Community Livelihood of Wetland Dwellers and their Dependence on Natural Resources in Bangladesh

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A B S T R A C T

This study aimed at exploring the status and pattern of community livelihood of the *Chalan Beel* area and its dependence on natural resources. A quantitative oriented qualitative method has been applied to understand the status and pattern of livelihood of community people at *the Chalan Beel* area, and their dependency on *Beel* resources. The study reveals that the level of yearly income was very low for community people. The majority (52.42%) had a yearly income of 10,000 Tk. to 1,60,000 Tk. while 89.32% had no hygienic latrine and 40.29% had no hygienic source of water. Only 14.07% become unemployed in the rainy season and 32.52% of people temporarily migrate to the other area. The study reveals that only 1.94% dwellers were highly dependent while 45.15% and 66.31% were dependent and slightly dependent, respectively.

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Introduction

The community livelihood of the wetland area goes through various challenges. Natural resources alleviate these challenges in many ways. *Chalan Beel* is the largest wetland in Bangladesh (Hossain *et al*., 2009). Historically 5 million people's livelihoods depended on it (Sayeed *et al.,* 2015). The existence of the *Beel* constitutes the livelihood of the community people in a particular way. Nevertheless, the development interventions like the construction

of dams, embankments, roads, railways, and industries reduced the total water body and created a non-conventional ecological condition. The source of income of people based on its natural resources has been hampered. In addition, the non-conventional ecological condition has also created challenges for the farmers. The ecological condition of the wetland defines the livelihood activities of the community people. Thousands of landless people survive on the *Beel* natural resources from the historical period. Crops cultivated in the *Beel* area contribute to the fulfillment of the food demand of local communities (Rahman *et al*., 2010). *Chalan Beel* retains a diverse range of fish, aquatic invertebrates, birds, and other aquatic animals upon which the local economy and livelihoods of some 5 million people depend (Hossain *et al.,* 2009). During the last half-century, development interventions have been undertaken in this area; mainly to increase food production for an increasing population, improve road systems, industrialization, and urbanization (Rahman *et al.,* 2010). The development interventions like constructions of embankments, dams, hydraulic structures, roads, and railway lines have reduced the total water body. Because of these development interventions and global climate change, the natural resources of the wetland have decreased and the natural water flows have been damaged (Ahashan *et al.,* 2008). The thousands of landless people depending on the natural resources have lost their livelihood activities. They have been engaged with alternative activities and many people have been unemployed. The difficulty of livelihood has harshly appeared to them. The misery and difficulty of livelihood have also appeared to those people who lead their lives by cultivation in the area (Alam, 2016). It has been very difficult to cultivate crops because of the inconvenient water and ecological condition of the area. In a word, the community people cannot depend on the natural resources of the area thus their livelihood is going through a hard condition (Johnson, 2013). The landless people are facing livelihood challenges and landowning farmers are facing livelihood challenges in the area (Alam *et al.,* 2017). Historically, *Chalan Beel* supplies groundwater to its surrounding area, keeps the northern region of Bangladesh free from drought in the non-rainy season, and helps to mitigate the challenges of flood in the rainy season by depleting excess floodwater through it.

The sociological study aiming to understand the livelihood pattern and the livelihood challenges of the *Beel* community remained unexplored. The overall purpose of this study was to assess the livelihood pattern of the *Chalan Beel* community and its dependency on natural resources. Specifically, the study tried to assess the human capital, physical capital, and financial capital of the Chalan Beel community. The study also tried to understand the dependency pattern of the community on natural resources.

Empirical research on the wetland dwellers' livelihood is very rare not only in Bangladesh but also in the world of sociological discourse. The anthropological studies on wetlands can contribute to provide analytical insights on the issue. It is difficult to establish a sociological understanding without keen sociological theory. Considering this type of weakness, we have tried to find out a sociological analysis of the community livelihood of the *Chalan Beel* area. This study will help building a sociological understanding of the *Beel* and community people relations. Therefore, the study aims to analyze the ecological dependency and livelihood patterns of *Beel*-inhabited people. The study will also help the policymakers to take effective initiative to improve the livelihood status of the wetland dwellers.

Methodology

The *Chalan Beel* is situated between 24.35° to 24.70°N and between 89.10° to 89.35°E. Historically, the *Beel* was spread over the 18 Upazila (sub-districts) of six districts, including Rajshahi (Paba, Bagmara, and Mohonpur), Pabna (Chatmohor, Vangura, and Faridpur), Sirajgonj (Tarash, Ullapara, Raigonj, and Shahjadpur), Natore (Sadar, Singra, Gurdaspur, and Baraigram), Naogaon (Manda, Raninagar and Atrai), and Bogra (Nandigram). It presently spreads over only 10 Upazilas including Singra, Gurdaspur, Boraigram, Chatmohor, Bhangura, Faridpur, Shahjadpur, Ullapara, Tarash, and Raigonj of three districts of Natore, Pabna, and Sirajgonj.

At the onset of the research, the total numbers of households within 500 meters from the boundary of the *Beel* were determined by a rapid survey. Households were then selected randomly from each settlement so that 20% of households formed samples for the interview. In total, 206 households were surveyed in nine small villages in three unions of Tarash Upazila of Sirajganj district. The nine selected villages were Nado syedpur, South Sampur, Ambaria, Hamkuria, Dobila, Ghor gram of Magura Binod Union and Kamarson, Makorson, and Kondoil villages of Soguna Union. Usually, household heads were interviewed but, in their absence, any member willing to participate was interviewed.

A quantitative oriented qualitative method has been applied to understand the status and pattern of livelihood of community people at *Chalan Beel* area and their dependency on *Beel* resources. The primary data were collected using various data collecting methods such as in-depth interviews, key informant interviews, Focus Group Discussions (FGDs), and direct observation. The interview was carried out in June 2015 using a structured interview schedule. The survey team consisted of the researcher and a field assistant. Before the survey, a pilot survey was conducted by the assistant to test the completeness of the questionnaire. After such a study, researchers modified some questions to improve clarity and minimize biases. In-depth interviewing is a qualitative research technique that involves conducting intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program, or situation (Hossain & Szabo, 2017). In the present research, in-depth interviews were conducted to understand the perspectives of agricultural farmers and landless people on the livelihood challenges they face in the study area. Additional information on the livelihood status of the community people was obtained by administering key informant interviews. Researchers interviewed chairman, members, and female members of union parishad as Key informants. Seven key informant interviews were conducted in the selected site of the study. Focus groups allow interviewers to study people in more natural settings. To understand the livelihood pattern of the community people, 12 FGDs were conducted in the study area. A transect walk was also carried out around the *Beel* area to observe the livelihood pattern of the community people and the changes in the dependency on the *Beel* resources. Secondary data were obtained from published documents, journals, articles, websites, thesis, maps, pictures, records from local institutions, etc. For this, libraries of relevant institutions and organizations were visited.

"A livelihood comprises the capabilities, assets (stores, resources, claims, and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term" (Chambers and Conway, 1991). Department of International Development (2005) developed the Sustainable Livelihood Approach (SLA). To assess community livelihood, SLA was widely applied (Kusters *et al.,* 2006; Wei *et al.,* 2008; Haque *et al.*, 2009; Cai & Gong, 2014). According to SLA, five asset categories form the main components of people's livelihood- natural, physical, human, financial, and social assets. Considering the situation of the study area, we took three asset categories -Human asset, financial asset, and Physical asset. Under these three categories, we selected some indicators based on the reality of the study area and research limitations (Table 1).

Table 1 Livelihood indicators

Assets	Indicators
Human	Education
	Occupation
	Employment opportunities
Financial	Income
	Livestock rearing
	Crops cultivation
	Loan facilities
Physical	Housing pattern
	Sanitation and drinking water
	Health facilities
	Electrification, Television/Radio, and Mobile phone use

To measure the dependency on natural resources, the respondents were categorized in three specific groups- slightly dependent, dependent, and highly dependent. Each of the categories had specific characteristics. The respondents had been considered 'Highly dependent' who got housing materials free of cost, catch fish, and collect other natural resources from the *Beel* (Islam & Hossain, 2014). The respondents had been considered as 'Dependent' who caught fish from the *Beel* and depend on the *Beel* for other purposes such as bathing, boating, livestock grazing, etc. but they did not collect natural resources for building houses. (Ayeb-Karlsson *et al.*, 2016). Other respondents had been measured as 'Slightly dependent' who did not catch fish but were dependent on the *Beel* for other purposes, such as bathing, swimming, boating, livestock grazing, etc. (Nayak, 2017).

The collected data were analyzed both quantitatively using SPSS software. Besides, qualitative data were analyzed without using the software. All questionnaires were scrutinized to detect errors and omissions. Accurate data that are consistent with other facts were included for coding and tabulation. Attribute data such as gender, religion, occupation, literacy was assigned numerals. The answer to the open-ended questionnaire was coded after

the survey and before putting it into SPSS software. The analyzed data were interpreted using graphs, figures, tables, and texts.

Result and Discussion

Demographic characteristics of the respondents

Mostly the respondents were household heads. In absence of a household head, the second person who takes most of the decision in the household was also considered as respondents. The proportion of male respondents was slightly higher than that of the female respondents. One hundred fifty-eight male and forty-eight female respondents were surveyed. Table 1 shows that the range of age of the respondents was from 22-81 years with a mean age of 43.19 years and a standard deviation of 14.34 years.

Table 2 Demographic characteristics of respondents

Characteristics (Measuring unit)	Score Range		Categories	Response	
	Possible score	Observed score		No	%
Age (year)	Unknown	22-81 years	Young (22-31 years)	49	23.76
			Middle-aged (31-51 years)	102	49.51
			Old age (51-81 Years)	55	26.69
Sex	Unknown		Male	158	77
			Female	48	23

Community livelihood of wetland dwellers

Three livelihood assets presented the community livelihood of *Chalan Beel* dwellers.

Human Capital

Education

Table 3 shows that most of the respondents (66.99%) had no formal education. Some of the respondents completed primary level education (10.68%) and 5.83% of the respondents did not complete the primary level of education (Primary level dropped out). Very few percentages of respondents completed the secondary level (5.88%), higher secondary level (2.91), graduation level (1.94%), and post-graduation (0.97%) level of education. The rest of the respondents completed class eight (2.91) and 1.94 percent did not complete class eight level of education.

Table 3 Level of education of *Chalan Beel* community

Characteristics (Measuring unit)	Score Range		Categories	Response	
	Possible score	Observed score		No	%
Education (Years of schooling)	Unknown	0-15	No education	138	66.99
			Primary complete	22	10.68
			Primary incomplete	12	5.83
			Class eight complete	6	2.91
			Class eight incomplete	4	1.94
			Secondary complete	12	5.88
			Higher secondary complete	6	2.91
			Graduation complete	4	1.94
			Post-graduation	2	0.97

Occupation

Table 4 shows that the occupation of the *Chalan Beel* community varied from the summer season to the rainy season. In the study area, agriculture is the main occupation of most of the respondents in the summer season. Taking agriculture as their primary occupation, they find other ways of earning. During the survey, it was found that most of the respondent's occupation was farming in their land (32.03%) during the summer season. They did not seek to sharecrop land for cultivation. The survey also found some farmers cultivate in their land and sharecropping land (5.83%), and some farmers take a lease from other farmers (1.94%) in the area. In the summer season, some (14.07%) respondents do informal work outside the community. They were mainly fishermen in the community while others were agricultural day labor (8.73%), and non-farm day laborers (6.31%). Mainly these respondents had no land to cultivate. Therefore, they were also involved with fish trading (2.91%), livestock rearing (3.88%), and transport laboring. As the percentage of educated people was very low, only 3.40% of respondents are government service holders. Therefore, it can be said that many people (39.81%) have their agricultural cultivation, whether in their land or leased land in the summer season. Islam & Kitazawa (2013) found similar result. In the rainy season, the farmers usually become unemployed. However, the respondents who have high land in the *Beel* can cultivate (4.85%) in the rainy season. Most of the people who have no cultivable land are usually involved with full-time fishing (26.70%) and part-time fishing (15.04%) in the area. Many people also earn through agro-day laboring (8.73%), livestock rearing (6.31%) small trading (10.19%), transport laboring (6.79%), and informal work outside (1.46%). During the survey, researchers found that many people (23.78%) become unemployed. They reported their total earnings in a year based on occupation in the rainy and summer season. These different categories are not mutually exclusive. They become

unemployed during this period so that they do not catch fish in the rainy season. During FGD, A 51 years old respondent, have cultivable land and do not catch fish in the *Beel,* responded during conducting FGDs,

"We cultivate crops for one time in a year, then we harvest the crops. We come back to home and then we rare cows, goats, hens, etc. In this way, we spend another six months of the year. After those 6 months, we go to Chalan Beel to earn from cultivation" (A 51-year-old male farmer of Kushabari village of Binod union, Tarash Upazila, Shirajgonj).

Table 4 Occupation of the respondents

Occupation in a summer season		
Categories	Frequency	Percentage
Farmer (own land)	66	32.03
Farmer (own & sharecropper)	12	5.83
Farmer (leasing)	4	1.94
Informal work in outside	29	14.07
Non-farm day laborer	13	6.31
Transport laborer	25	12.14
Agro Day laborer	18	8.73
Small trade	17	8.25
Livestock rearing	8	3.88
Govt. service	7	3.40
Fish trading	6	2.91
Old/disabled	1	0.49
Occupation in a rainy season		
Full-time fishing	55	26.70
Part-time fishing	31	15.04
Unemployed	29	14.07

Small trade	21	10.19
Agro day laborer	18	8.73
Transport labor	14	6.79
Livestock rearing	13	6.31
Farming in own land	10	4.85
Boatman	6	2.91
Farmer (leasing)	4	1.94
Informal work in outside	3	1.46
Imamate	2	0.97
Total	206	100.00

Employment opportunities

Community people who have no cultivable land usually go to other regions of the country for work during the summer season. The study found that 29 percent of the respondents go to other districts for work in the summer season. They usually go to Dhaka, Chittagong, and kumilla for work. In the rainy season, they come back home and catch fish in the *Chalan Beel*.

Financial Capital

Income

Because of the variation of occupation based on season, the income of the households varies. The household income is very much linked with the ecological conditions of the wetland area.

Income of the household during last six months (the summer season)

Among the farmers, 58.53 percent earned 10,000-70,000 Tk. and 41.46 percent earned 90,000-1,50,000 Tk. in six months during the summer season. Among those who were related to laboring in agriculture, non-agriculture, and transport, 62.5 percent earned 20,000-40.000 Tk. and 37.5 percent earned 41,000-70,000 Tk. in six months during the summer season. The study found that 65.51 percent earned 48,000-90,000 Tk. and 37.48 percent earned 91,000-1,20,000 Tk. who were involved with informal work outside the community. Respondents whose profession were fish trading, livestock rearing, and small trade, 38.70 percent of them had 5,000-60,000 Tk. and 61.29 percent had 1,00,000 -2,00,000 Tk. income during the summer season (Table 5).

Table 5 Distribution of household income by season (last six months)

Category of occupation	N=206	Range of income Tk. BD	Frequency	Percentage
Household income in the summer season				
Farmer (own land), farmer (own & sharecropper), farmer (leasing)	n=82	10,000-70,000	48	58.53
		90,000- 1,50,000	34	41.46
Agri. day labor, non-farm day labor, transport labor	n=56	20,000-40,000	35	62.5
		41,000-70.000	21	37.5
Fish trading, livestock rearing, and small trade	n=31	5,000-60,000	12	38.70
		1,00,000-2,00,000	19	61.29
Informal work in outside	n=29	48,000-90,000	19	65.51
		91,000-1,20,000	10	34.48
Household income in the rainy season				
Category of occupation		Range of income Tk. BD	Frequency	Percentage
Farming in own land, farmer (leasing)	N=14	10,000-70,000	8	57.14
		90,000- 1,50,000	6	42.86
Agriculture day labor, Transport labor	N=31	20,000-40,000	11	35.48
		41,000-70,0,00	20	64.51
Full-time fishing, part-time fishing	N=102	25,000-35,000	65	63.72
		36,000-40,000	37	36.27
Small trade, Boatman	N=18	5,000-60,000	16	59.25
		1,00,000-2,00,000	11	40.74
Informal work in outside	N=3	48,000-90,000	2	66.66
		91,000-1,20,000	1	33.33
Unemployed	N=29	No Income		
Yearly income Tk. BD				
Govt. service		1,44,000-1,50,000	7	100
Imamate		30,000-50,000	2	100

Income of the household during last six month (the rainy season)

The table shows that farmers who cultivated in the rainy season had six-month's income of 10,0 00-70,000 Tk. (57.14%), and 90,000-1,50,000 Tk. (42.86%). The respondents who were involved with agriculture day laboring, transport laboring, 34.37 percent of them had a six-month's income ranging from 20,000-40,000 Tk. and 67.74 percent had 41,000-70,000 Tk. During the rainy season, many of the respondents earn through full time and part-time fishing. Among them 63.72 percent earned 25,000-35,000 Tk. 36.27 percent earned 36,000-

40,000 Tk. in six months of the rainy season. Some respondents were related to small trade and boating. They earned 50,00-60,000 Tk. (59.25%) and 1,00,000-2,00,000 Tk. (40.74%). During this season, very few respondents go outside for work and earn 48,000-90,000 (66.66%), and 91,000-1,20,000 Tk. (33.33%) during the rainy season (Table 5).

Livestock rearing

The percentage of households who reared livestock and poultry bird is (64.56%) in the *Chalan Beel* area. Others have no livestock and poultry birds in the area. During the survey, it was found that 64.56% of respondents had their livestock and poultry birds. From them 54% had cows, 70% had goats, 80% had hens and 90% had duck. Only 5% of respondents had farmed livestock and 95% had non-farmed livestock. Johnson, (2013) found the same result. The respondents said that the natural support of the *Beel* for the livestock rearing had been decreased. Now there was no common grazing land. In private owned land, owners cultivated during the summer season. Therefore, they could not rear the cow and goat in the field. Besides, in the rainy season, the whole *Beel* became flooded. In this time, livestock rearing became so difficult. As a result, people did not want to rear cows and goats. They reared duck but in the rainy season, it becomes difficult to control them. Duck went to other places and they became lost. Bernier *et al*., (2016) found the same result.

Crops Cultivation

There are two types of land areas in the *Chalan Beel*: high land and low land area. There are different opportunities and nature of cultivation in these two types of areas. The high land area is known as char areas. Many types of crops are cultivated in the high land area such as rabi crops-maize, potato, garlic, onion, etc. The duration of rabi crops is from Kartik to Chaitra (November to April). Sugarcane is also cultivated during this period. Cultivation of lentils, mustards, banana, mangoes wheat, etc. has been decreased for more maize cultivation in the area. If water is flown or comes through the *Beel* before the month of Kartik (November), community people can cultivate mustards. Besides, if the water of the *Beel* comes slowly then the cultivation of mustard becomes hampered. They cultivate boro (summer) crops in the *Beel* during Magh-Falgun (January-February) month and harvest in Chaitra-Boishakh (April-May) month. After Boishakh, the lower lands of the *Chalan Beel* become submerged and the flooded situation continues for six months. In the rainy season, nothing can be cultivated in the lower area of *Chalan Beel* without aman crop. Besides paddy crops, 20 percent of households cultivate jute, 15 percent cultivate maize in the area and 30 percent of households cultivate potatoes in the summer season. Few of them (5%) cultivate grass in the area for commercial sales in the market. During key Informant interview with the chairman of Binod union he said,-

"It cannot be possible to cultivate in this land all year round because about 6 or 8 months in the year the land stays underwater. At that time, it is not possible to cultivate anything. Mainly in the rainy season, it is impossible to cultivate. In this time people mainly live their livelihood by fishing in this area" (Chairman, Binod union of Tarash Upazila, Shirajgonj).

The opportunity of taking a loan

There were opportunities for taking loans from NGOs. The majority of the households (69.9%) were involved with NGOs. They took loans from those NGOs. The mean amount of loan was 10,000 to 50,000 Tk. The interest rate was 22% to 25%. Researchers found that 40% of respondents took loans from local usurers. Local usurers were their neighbors and political leaders of the area. The rate of interest was very high of local usurers than the NGOs' interest rate.

Physical Capital

Housing pattern

The housing pattern is an indicator of one's economic condition. Solvent persons always want to build their houses in permanent nature. Poor people cannot do this. During the study, researchers found that most of the respondents live in personal land (98.06%) and only 1.94% live in khash land.

Materials used for housing

Table 6 shows that the majority (66.50 %) of the respondents used tin as a construction material for their house. They choose tin as comfortable housing material. The reason behind choosing tin was that it was less costly and long-lasting. They also used *Beel* materials for the building of the walls of their houses. Only 1.94% of respondents used reed, 4.37% vetiver grass, 1.94% catkin grass, 4.85% mud, and only 6.61% bamboo as the material of constructing walls of their houses. Only 7.77% of respondents use brick/concrete for the building of walls. The data showed that all the respondents used tin for the construction of roofs. The floor was made of brick and concrete (7.77 %) in the area. Haroon & Kibria (2017) found the same result.

Table 6 Materials used for building the house

Parts of house	Materials used	Frequency	Percentage
Wall	Tin	137	66.50
	Bamboo	26	12.62
	brick/concrete	16	7.77
	Mud	10	4.85
	Vetiver Grass	9	4.37
	Catkin grass	4	1.94
	Reed (ikor)	4	1.94
	Total	206	100.00
Roof	Tin	206	100.00
	Mud	-	-
	Brick	-	-

Floor	Mud	190	92.23
	brick/concrete	16	7.77
	Total	206	100.00

Sanitation and drinking water

During the survey, it was observed that only 10.68% of respondents used hygienic latrine. The majority of the respondents (75.73%) used semi paca and 7.27% used non-hygienic latrine. Some respondents defected in the field (5.83) because they had no latrine. Many of the respondents (39.32%) assured that they used to drink non-hygienic water, while 59.71% of respondents from paca (hygienic tube well). Some people drank the water from the wetland (Table 7).

Health facilities

In the study area, 44.66% of respondents reported that they visited a doctor during their disease of any member of their family. The Rest of the respondents visited both doctor and village doctors who do not have a doctoral academic background (Kobiraj) (27.18%). The study also found that 12.13 percent of the respondents usually visit homeopathy doctor and 16.01percent only kobiraj in the study area (Table 7). They had reported that because of the lack of road communication, they had to face difficulty to go to the hospital in an emergency case. In the case of pregnant patients, it became very difficult to go through the road. In the rainy season, these became very unsuitable to go walk over it. Alam *et al*., (2017) found the same result.

Table 7 Responses on sanitation, water, and health facilities.

Responses	Frequency	Percentage
What types of latrine do you use?		
Hygienic	22	10.68
Semi paca	156	75.73
Kacha	16	7.77
Defecation in field	12	5.83
Total	206	100
What types of water do you drink?		
Hygienic tube well (paca)	123	59.71
Non-hygienic (kacha)	81	39.32
Water from wetland	2	0.97
During the disease of your household members, with whom do you visit?		
Doctor	92	44.66
Both Doctor and Kobiraj	56	27.18
Homeopathy Doctor	25	12.13
Only Kobiraj	33	16.01
Total	206	100

Electrification, Television/Radio, and Mobile phone

During the questionnaire survey, it was found that 60.05 percent of respondents enjoy the electrification facility and the rest 40 percent of respondents had no electrification facilities. The majority of the household (55%) had radio or television. Almost all of the households (92%) households had a Mobile phone.

Livelihood dependency on *Chalan Beel* natural resources

Historically, the livelihood of *Chalan Beel* community depends on natural resources. The pattern of use of natural resource and dependency on natural resources are discussed below.

Getting household materials free of costs

Table 8 shows that 4.36% of respondents usually got the materials free of cost from the *Beel*. The materials they got from the *Beel* partially helped them building house. Most of the households (95.63%) responded that they did not get household materials from the *Beel for* free.

Table 8 Distribution of respondents by getting household materials free of costs

Getting cost-free materials for housing	Frequency	Percentage
Yes	9	4.36%
No	197	95.63%
Total	206	100.00

Types of cost-free housing materials

Table 9 demonstrates that only 4.37% of households got the household materials free of cost while 44.44% got catkin grass, 44.44% got reed and 88.89% got jute sticks. All of the respondents collected grass from the Beel. Nevertheless, all the respondents confirmed that they got mud free of cost from the *Beel*. Ahammad *et al*. (2013) had found the same result.

Table 9 Distribution of respondents based on their access to different cost-free housing materials

Types of materials getting free of costs	Frequency (n=9)	Percentage
Catkin grass	4	44.44
Reed	4	44.44
Grass	9	100.00
jute stick	8	88.89

Involvement of family members in the collection of Beel resources

During the survey, researchers observed that 45.14% of respondent's family members of the *Beel* community were involved with the collection of *Beel* resources. The rest of the respondents do not collect resources from the Beel (Table 10).

Table 10 Distribution of household members collecting resources from wetland

Involvement of family members in the collection of *Beel* resources	Frequency	Percentage
Yes	93	45.14
No	113	54.85
Total	206	100.00

Involvement of female family members in the collection of Beel resources

Results revealed that 15.53% of female members of the household had involvement with the collection of *Beel* resources. Usually, they collected leafy vegetables and snails for ducks. Ahmed *et al.* (2010) had reported the same result. Other researchers had seen the same condition in the *Chalan Beel* area. Alam *et al.* (2017) found that female members sometimes collected the abandoned port of paddy from the *Beel* for use as fuel. The number was very small because the female members became discouraged to go outside for the activities in rural areas. They went to a nearby field for the collection of leafy vegetables but now the leafy vegetables are rare. Thus, most of the female family members of surveyed households did not go outside for the collection of natural resources from the *Beel* (Akinwale, 2010). From informal discussion with the community people (Moshy *et al.,* 2015) it was known that the female members went outside for the collection of natural resources such as leafy vegetables occasionally with fellow women (Nasar *et al*., 2016).

Collection of other resources from Beel

Table 11 demonstrated that nearly half of the respondents (45.14%) collected natural resources from the *Beel* and almost all of them (94.62%) caught fish in the *Beel*. The fish can be easily caught in the Beel area compared to other resources. They collected grass (98%) for the food of animals in the *Beel*. Researchers found that 19.35 % of dwellers collected fuel from the area such as wood and the abandoned part of crops while 40.27% dwellers collected leafy vegetables from the *Beel.* Rahman (2018) found similar result. A 60 years old female respondent said "*some years ago we collected various vegetables from Beel. But now these leafy vegetables are not available in the Beel area*". Some were seen but a very lower amount was available. Everyone made the land cultivable, no single piece of land left unutilized/fallow (Speranza *et al.*, 2014). So, these types of leafy vegetables became rare. Only 3.22% of respondents collected birds from the *Beel* area. The availability of birds was very rare. Because of the lower flow of water, birds do not come to the *Beel* area. A respondent said, "*Because of the lower flow of water there is no aman (rainy) cultivation and birds are not seen in the Beel area.*" People collected snails (32.66 %) from the *Beel* and they had ducks. Snails were very available in the area of *Beel* but nowadays there are no more

available as reported by the respondents. Because of government prohibition and fear of harassment of police, the community people did not want to say that they were involved with fishing (Sultana & Islam, 2016).

Table 11 Distribution of respondents collecting different types of resources from *Beel* (n=93)

Types of resources are collected from wetland	Frequency (n=93)		Percentage
Fish catch	Yes	88	94.62
	No	5	5.38
Grass/reeds	Yes	9	9.7
	No	81	87.1
Fuel	Yes	18	19.35
	No	75	80.65
Leafy vegetables	Yes	17	40.27
	No	76	59.73
Birds/ turtles	Yes	3	3.22
	No	90	96.77
Snails	Yes	30	32.26
	No	63	67.74

Fishing in the Beel

Table 12 shows that, from those 82 respondents who were involved in catching fish for selling and consumption or both, the majority of the respondent's per day earning was 100-150 Tk. (53.66%). During the survey, 29.26% of respondents reported that they had 200-250 Tk. per day earning from fishing in the Beel. Rahman *et al.*, (2018) found the same result. Some of the respondents (14.63%) earn 300-350 Tk. per day from fishing in the *Beel*. A very small number of people earn 500 Tk. (3.65%) and 400 Tk. (6.10%) per day from fishing in the *Beel*.

Table 12 Distribution of respondents by per day income in the fishing season

Per day income	Frequency (n=82)	Percentage
100-150 Tk.	44	53.66
200-250 Tk.	24	29.26
300-350 Tk.	12	14.63
400 Tk.	5	6.10
500 Tk.	3	3.65

Challenges in fishing

Table 13 shows that 73.86% of respondents face challenges in fishing due to the government's ban on fishing. Community people reported that due to lack of fishing boats

and net they face challenges in fishing (26.13%). Researchers found that 53.48% of respondents said due to the limited access to get soft credit they face challenges. Goulden *et al.* (2013) found the same result. Haroon & Kibria (2017) found that community people face challenges in fishing due to river water reduction because of the international river water crisis (40.70%), loss of fish species (96.59%), and biodiversity loss because of climate change (29.54%).

Table 13 Distribution of respondents by facing challenges during fishing

Challenges related to fishing	Frequency n=88	Percentage
The government ban on fishing	65	73.86%
Lack of fishing boat and net	23	26.13%
Limited access to get a soft credit	47	53.48%
Loss of fish species	85	96.59%
Biodiversity loss due to climate change	26	29.54%
River water reduction due to the international river water crisis	35	39.77%

Other livelihood purposes on wetland

As in table 14, 46.12% of respondents mentioned that they got fuel from *Beel* while 39.32% got from their own tree/bamboo/crops and 14.56% bought from the market. The majority of the respondents (45.11%) got fodder from their land in the *Beel* area while 37.56% got from other areas. Only 13.53 percent said that they got fodder from common land in the *Beel* area. Only 1.50% got fodder from their grass cultivation, and 2.25% bought from the market (Mutahara *et al.,* 2016).

Table 14 Different livelihood purposes in the *Beel* resources

Where Do You Get Fuel for Cuisine?	N=206	
Responses	Frequency	Percentage
From *Beel* area	95	46.12
Buy from market	30	14.56
From own tree/ bamboo / crops	81	39.32
Where Do You Collect Fodder?	n=133 (who have livestock)	
From other's land in *Beel* area	50	37.59
From own land in *Beel* area	60	45.11
From common land in *Beel* area	18	13.53
From own grass cultivation field	2	1.50
Buy from market	3	2.25
Where Do You Take Livestock for Grazing? n=133 (who have livestock)		
Common land in the *Beel*	70	52.63
Own land in the *Beel*	27	20.30
Other lands in the *Beel*	36	27.06

For What Purpose Are You Dependent on *Chalan Beel*?	N=206	
Water for Irrigation	206	100
Boating	206	100
Fishing	88	42.71
Bathing/ Summing	40	19.42
Picnic/ recreation	10	4.85
Religion purposes	2	0.97

Calculation of dependency on *Beel* resources

The dependency of community people on *Chalan Beel* natural resources included 8 major purposes; picnic/ recreation (4.85), fuel (58.25), bathing /swimming (19.42), boating(100), fish catch (42.71), livestock grazing (52.63), fodder (13.53), Collecting materials for building a house (1.94%).

Researchers found that 1.94 percent of the respondents got some house building materials free of cost. From them, four households said that they also caught fish and collected other natural resources from the *Beel*. Based on the measurement criteria only 1.94 percent of respondents had been measured as 'Highly dependent' on the *Beel* resources (Figure 1).

During the survey, researchers found that 45.15 percent of respondents caught fish. All of them collect other resources and depend on *Beel* for other purposes. Based on the measurement criteria took by researchers, 45.15% of the respondents had been identified as 'Dependent' on the natural resources of the *Beel* Figure 1.

Figure 1 shows that 66.31 percent of the respondents did not catch fish but were dependent on the *Beel* for other purposes, such as bathing, swimming, boating, livestock grazing, etc. Following the measurement criteria, these majority percentage of the respondents (66.31%) were identified as 'Slightly dependent' on the *Beel* resources.
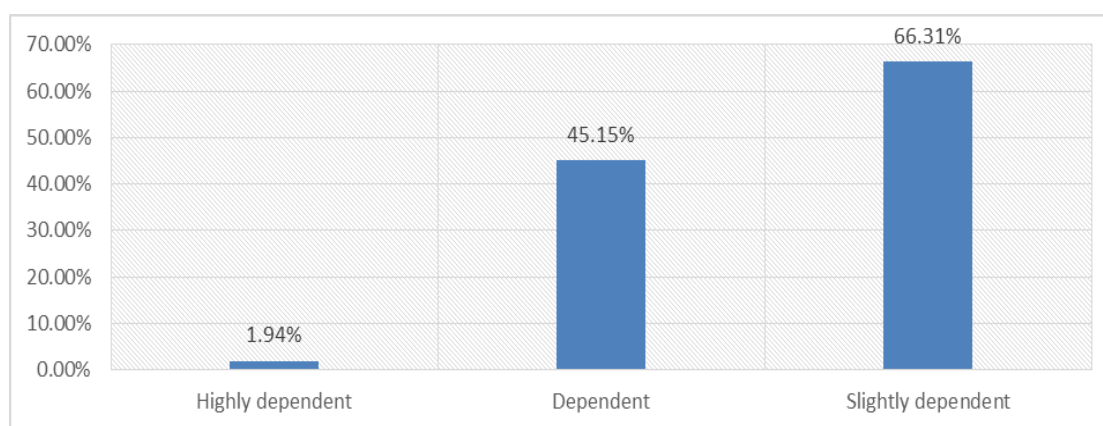

Figure 1 Respondents' dependency on wetland (Beel) resources

Conclusion

The study reveals that the community people of *the Chalan Beel* area had a lower standard of livelihood. They had a very lower amount of income. They use a non-hygienic latrine. Due to the lack of proper road facilities, they cannot visit doctors. *Beel* community people depend on village doctors who usually do not have a medical academic background (kobiraj). They were involved with NGOs and got loans from these NGOs. They also took loans from local usurers with a high-interest rate. The profession of community people varies from the summer season to the rainy season. In the rainy season lands, become flooded for six months. During this time, many people migrate to other places. Natural resources of the *Beel* have been decreased. Community people cannot collect resources for household purposes without fishing. The amount of fish has been decreased. Thus, the income-based on fishing had decreased. The nature of dependency on the natural resources of the *Beel* has been changed. People are no longer highly dependent on the natural resources of the *Beel*.

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