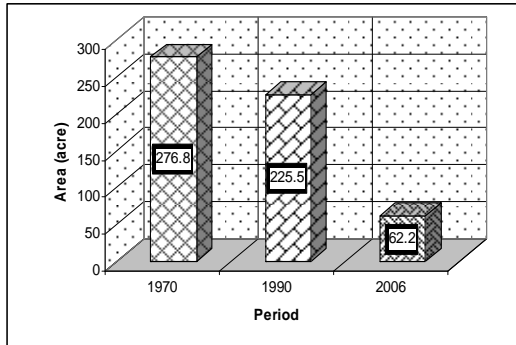
Source: Field survey, 2006

Crop Agriculture

The land under crop agriculture land was covered 276.84 acres, 225.51 acres and 79.13 acres being 76.37 percent 62.21, percent and 21.83 percent during 1970's, 1990's and 2006's respectively. It has decreased and converted in to settlements and agri-fisheries land. During 1970 to 1990's and 1990's to 2006's 51.33 acres and 146.38 acres agriculture land has converted into agri-fisheries land. The following Figure-4, indicates that the agriculture land has decreased faster rate during 1990's to 2006's than 1970 to 1990's. Furthermore,

with the decreases of crop agricultural land the grazing land and play field also decreased.

Figure-4: Crop agricultural land use changes

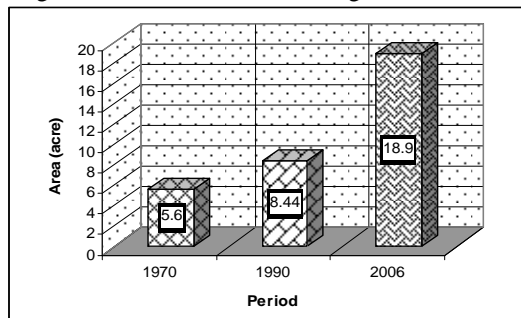


Source: Field survey, 2006

Fisheries

The fisheries land was covered 5.6 acres, 8.44 acres and 18.89 acres being 1.55 percent 2.33, percent and 5.21 percent during 1970's, 1990's and 2006's respectively. It has increased with the passes of time. During 1970 to 1990's and 1990's to 2006's 2.84 acre and 10.45 acre agriculture land has converted into fisheries land. In figure-5, the bar chart of fisheries land indicates that the agriculture land has increased faster rate during 1990's to 2006's than 1970 to 1990's. In addition, this increased fisheries sector has been supplying supplementary fish nutrient to the people of study area.

Figure-5: Fisheries land use changes



Source: Field survey, 2006

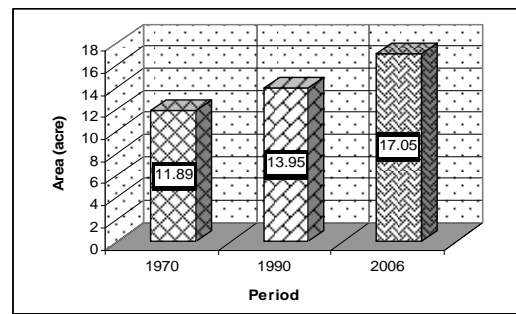
Pond

The study area contains a large number of ponds. Ponds have increased due to increase of settlement of the study area. In 1970s, 1990s and 2006s the total numbers of pond were 78, 115 and 165

respectively. The average size of pond in the study area were 75' x 65'. In 1970s, 1990s and 2006s the pond area occupy 11.89 acre, 13.95 acre and 17.05 acre being 3.28, 3.85 and 4.71 percent of total land. To minimize land and water use conflicts, in areas with low population density, increase of pond is a constructive entry for livelihood (Patrik, 2002).

The ponds of the village remain the water level of 4-6 ft in summer season and 8-10 ft in the monsoon of rainy season.

Figure-6: Pond increasing in different period



Source: Field survey, 2006

Institution

There were two primary school, one high school, one college, two temples, one mosque, and one health centre in study area. The land under institutions have increased, only 3.89 acres during the study period. In 1970 and 1990, 1.8 acres and 2.72 acres of total land of the study area were used for these purposes while it composes 5.69 acres at present.

Commercial

The total commercial land in the study area is 5.67 acre in present time. The commercial land has increased only 0.34 acres being 0.9 percent of the study area during 1990's to 2006's. Most of the structures in commercial area are Katcha and semi pucca. The number of shops increased over time.

Road

In the study period, there were no changes in land under road. There are two types of road in study area one was constructed by WAPDA and CARE constructed another one. The amount of land under road was 15.5 acres, which was about 4.27 percent of the total land.

CHANGES OF LIVELIHOOD

From the various indicators of livelihood only four indicators income, occupation, seasonality and social identity was selected because the changes of land use mainly effects on those indicators of livelihood in the study area.

Occupations

There has significant changed in the occupational pattern in the study area. In the study area, most of the household head's occupations were agriculture in 1990. Later than the land use changes of the study area most of the farmers have changed their principle occupation and switch over to gher. They are engaged in multi purpose activities. Their goal was to continue their livelihood with ample scope of work throughout the year so that they may not have any nil income periods. So besides agriculture, people frequently are engaged in gher, shrimp peddler, handicraft, transport, fishing and other services. Since an ample scope of employment has created with the changes of land use, the labor demand also increased in the study area. So the small farmers who always suffer for no working opportunity as well as the women involvement in relevant work of agri-fisheries increased.

Agricultural land non-agricultural labor

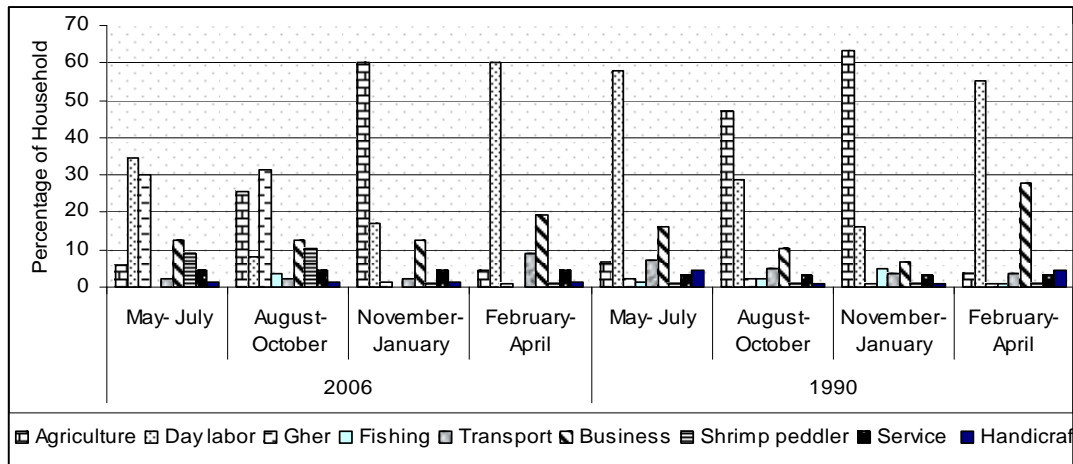
Household whose major source of income during the preceding year was farm working as agriculture labor were considered as agriculture labor household. In 1990, the working people in the

study area were engaged as labor in crop agriculture but in 2006 those people engaged as labor in shrimp culture related working and generated more income than before. So the household who have no own land but with the changes of land use changes their occupation and continuing a sustainable livelihood. Sustainability will achieve when a livelihood can cope with and recover their stresses without undermining the natural resource base (Carney, 1998). Again, the households, who earn their livelihood from the non-agriculture activities, are called the non-agriculture labour households. The households engaged in transport, services and handicraft were included in this category. Through the land use changes there have no direct effects on those categories of household but indirectly there have some effects on those categories.

Occupational Seasonality

In 1990, November to January was the peak season of income from agriculture and the other months of the year they were looking for per time employment. In 2006, November to January is still the peak season of income from agriculture and the other months of the year they engaged in shrimp cultivation and other work relevant with shrimp culture. March, April, May and June- this four month were the little income period for the farmer day labour and fisherman before land use changes but after land use changes the people have scope to work as day labour in shrimp farm for excavation and make or repair of ring road of gher.

Figure-7: Seasonality of the occupation of the household in the study area



In 2006, about 36 % and 30% of household heads were engaged in day labor and gher in the period of May to July but in 1990, it was 56 and 7% respectively. Before land use change, 47% and 7% household heads were engaged in crop agriculture and gher business in the period of August to October but after land use changes it is 26 and 32% respectively. Similarly, in 2006, 60 % and 19% of household head are engaged in crop agriculture and day labor in the period of November to January but in 1990, it was 62 and 16 % respectively.

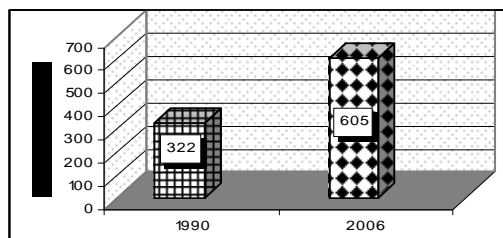
Seasonal Unemployment

Seasonal unemployment is a vital issue for poverty in Bangladesh (Kabir, 1995.). In 1990, the main source of employment for small farmer and day labour was crop agriculture related. As a result, from February to June and September to December the villagers were suffered in employment. But in present the working people in the study area are engaged in shrimp culture. So after changes of land use the rate of seasonal unemployment decreased. So it becomes more helpful for small farmer because now they have no apprehension for seasonal unemployment.

Income

Income is one of the best indicators to measure the livelihood pattern of a community. Livelihood pattern of a community absolutely related to income. Income diversification is vital things to improve livelihood, there are no quick solutions that will be sustainable and growing over time (Thunberg, et al, 2003). The income pattern of household in study area changes with the changes of land use. All households in the study area have influenced directly or indirectly by land use changes. Positive impact of land use changes can be visualized by comparing the monthly per capita income of the people of the study area in different years.

Figure 8: Monthly per-capita income (Taka)



Source: Field survey 2006

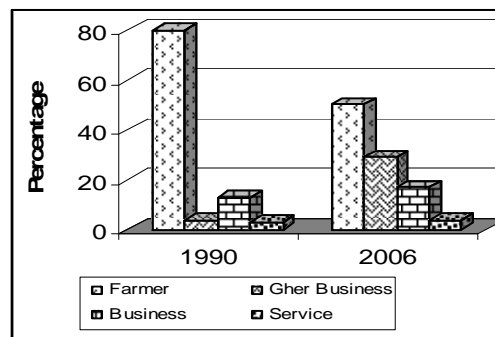
Prior to the land use changes there were a drastic seasonal income variation because they had no available income opportunity all over the year but after land use changes they earn money around the year. The high income period is November to January and May to July in 2006 but in 1990 it was only at the season of November to January.

In the study area, there are 43 households who have shrimp gher in their own land in 2006 but in 1990 it were only 3 households. So it can be seen that by this study period 40 household changes their land use from crop agriculture to agri-shrimp culture. The people who have own agri-shrimp firm generate income from shrimp and from crop agriculture where the people who have no shrimp gher generate income only from crop agriculture. So though a small farmer has a piece of land but he generated more income after changing his land to agri-shrimp culture.

Social identity

It is a very important concern that which identity ones prefer more in his society. The social identity of the household head changed with the changes of land use. In 1990 the people who introduced with others as a farmer or a day labour but now he gives his identity as a gher owner because he changes his land use through shrimp cultivation. That gives more satisfaction to a small farmer. Social identity of different household head in different time in the study area is given in figure-9.

Figure-9: Social identity



Source: Field survey 2006

Decrease dependency on Mohajon

Ownership of land is considered as one of the most important determinants of livelihood status in rural Bangladesh. In study area, most of the poor are small farmer so they had to depend on Mohajon (landlords). But after changing the land use the

dependency on Mohajon has decreased to a great extent. Based on monopoly control, there is a propensity among the large landowners in the study area in the past. The small farm owners share the land from Mohajon and get small portion of crop form sharecropping. Unfair tenancy relation can be considered in this respect. In order to carry on the livelihood, small farmers require access to land through share and other forms of tenancy. The terms and conditions of tenancy were not favorable to them and their rights were not secured. But in 2006 in study area there has available scope to generate income without sharecropping under a Mohajon so the small farmer are getting additional benefit from land use changes.

Pressured on small farmer

In the study area there are some farmers who have land besides the large farmer's land. When any land come under shrimp cultivation then it is needed to make a dike around the land. In case of small land if a dike is construct around the land the rest of the land is not sufficient for shrimp cultivation. As a result, when the small parcel land come under shrimp farm, the large farmers take lease the land from small farmer. In the study area, there are 11 household who had to lease or share their land to large farmer for shrimp farming. So if a small farmer lease or share his land to a large farmer, he has little right on this land. So it is on of the main difficulty of land use change to agri-shrimp for small farmer.

Conclusion

A significant change has occurred in agriculture land in the study area. About 46.26 percent of the total land has changed from sole agriculture to agro-shrimp farm during this period that has a resulting effect on the change of livelihood pattern of the small farmer in this area. Before the land use change the small farmers were engaged in crop agriculture as a result they fully engaged in work only for harvesting period of paddy over the year. The scope of employment opportunity and working hour has changed with the changes of land use. At the same time, some households owning no parcel of agricultural land get access to income generating activities all over the year that leads to the change in income pattern of those people.

Therefore, the study reveals that in rural area the land use changes from crop agriculture to agro-shrimp culture have a positive effect on livelihood

of the small farmer in Bangladesh. In the context of present poverty situation of Bangladesh agro-shrimp culture can play a great role in poverty alleviation and better livelihood of rural poor.

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