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Climate Change Impacts on Socioeconomic Conditions in Rural Areas of Bangladesh

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ABSTRACT

Climate change is a significant global issue that has far-reaching impacts on various aspects of human life, including socioeconomic conditions in rural areas. Bangladesh is one of the countries that are most vulnerable to climate change, and its rural areas are particularly affected. This journal aims to explore the impacts of climate change on socioeconomic conditions in rural areas of Bangladesh. Historically, Bangladesh is one of the most susceptible countries of the world to bear the burden of the negative impact of climate change. Climate change refers to any significant change in measures of climate (such as temperature, flood, cyclones, tornado, drought, precipitation, wind, sea level, and natural phenomena), lasting for an extended period of time (decades or longer) that negatively affects the terrestrial and aquatic ecosystems (all living things: plants, animals and organisms, interacting with each other, and also with their non-living environments: weather, earth, sun, soil, climate, and atmosphere). However the present stud has conducted to find out the demographic profile and household composition of climate change vulnerable people of northern parts of Bangladesh and to explore the income status and income generating activities of climate change vulnerable people of northern parts of Bangladesh. The study was conducted at Kurigram district in Bangladesh. The study was survey type. The recommended sample size of 368 was decided to allow for possible attrition. An effort was made to survey the same group of respondents at baseline although it was not always possible. Data were collected from primary and secondary sources. Primary data were collected from the respondents of the study area and secondary data were collected from books, research reports, journals, annual report, websites and internet. From the study it was found that flood occur in this area in every year. People live in these areas with very peace but flood and drought hamper the lives of the people. The rate of education of this area is low in comparison to other areas. In char areas the students face tremendous problems during rainy season to go their schools and colleges because of communicating roads. In the char areas most of the roads go under water in the rainy season. Each and every year floods damages many houses, huge amount of crop loss, death of many domestic animals, loss of homesteads, loss of crop lands, landslide etc. in the northern parts of Bangladesh. Some people die due to flood in this area. Income generating activities reduced in the rainy season. People loss their works, assets and sometimes depletion of savings, restricted movement due to unprecedented recurrent flood. People face financial shortage. During flood many diseases like diarrhea, cholera, dysentery and typhoid spread tremendously. People face lack of pure drinking water. Adaptation, rather than being concentrated in one sector, should essentially be dispersed across all socio-economic sectors including water, health, agriculture, and infrastructure, each of which presents in own challenges, and will involve stakeholders in different if overlapping groups. Adaptation measures are likely to be less capital intensive and more amenable to small scale interventions. Living house should be built in such a way so that the houses can resist floods and cyclones. Meaningful, achievable climate change targets should be adopted. Commitment should be ensured from developing countries fair share to climate change adaptation for Bangladesh. Education, training and public awareness should be ensured. Seeking more support for climate change mitigation and adaptation research: The Government of Bangladesh should look for increased funding support to research into innovative technologies including renewable energy, understanding climate change dynamics, carbon capture and sequestration, energy efficiency, crop varieties, and other adaptation and mitigation innovations. Collaboration should be done with our neighbors who are victim of climate change.

Keywords: *Climate change, Flood, Natural disaster, Adaptation, Vulnerability, Damage*

INTRODUCTION

Climate change is a significant global issue that has far-reaching impacts on various aspects of human life, including socioeconomic conditions in rural areas. Bangladesh is one of the countries that are most vulnerable to climate change, and its rural areas are particularly affected. This journal aims to explore the impacts of climate change on socioeconomic conditions in rural areas of Bangladesh.

Climate Change Impacts in Agricultural Communities in Rural Areas of Coastal Bangladesh: A Tale of Many Stories

According to, climate change has significant impacts on agricultural communities in rural areas of Bangladesh. The study found that climate change has led to increased flooding, and drought, which have adversely affected crop production and livelihoods. The study also revealed that women and marginalized groups are particularly vulnerable to the impacts of climate change.

Climate Change and Health in Bangladesh: A Baseline Cross-Sectional Survey

Climate change also has significant impacts on health in Bangladesh, as highlighted in the study found that climate-sensitive diseases, such as diarrhea, dengue and malaria, are prevalent in the country, and their incidence is likely to increase due to climate change. The study also revealed that the impacts of climate change on health are more severe in rural areas, where access to healthcare is limited.

The Implications of Population Growth and Climate Change on Sustainable Development in Bangladesh

Population growth and climate change are two significant challenges facing Bangladesh, as highlighted in the study found that rapid population growth, unplanned urbanization, and increasing urban inequalities are exacerbating the impacts of climate change on sustainable development in the country.

Manifestations of Climate Change Impacts Affecting Socio-economy in Bangladesh

Investigated the impacts of climate change on the socio-economy in Bangladesh. The study found that climate change has led to increased poverty, food insecurity, and migration in the country. The study also revealed that the impacts of climate change are more severe in rural areas, where the majority of the population depends on agriculture for their livelihoods.

Aftermath of Climate Change on Bangladesh Economy: An Analysis of the Dynamic Computable General Equilibrium Model

Analyzed the overall impact of climate change on Bangladesh's economy using the computable general equilibrium model. The study found that climate change has significant adverse impacts on the country's economy, including reduced agricultural productivity, increased healthcare costs, and decreased labor productivity. The study recommended that Bangladesh should implement policies to mitigate the impacts of climate change on its economy.

The Impact of Climate Change, Population Growth, and Development on Sustainable Water Security in Bangladesh to 2100

Investigated the impacts of climate change, population growth, and development on sustainable water security in Bangladesh. The study found that climate change has significant impacts on water demand for irrigation, which is critical for agriculture in the country. The study also revealed that several factors that are within Bangladesh's control, such as imports, a shift to wheat, and population growth, have a greater impact than the most extreme hot-dry climate change scenario.

The most significant climate change impacts on rural areas in Bangladesh are:

1. Reduced agricultural productivity due to increased salinity intrusion, flooding, and drought
2. Increased poverty, food insecurity, and migration
3. Climate-sensitive diseases, such as diarrhea, dengue, and malaria, which are prevalent in the country, and their incidence is likely to increase due to climate change.
4. Increased migration to urban areas in search of non-agricultural employment, putting pressure on urban infrastructure.
5. Decreased crop yields and water shortages during dry seasons
6. Increased frequency and intensity of tropical cyclones and rising sea levels
7. Adverse impacts on health, which are more severe in rural areas, where access to healthcare is limited
8. Increased spending to deal with climate change impacts in rural areas, which is still not enough
9. Impacts on sustainable water security due to increased water demand for irrigation, which is critical for agriculture in the country

These impacts have cascading effects on socioeconomic conditions in rural areas, including reduced livelihood opportunities, increased poverty, and food insecurity. Women and marginalized groups are particularly vulnerable to the impacts of climate change. Cohesive actions on climate change are necessary to eliminate extreme poverty and inequality and promote sustainable development in the country.

Climate change has significant impacts on agriculture in rural areas of Bangladesh, as highlighted in the following points:

1. Increased flooding and drought have adversely affected crop production and livelihoods.
2. Warmer temperatures linked to climate change will severely reduce the growth of various winter crops, including wheat.
3. Gradual loss of arable land, declining soil fertility, and Stalinization are some of the challenges faced by agriculture in Bangladesh
4. Climate change has led to decreased crop yields and water shortages during dry seasons.
5. Climate change has led to increased poverty, food insecurity, and migration, which have adversely affected agriculture in rural areas.
6. Climate-sensitive diseases, such as diarrhea, dengue, and malaria, are prevalent in the country, and their incidence is likely to increase due to climate change, which can adversely affect agricultural productivity.

These impacts have cascading effects on socioeconomic conditions in rural areas, including reduced livelihood opportunities, increased poverty, and food insecurity. Women and marginalized groups are particularly vulnerable to the impacts of climate change. Cohesive actions on climate change are necessary to eliminate extreme poverty and inequality and promote sustainable development in the country.

Farmers in rural Bangladesh have been taking various adaptive measures to cope with the impacts of climate change. Some of these measures are:

1. Change in farming practices, such as crop diversification, use of drought-tolerant crops, and improved irrigation systems.
2. Use of early-maturing crop varieties to avoid the impacts of drought and flooding.
3. Adoption of agro-forestry practices to improve soil fertility and reduce soil erosion.
4. Use of organic fertilizers and integrated pest management practices to reduce the use of chemical fertilizers and pesticides.

5. Adoption of livestock rearing and fish farming to diversify income sources.
6. Use of weather forecasting and early warning systems to prepare for extreme weather events.
7. Participation in training programs and workshops to learn about climate-smart agriculture practices.
8. Use of microfinance and insurance schemes to cope with crop losses due to climate change.
9. Use of Locally Led Adaptation initiatives, such as climate adaptation clinics, to access tools and advice on how best to respond to climate change.

These adaptive measures are critical to combat climate change and reduce its impacts on agriculture and livelihoods in rural Bangladesh. However, more efforts are needed to scale up these measures and ensure their sustainability.

Historically, Bangladesh is one of the most susceptible countries of the world to bear the burden of the negative impact of climate change. Climate change refers to any significant change in measures of climate (such as temperature, flood, cyclones, tornado, drought, precipitation, wind, sea level, and natural phenomena), lasting for an extended period of time (decades or longer) that negatively affects the terrestrial and aquatic ecosystems (all living things: plants, animals and organisms, interacting with each other, and also with their non-living environments: weather, earth, sun, soil, climate, and atmosphere). Greater energy efficiency and new technologies hold promise for reducing greenhouse gases (such as Carbon dioxide- CO_2, Methane- CH_4, Nitrous oxide- N_2O, water vapor, while others are synthetic. Those that are man-made include the chlorofluorocarbons-CFCs, Hydro-fluorocarbons-HFCs, Per-fluorocarbons-PFCs, Sulphur- hexafluoride- SF6) and solving this global challenge. Greenhouse gases and certain synthetic chemicals, trap some of the Earth's generated energy, thus retaining heat in the atmosphere. Efforts are being made for reducing, reusing and recycling solid waste to decrease the amount of heat-trapping greenhouse gases released.

Bangladesh is now widely recognized to be one of the countries which are most vulnerable to climate change. Natural hazards that come from increased rainfall, rising sea levels, droughts and tropical cyclones are expected to increase as climate changes, each seriously affecting agriculture, water and food security, human health and shelter. It is believed that in the coming decades the rising sea level alone will create more than 20 million climate refugees. Bangladeshi water is contaminated with arsenic frequently because of the high arsenic contents in the soil. Up to 77 million people are exposed to toxic arsenic from drinking water. Due to climate change, the rural people affected more in Bangladesh. Flood is a natural disaster occurs due to climate change. Each and every year floods damages many houses, huge amount of crop loss, death of many domestic animals, land loss, landslide etc. in the northern parts of Bangladesh.

OBJECTIVES OF THE STUDY

The Objectives of the study are as follows:

1. To find out the demographic profile and household composition of climate change vulnerable people of northern parts of Bangladesh.
2. To explore the income status and income generating activities of climate change vulnerable people of northern parts of Bangladesh.

METHODS AND MATERIALS

Setting

The overall target of the research was to reach 4,000 extreme poor in six (6) unions of Kurigram District of Bangladesh. The study survey in general attempted to follow the same households from the baseline study of the project as this will be helpful to make the comparison.

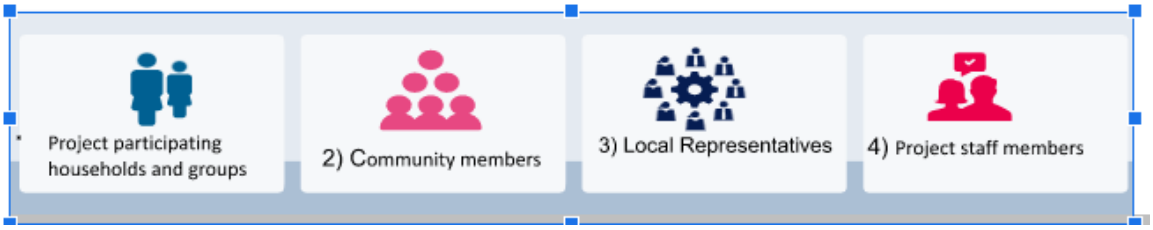


Figure 1: Key stakeholder groups.

Open-ended questions

Standardization procedures for data collection were implemented at study points to ensure the validity and reliability of the data, with a web-based e-survey data collection platform being used not only for standardization but also for efficiency. The KOBO-tool was chosen for its capabilities for offline data collection, compatibility and multiple-language hosting. These features allowed data collectors to access the data collection tools on a mobile device (smart phone or tablet), even in areas with no Internet connection. The data they collected in the field could be uploaded once they had connectivity. The research assistants were trained as enumerators along with field testing on the data collection including how to edit data should an user make a mistake in data collection before final submission, explaining terminology, how to communicate with participants to elicit relevant responses to the survey and how to navigate the survey process. The data collector had to include their name and mobile number with each survey response so that consultant/administrators could easily query specific survey responses if necessary.

Sampling

The study collected data from a random sample of the program participants. With an acceptable margin of error of 5% among the target population of 1100. The estimated sample size is 285 (raosoft.com/samplesize.html) and the baseline survey was conducted at 30% of the total households i.e., 330 sample size.

Analysis

For quantitative data, responses were downloaded into a Microsoft Excel format from the Web-based platform and cleaned, and then analyzed using SPSS vr-26. Analysis through frequency observations was primarily used to measure baseline and study differences and this informs most of the discussion of the results. A significance level (α) of 0.05 is normally used to judge whether the results are statistically significant, but other commonly used levels are 0.01 and 0.10. In this analysis, 0.10 was chosen to reduce the risk of a difference being missed. For qualitative data, information/ transcripts in Bengali were translated into English and cross-checked for accuracy. To sufficiently complement quantitative data, nine (9) FGDs and nine (9) IDIs for case studies were conducted.

1. Survey Respondent's Information:

Information of the survey respondents was also collected to establish the validity of the sources of the survey information. The data collector had to include respondent's name and

mobile number with each household survey so that consultant/administrators could easily query specific survey responses if necessary. The tables below show the number of household surveys by unions, total FGDs and IDI (table-1a); respondents age group (Table-1. b), Relationship of the respondents with the household head (Table-1.c); Gender of the respondents (table-1d) and Religious affiliation (Table-1.e) are presented below:

Table 1.a: Union wise Respondent distribution					**Total 1.a: number of Qualitative Data Tools**			
	Baseline		End-line		Baseline		Study	
	Frequency	Percentage	Frequency	Percentage	**FGD**	**IDI**	**FGD**	**IDI**
Andharir Jhar	43	13.0	52	14.1	4	14	9	9
Banga sonahat	43	13.0	48	13.0				
Baldia	49	14.8	56	15.2				
Char Bhurungamari	50	15.2	52	14.1				
Paikarchara	75	22.7	81	22.0				
Tilai	70	21.2	79	21.5				
Total	**330**	**100.0**	**368**	**100.0**	**4**	**14**	**9**	**9**

Table-1. b: Shows the respondents by ages classification Respond Age category				
Age	**Male**	**Female**	**Number**	**Percentage**
16-25		31	31	8%
26-35	1	92	93	26%
35-45		102	102	28%
46-55		55	55	15%
56-65	1	41	42	11%
65+		45	45	12%
Total	2	366	368	100%

Table-1.c: Respondent's Relation with Household Head

	Frequency	Percent
Mother	12	3.3
Mother-in Law	1	.3
Self	119	32.3
Son	1	.3
Wife	235	63.9
Total	**368**	**100.0**

Table-1. d: Respondents by Gender

	Frequency	Percent
Female	366	99.5
Male	2	.5
Total	**368**	**100.0**

Table-1.e: Respondents Religion

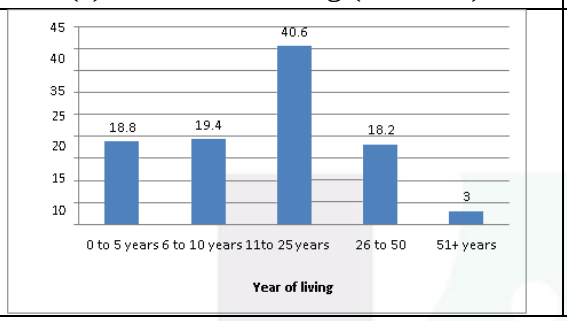
	Frequency	Percent
Hindu	8	2.2
Muslim	360	97.8
Total	**368**	**100.0**

RESULTS AND DISCUSSION

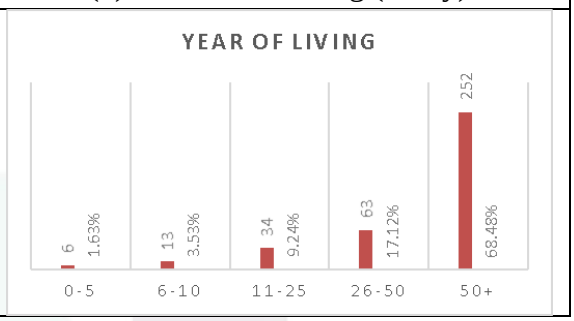
1. Demographic Profile and Household Composition & Core Data:

Figure 2: Duration of living in this area- respondent level

(a) Duration of living (Baseline)



(b) Duration of living (Study)



Duration of living in the Area Key Findings (Figure-2)

- **Figure-2 shows that Respondents live in the area** vary in their timeframe. Baseline findings indicate that a large number, 40.6% are living in these unions between 11 to 25 years followed by 18.2% from 26 to 50 years. Compared to the end line findings that majority of the people living in the area ranges from 26 to 50 (17.12%) and 50+ years (68.48%).

Table 2. Key Demographics

Demographic Characteristics	Indicator	Baseline %	Study % N=1185
Age Range:	• Up to 6 years	NA	10.63
	• 7-18	NA	25.74
	• 19-25	NA	11.81
	• 26-45	NA	29.79
	• 46-65	NA	13.4
	• 65+ years of age	NA	8.6
Religions / Faith:	• Muslims	NA	97.83
	• Hindu	NA	2.17
Marital Status:	• Unmarried	NA	40.68
	• Married	NA	46.08
	• Divorced	NA	1.27
	• Widowed	NA	11.98
Educational Status:	• Who can Sing or can write / read	48.8	9.18
	• Who never attended school ever	30	55.86
	• Attended school (class 1-5)	16.32	25.80
	• Attended school (class 6-10)	3.94	7.87

	• SSC or equivalent passed	0.6	1.1
	• HSC or equivalent passed	0.3	.86
	• Attended above HSC	0	0
Disability Status	• Male	3.2	4.7
	• Female	3.5	3.97
Disability Type	• Chronic sickness		1.26
	• Mental		1.35
	• Physical		5.23
Non-local and local status:	• Non-locals called "Vati" ethnic group	NA	69.02
	• Local called "Teli" ethnic group	NA	30.98
Dwelling House Location	• Road side	11.2	20.38
	• Plain land/ main Village	57	33.97
	• Riverside	4.8	5.43
	• On the Dam/ embankment	4.5	0.27
	• Char Area	21.5	39.95
Dwelling House Vulnerably	• Above Flood level	50.9	47.28
	• Below Flood level	49.1	52.72

Household size and composition Key Findings (Tables 3)

- **Age's class:** of the total HH Members (1185) under 6-years of age constitutes 10.63%, 7 to 18 years of age makes 25.74%; HH population between age 19-65 years which is most productive groups accounts for about 55% of the total population in the surveyed HH while 8.6%.
- **Marital status:** the analysis is based on total population (N 1185) of the surveyed HH not on the respondents only. The findings reveals that the percentage of unmarried accounts for 40.68%, while married percentages accounts for 46.08%; divorcees count at 1.27% and Widowed for 11.98 percentages. However, the results in the endline may be explained as awareness against child marriage, married couple are more stable than ever before, marriage of young widows.
- Schooling has improved significantly to 35.63% compared to 21.16% in the baseline.
- Average household size is 3.22. In term of size of the households with number of HH members shows more or less an expected trend, where 1, 2 and 3 -member households have slightly declined, may be attributed rejoining with family, newly married etc. as well as awareness and adoption of family planning measures. 4-member households rank highest percentage (27.32%)
- **Location of the dwelling houses:** it worth to mention that the end line survey conducted was not exactly on the same households due to lack of the list of HH in the baseline. Analysis of the HH surveyed revealed that that Roadside HH accounts for 20.38%, while within then village is about 34%; HH in the Char area goes for 39.95%; HH on the Riverside for 39.95 and HH on Dam/ Embankment count 0.27 percentage.

Ethnicity and Religion Key Findings (Tables 2)

- Table-1, shows a significant proportion of the **people settled** to the area for various reasons and are called "Vati", while the people originally from the area are called

"Teli". Mostly settlements happened either due to marriage relationship or for river erosion or to have a better safe place against flood.

- Islam faith is the most frequent **religion** (97.83%).

Table-3: Key Dwelling House Characteristics, Ownership, Construction material, Water Sanitation, electricity.

House Characteristics	Indicator	Baseline %	Study %
Dwelling House Ownership	• Own	NA	64
	• Khash land/Govt land	NA	12.23
	• User (live on others land)	NA	23.91
Size of the Households:	• Average Household Size		3.22
	• 1-member household	19.1	17.39%
	• 2-member household	15.2	13.86%
	• 3-member household	25.5	22.55%
	• 4-member household	25.5	27.72%
	• 5-member household	12.4	13.32%
	• 6-member household	2.4	4.35%
	• 7-member household	0	0.82%
Number of Rooms excluding Kitchen	• 1-Roomed		67.39
	• 2- Roomed		29.89
	• 3-Roomed		2.72
Houses have Separate Kitchen	• Separate Kitchen	34.2	83.97
House Construction Materials	• Wall – Cement/Bricks	0.6	1.63
	• Wall-Tin sheet	80	89.95
	• Wall-Bamboo/ straw/ mud	1.8	7.88
	• Wall- Plastic	17.6	.0.54
	• Floor- Cement/Brick	NA	6.52
	• Floor- Mud	NA	93.48
	• Roof – CI Sheet	NA	98.64
	• Roof – Concrete	NA	0.27
	• Roof – Straw	NA	1.09
Drinking Water source	• Own Tube well	58.5	83.42
	• Neighbor Tube-well	39.1	14.13
	• Community tube-well	5.1	2.45
Point of Defecation	• Katcha/ Non sanitary	91.2	8.97
	• Sanitary	0	87.23
	• Pit Latrine	NA	2.17
	• Open Space	8.8	1.63
Electricity Source	• REB/Grid	6.1	72.28
	• Solar	NA	14.67
Cooking Fuel	• Fuel wood/ Kerosine		5.43

	• Tush kath/Twigs. Leaves, straw etc.		72.28
	• Cow dung (dry)		22.28
Part of House used for Business	• Part of House used for Business activities		2.99

Housing Characteristics, Ownership, Construction material, Water Sanitation, electricity Key Findings (Tables 3)

- **House Ownership:** 64% of the households now live in their own houses
- **Separate kitchen:** 83.97% houses have separate kitchen compared to 34.2% in the baseline
- **House size by number of rooms:** 1- & 2-rommed houses accounts for about 97.28%, while 2.72% have 3-roomed houses
- **House Constriction materials:** Housing walls using Tin-Sheet/ CI-Sheet increased to 89.95% from 80% in the baseline, while use of plastic sheets for wall making as declined to 0.54% from 17.6%. House floors are mostly made of mud (93.48%, and Roofs are of Ci-Sheet (98.64%)
- **Drinking water Sources:** 83.42% households compared to 58.5% (baseline) own tube-well as a source of safe drinking water and other purposes
- **Point of Defecation:** Most significant changes happened, 87.23% houses have sanitary toilets compared to 0% in baseline, a drastic decline to 8.97% from 91.2% in baseline use of katcha/unsanitary toilets, while open space use also declined to 1.63% from 8.8% in the baseline.
- **Electricity:** 72.28% houses compared to only 6.1% have grid connections and 14.67% has their own solar system
- **Part of the houses used for Business activities:** about 2.99% found to use their houses & its area for business activities.

Table 4: Main Occupation of the Household members

SL	Occupation	Number	Percentage
1	Agriculture Labor	267	22.53%
2	Craftsman (mason, wood/ furniture, Tiles)	14	1.18%
3	Day Labor (traditional Rice drying & Milling, Factory, porters, Brickfield worker, Restaurant worker)	98	8.27%
4	Barber	5	0.42%
5	Hand loom/Tat buna	6	0.51%
6	Garments Labor	2	0.17%
7	Fish Business	16	1.35%
8	Village Police/Gram Police	2	0.17%
9	Livestock Rearing	218	18.40%
10	Rural (Polli) Doctor	3	0.25%
11	Food business/Restaurant Owner	14	1.18%
12	Driver (Rickshaw/ Van)	14	1.18%

13	Tailor	16	1.35%
14	Small Business	32	2.70%
15	Bamboo worker	1	0.08%
16	Imam/ priest of mosque	1	0.08%
17	Beggar	8	0.68%
18	Work in other home	125	10.55%
19	Unemployed	343	28.95%
		1185	**100.00%**

Main Occupation of the Households (Table-3)

- Livestock rearing (18.40%) and agricultural labor (22.53%) counts the highest percentages among all household members (1185) irrespective of age, gender and disabilities etc.

Table-5: Functional skills & Experiences within the household members outside main occupations.

SL	Functional Skills	Number	Percentage
1	Plant Nursery	40	23.12%
2	Food Processing	20	11.56%
3	Tailoring	29	16.76%
4	Trading	32	18.50%
5	Hair Salon	4	2.31%
6	Handicrafts	6	3.47%
7	Fish Business	1	0.58%
8	Grocery shop	8	4.62%
9	Auto Driver	1	0.58%
10	Bakery Maker	1	0.58%
11	Restaurant	15	8.67%
12	Carpenter	4	2.31%
13	Mid-wife/Dhattree	2	1.16%
14	Needle work/Katha Stitching	2	1.16%
15	Stone worker/Pathor Labour	4	2.31%
16	Loom/Tat Buna	2	1.16%
17	Mason/Raj Mistree	2	1.16%
Total		**173**	**100.00%**

Functional Skills and Experiences other than main occupation within the Households (Table-4)

- There are 17 types of functional skills and experiences those exists among 173 household members counting plant nursery 23.12%, trading 18.50%, tailoring and needle works (16.76%), food processing (11.56%). For additional and to diversify income and employment scopes these skills pose opportunities if properly supported.

2. Poverty Status, Family Well-being, Income, Savings and Productive Assets:

Table 6. Poverty Status and National Benchmarks

Progress out of Poverty Index		
Mean likelihood below National Poverty Line below $1.90		9.2% (ADB 2019)
Indicator	**Baseline**	**Study**
Per Capita Income per Day	21.27	45.76

Table 7. Family Well-being:

indicators	Baseline		Study	
	# HH	%	# HH	%
Do all school aged children go to school				
Yes			301	81.79%
No			67	18.21%
Overall improvement in housing condition				
Yes			362	98.37%
No			6	1.63%
improvement in health and water sanitation				
Yes			362	98.37%
No			6	1.63%
Improvement in financial and other skills through training				
Yes			360	97.83%
No			8	2.17%

Table 8: Households Main Economic /Income Activities and Income:

Baseline %			Study %		
Household Economic Activities	**Total Yearly income**	**Per Capita income/day (N 1004)**	**Household Economic Activities**	**Total Yearly income**	**Per Capita income/day (N 1185)**
Farming	52250	**21.27 BDT**	Works in others home	3400500	**45.76** (inflation adjusted)
Agro based day labour	4623960		Chatal Labour	201000	
Non Agro based day labour	468594		Mestree(Raj Mestree, Kath mestree, Tiles Mestree)	660000	
Fisher /Fishery	58800		Agriculture Labor	8987220	
Animal husbandry	2700		Day Labor (Chatal,Mile, Factory, Kuli, Bricks Vata, Restaurant)	1318920	
Restaurant/Shop worker	128002		Napit	120000	
Maid/Servant/work in other People's house	492600		Tat buna	114000	
Swing/ Handy craft (With payment)	250544		Garments Labour	120000	
Rickshaw/Van driver	449596		Fish Business	452160	

Micro enterprise in own house	30000		Gram Police	80000	
Restaurant/Shop owner	92000		Livestock	2864400	
Business (Whole sell, Industry)	11000		Polli Doctor	180000	
Skilled labor (Carpenter, Potter, Black smith, Gold smith, Mechanic)	413504		Restaurant Owner	940000	
Community health staff(Midwife,Nurse)	12000		Driver (Rickshaw/ Van)	1848000	
Beggar	80960		Tailor	537600	
Land lease/rent	7500		Small Business	1920000	
Rice collection	34300		Beggar	91200	
Retailer (fish, vegetable, cloths, woods etc.)	69000		Imam	35000	
Other small business	209202		Animal Brokers (Cow Dalal)	80000	
Unemployed	187748				
Others	21000				
Total	**7,695,260.00**			**23,950,000.00**	
Average income per household	**23318.97**			**65081.52**	

Table 8.a: Gross Income generated from Project Assets:

Type of project assets	# HH	**Last year's Assets Sale/Production in Taka**	**Management Cost**	**Gross Profit**	**Average profit per HH**
Cow	282	14742500	5495260	9247240	32791.63
Land	48	415860	62100	353760	7370.00
Small Business	39	205000	106500	98500	2525.64
Goat/ Sheep	210	1011103	221200	789903	3761.44
Poultry	140	394050	72210	321840	2298.86
Vegetables	190	334750	45660	289090	1521.53
Total		17103263	6002930	11100333	

Table-8. b: Classification based of the Total average Income Value Group

	Frequency	Percent	Valid Percent	Cumulative Percent
Under 10000	1	.3	.3	.3
10001-30000	90	24.5	24.5	24.7
30001-50000	70	19.0	19.0	43.8
50001-65000	87	23.6	23.6	67.4

65000 and highest	120	32.6	32.6	100.0
Total	368	100.0	100.0	

Table 9. Household Major Expenses

Indicator		**Baseline %**	**Indicator**		**Study %**
Expense Items	Total Expenses	Percent (%)	*Expense Items*	Total Expenses	Percent (5)
Food	534645.8	54.4	Education	92075	4.07
Health	34559.73	4.1	Food	1579600	69.87
Clothing	2349.92	4.1	Health Treatment & Medicine	93000	4.11
Education	22289.4	5.2	Clothing	53900	2.38
Gas/electricity bill	1549.94	3.6	House Rent	200	0.01
Repair	820.05	2.5	Soap/Toiletries	63340	2.80
Fuel	24365.6	2.9	Entertainment	5350	0.24
Transport	9957.2	4.5	House Repair and Maintenance	51500	2.28
Cosmetics (soap, oil, shampoo)	49104	5.0	Electricity Bill/Power Supply	31148	1.38
Pan, biri & cigarette	36456	5.7	Livestock shed & Agricultural Tools	94550	4.18
Others	11689.92	8.0	Transport	42320	1.87
			Cooking fuel	59500	2.63
			Betel leaf, Bidi, cigarettes	73430	3.25
			Others	20810	0.92

Table 10: Household Savings.

Savings with	**Number of HH**	**Total Saving**	**Average Saving**
a. Savings with project group	*368*	*609178*	*1655.38*
b. ***Savings with other entities:***			
Cash in Hand	309	707470	2289.55
Bank/Post/ Office/ Insurance	8	29,700	3713
NGO	5	12400	2480
Non-Informal Institution	2	8,500	4250
	324	*758070*	*12732.05*
Grand Total (a+b)	**368**	**1367248**	**3715.35**

Table 11: Household Borrowing/Loan Purpose and Sources

Loan Purpose	**Sources of Loan**	**Number of HH**	**Total Loan**	**Average Loan**
Food	Rice Bank	127	109630	863
	Neighbor	4	28000	7000
	Relatives &	11	33900	3082

	Friends			
Medical Treatments	Rice Bank	92	77700	845
	Group Member	1	500	500
	Neighbor	8	8900	1113
	Relatives & Friends	31	70700	2281
Education	Rice Bank	11	11000	1000
	Relatives & Friends	3	8000	2667
Land Share cropping/ mortgage	Rice Bank	4	3500	875
	Neighbor	1	10000	10000
	Relatives & Friends	3	27000	9000
Land lease	Relatives & Friends	1	2000	2000
Asset Purchase	Rice Bank	21	20000	952
	MFI	2	2800	1400
	Relatives & Friends	2	17000	8500
Live Stock	Rice Bank	58	58700	1012
	Neighbor	2	5000	2500
	Relatives & Friends	3	14000	4667
Marriage	Rice Bank	1	5000	5000
House Repair	Rice Bank	6	11000	1833
	MFI	1	10000	10000
	Neighbor	3	12000	4000
	Relatives & Friends	2	40000	20000
Others	Rice Bank	1	1000	1000
	Neighbor	1	1000	1000
	Relatives & Friends	1	100	100
		Total	**588430**	**103188**

Table 12. Access to/ Available Productive Assets

Asset Indicator	Baseline % of HH [N = 330 HH]	Study % of HH [N = 368 HH]
Cow/Buffalo/Horse	5.80	83.70
Chicken/Duck	40.30	79.35
Mobile	NA	77.72
Goat	5.20	44.29
Pigeon/Quail	0.30	0.82
Fishing Net	1.20	15.22
Rickshaw/Van	0.90	2.17
Tube well	NA	80.71

Horse Cart	NA	0.54
Bicycle	2.40	23.37
Boat	NA	0.82
TV	NA	1.63
Pond	NA	0.54
Hazari Barshi	0.30	1.63
Power tiler	NA	0.27
Motor Bike	0.30	0.27
Ornaments	NA	62.77
Home Land	NA	55.43
Farm Land	NA	30.98
No Assets	43.30	0

Table 13. Growth in estimated Value of Productive Assets at end of the project period

Description of Assets	Total Number	Total value	Average asset value Per household
(a) Project Support		***24200000***	**22000**
Cattle	1231	41872000	
Goat/ sheep	1238	3408600	
Land Purchase (decimal)	195	2028000	
Land Mortgage (decimal)	3473	8383000	
Duck	1816	538700	
Chicken	8027	1304330	
Pigeon	90	17800	
micro business	2109000	2109000	
Rickshaw van	1039000	1039000	
sewing machine	140000	140000	
boat	90000	90000	
fishing net	275700	275700	
tool box	146200	146200	
others	153500	153500	
(b) Total		***60505830***	**55005**
(b-a) Net Growth in value		**36305830**	**33005**

CONCLUSION

Climate change has significant impacts on socioeconomic conditions in rural areas of Bangladesh. The impacts include reduced agricultural productivity, increased poverty, food insecurity, and migration. Women and marginalized groups are particularly vulnerable to the impacts of climate change. Cohesive actions on climate change are necessary to eliminate extreme poverty and inequality and promote sustainable development in the country. This study was designed to assess whether the research intervention of demographic profile and household composition of climate change vulnerable people of northern parts of Bangladesh specially Kurigram district. People live in these areas with very peace but flood and drought hamper the lives of the people. The rate of education of this area is low in comparison to

other areas. In char areas the students face tremendous problems during rainy season to go their schools and colleges because of communicating roads. In the char areas most of the roads go under water in the rainy season. Each and every year floods damages many houses, huge amount of crop loss, death of many domestic animals, loss of homesteads, loss of crop lands, landslide etc. in the northern parts of Bangladesh. Some people die due to flood in this area. Income generating activities reduced in the rainy season. People loss their works, assets and sometimes depletion of savings, restricted movement due to unprecedented recurrent flood. People face financial shortage. During flood many diseases like diarrhea, cholera, dysentery and typhoid spread tremendously. People face lack of pure drinking water.

RECOMMENDATIONS

Still many climate change impacts timing and exact magnitude are uncertain. Hence, the strategy and action plan will require periodical revision. The following enhancements should be considered by Government of Bangladesh to their policies and programs:

1. Adaptation, rather than being concentrated in one sector, should essentially be dispersed across all socio-economic sectors including water, health, agriculture, and infrastructure, each of which presents in own challenges, and will involve stakeholders in different if overlapping groups. Adaptation measures are likely to be less capital intensive and more amenable to small scale interventions.
2. The study recommended that cohesive actions on climate change are necessary to eliminate extreme poverty and inequality and promote sustainable development.
3. Living house should be built in such an way so that the houses can resist floods and cyclones.
4. Governmental institutions (ministries, governmental organizations and agencies), private entries and NGOs should consider integrating climate change in their planning and budgeting at all levels of decision making and coordinate their actions among themselves.
5. Meaningful, achievable climate change targets should be adopted.
6. Commitment should be ensured from developing countries fair share to climate change adaptation for Bangladesh.
7. Education, training and public awareness should be ensured.
8. Seeking more support for climate change mitigation and adaptation research: The Government of Bangladesh should look for increased funding support to research into innovative technologies including renewable energy, understanding climate change dynamics, carbon capture and sequestration, energy efficiency, crop varieties, and other adaptation and mitigation innovations.
9. Collaboration should be done with our neighbors who are victim of climate change.

REFERENCES

1. Adger, W.N. 2006. Vulnerability. Global environmental change. Vol 16.pp 268-281.
2. Agent-based integrated assessment modeling: the example of climate change. Integrated Assessment, Vol2. pp 17-30.
3. Amin, M. S. 1989. The Disaster Flood- 1987-88: The Causes and Rehabilitation Agro-technologies. Edited. Bangladesh Agricultural Research Council Ministry of Agriculture. GOB.
4. Amin, M.S.; Anwar, I and Huq, S. M. I. 1990 Flood in Bangladesh and its Rehabilitation. Bangladesh Agricultural Research Council Ministry of Agriculture. GOB.

5. Amin, M.S.; Anwar, I and Rahman S. F. 1990 Tornados in Bangladesh and its Rehabilitation. Bangladesh Agricultural Research Council Ministry of Agriculture. GOB. Busse, M. 2000
6. Eakin , H and Luers, A.L. 2006. Assessing the vulnerability of socio-ecological systems. Annual Review of Environmental resources. Vol. 31. pp 365-394.
7. Fussel, H.M. 2005. Vulnerability in climate change research: a comprehensive conceptual framework. UC Berkeley: University of California International and Area Studies, UC Berkeley.
8. Gallopin, G. C. 2006. Linkages between vulnerability, resilience and adaptive capacity. Global Environmental Change. Vol 16.293-303.
9. Hasan, S R 2008 Environmental Laws, Banglapedia: The national encyclopedia of Bangladesh; Asiatic Society of Bangladesh, Dhaka; Retrieved: 2007In International Review of Business Research Papers . 4 :((3) -2008
10. IPCC, 2007: Summary for Policymakers. In:Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK,7-22
11. James K. Boyce 2003 Inequality as a cause of environmental degradation Dept of Economics, University of Massachusetts, In Ecological Economics:11(3) 1994, 169-178 Jan 10, 15:17 UTC [cited 2007 Mar 1].
12. Khalequzzaman, M 1988 Environmental hazards in the coastal areas of Bangladesh: in, Ferraras, S. F., and Pararas-Carayannis, G. (eds.), Proc 3rd Intern Conf Natural and Man-made Coastal Hazards California, Mexico, p. 37-42.)
13. McCarthy, J. J., Canziani, O. F., Leary, N. A., Dokken, D.J., and White, K. S. (eds.): 2001, Climate Change 2001: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge.
14. Moss, S., Pahl-Wostl, C. and Downing, T. 2000.
15. Nicholls, R.J. and Mimura, 1998: Regional issues raised by sea-level rise and their policy implications, Climate Research, 11(1), 5-18.
16. Obrien, K., Leichenko, R., Kelkar, U., Venema, H., Aandahl, G., Tompkins, H., Javed, A., Bhadwal, S., Barg, S., Nygaard, L., West, J. 2004. Mapping vulnerability to multiple stressors: climate change and globalization in India. Global environmental change. Vol 14.pp 303-313.
17. Trade, Environmental regulations and the world trade Organization.' World Bank, Policy Research Working Paper, 3361. Dean, Lovely and Wang 2005, 'Are Foreign Investor attracted to weak Environmental Regulations?-Evaluating the Evidence from China'. World.