

RESEARCH REPORT ON

Community Water Management for Improved Food Security, Nutrition and Livelihoods in the Polders of the Coastal Zone of Bangladesh

WATER, LAND AND ECOSYSTEM BANGLADESH

JULY 2015

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1. Introduction and Background Information

Bangladesh is one of the world's poorest and most vulnerable homes for rural people. Low yielding rice crop is the main source of food security. But, there are great opportunities to intensify the productivity of the land and water resources through the uses of improved rice varieties and other crops which requires improved water management, strategic operation of the sluice gates and creation of hydrologically defined water management units (WMUs) through separation of lands of different elevation. This project searches for novel approach for improving water management for more resilient, productive and diverse cropping systems and for sustainably improving water governance and equity in water use. This task also tries to better understanding of the roles and responsibilities of both women and men in the management of land and water resources and development of livelihood opportunities for women that comes from improved agricultural water management. IRRI leads this project and benefits from partnerships with Institute of Water Modelling (IWM), Bangladesh Rice Research Institute (BRRI), BRAC, AAS/World Fish and Blue Gold Program implemented different interventions where IWMI and Shushilan for the impact assessment.

The main purposes of this study are impact assessment and socio-economic analysis of the interventions related to this project. The significant interventions of this study are extension services (new crops, fertilizer, and technology), information dissemination and infrastructure development. So, it is one of the comparative studies aims to improve food security, nutrition and livelihoods in the polders of the coastal zone of Bangladesh.

2. Methodology and Field Plan

2.1 Study Area and Sample Size

District	Polder	Upazila	Union	Villages	Surveyed Questionnaire
Khulna	Polder 30	Batiaghata	Batiaghata	12	300
			Gangarampur	9	225
	Polder 28/1	Batiaghata	Jalma	8	200
	Polder 28/2	Batiaghata	Jalma	12	300
Total	3	1	3 Union	41 Villages	1025

2.2 Team Composition

Research Coordinator	Field Coordinator	Data Enumerators	Data Entry Operators
Mustafa Bakuluzzaman	Md. Saidul Islam	1. Nazmus Sakib 2. Mehir Kanti Mondal 3. Farhana Khandokar 4. Moklesur Rahman 5. Mijanur Rhaman 6. Shanta Kar (FGD Facilitator)	1. Abdullah Md. Zobayer 2. Abdul Kuddus 3. Anup Kumar Debnath 4. Mohon Sardar 5. Sohel Rana 6. Ashish Kumer Sarker
	Sabekun Naher	7. Aman Ullah 8. Dipti Gain 9. Hasan Al Zahid 10. Lenin Sarker 11. Tanjim uddin 12. Bongkim Chandra Roy	7. Onadi Krisna Roy 8. Ali Mortoaza Khan
	Md. Atikul Islam Shah	13. Zakirul Islam 14. Tapan Kumar Gayenor 15. Kamrul Hasan 16. Borhan Uddin 17. Aminur Rhaman	

2.3 Sampling Technique

Condition of the community water management system is explored in this study to better understand how way it is possible to improve food security, nutrition and livelihoods of the coastal community. The vital instruments of this study are household questionnaires, WMO (Water Management Organization) questionnaires and FGD (Focus Group Discussion). This study exercised structured interview schedule using random and stratified sampling method to collect the number of total households and sample households of a village from the study area. The population list for identification sample size was collected from tax assessment lists of Union Parishad office firstly. Then IWMI (International Water Management Institute)

finalized the household list through random sampling using Tax collection list of each Mouzas.

2.4 Training and piloting

The training and piloting had conducted by international water management institute resources personnel with the help of data collector team in Shushilan Head Office at Khulna. The training and piloting was consisting of two days in 7th to 9th June 2015. The first day training of data collection start at 8.30 am and end at 5.pm. The second day training was as same. After end of the training we had gone through for piloting at Mirzapur and Deautola in 9th to 10th June for identifying is the questionnaire matching the field or not? The problems regarding questionnaires and improving the efficiency of data enumerators about questionnaires also reviewed.

We also examine here that how many times will take to conduct a single interview. What response we can get from aman paddy farmers and we tries to find difficulties. How can we ask an easy way the questions through to respondent? After back from field we discussed among us on the basis of field piloting, we shared our difficulties and problem to IWMI. Our motto was that all decisions and throwing pattern of questions as will be same that we can reach under the shadow of umbrella.



Picture: 2 Training Session at Shushilan Khulna office

2.5 Questionnaire review and final Development

The questionnaire was developed by IWMI in English and translated into Bangla by bilingual staff of Shushilan both the household and WMO questionnaire. Most of the questions are structured format. There are a few of question corrected by research investigator based on during training and field findings. During training, we arranged demy interview or MOCK test for interviewer as he/she could memorize all questionnaires. Which question is not appropriate or difficult to understand for interviewee or not able to give us suitable information for better result of data collection that had tried to revise. We were very conscious as every respondent can understand and give us good answer asking question by interviewer. For the interested of good variable, we explored all box as research assistant (RA) can write down freely. It was also finalized to discuss with IWMI personnel. Please find the final questionnaire in **Annex-1**.

2.6 Field Plan

Tasks	Deadline	Responsible Person
Confirmation of data enumerators and data entry operators	28 th May	Shushilan HR
Translate Household and WMO questionnaire into English to Bangla	29 th May	Mustafa Bakuluzzaman

Tasks	Deadline	Responsible Person
Collection of household/voter list from respective UP/Upazila	2 nd June	Md. Saidul Islam
First meeting with field team	3 rd June	Mahanambrato Dash (Liton), Md. Saidul Islam
Movement of field team from Dhaka to Khulna (for orientation)	6 th June	Md. Saidul Islam
Training and Piloting	7 th -10 th June	Mustafa Bakuluzzaman, Nandish, Archisman, Panchali and Md. Saidul Islam
Finalization of study instruments and detailed field plan	2 nd June	Md. Atikul Islam Shah, Md. Saidul Islam and Sabekun Naher
First Field Work		
Fieldwork	12 th – 18 th June	Md. Atikul Islam Shah, Md. Saidul Islam and Sabekun Naher
Data entry	13 th 19 th June	Mustafa Bakuluzzaman, Md. Saidul Islam
Second Field Work		
Fieldwork	20 th - 26 th June	Md. Atikul Islam Shah, Md. Saidul Islam and Sabekun Naher
Data entry	21 th – 27 th June	Md. Saidul Islam
Movement of field team from Khulna to Dhaka	28 th June	Md. Saidul Islam

2.7 Data Collection

The *Shushilan* with its experienced research team had conducted household interview by face to face interview process. The sample size was 1025 households located in 41 villages from 3 polders of the study area. Households' data was collected through purposive sampling method. Before going to the field, we had provided to data enumerator a name list where was containing different name of respondent both male and female. Here we marked 5 selected and 5 reserve respondents for data collectors. So total numbers of 10 respondents given to interviewer before starting their interview. They move through village every working day taking their name list. It was mandatory that he/she used to meet selected ID if any research assistant could not get selected respondent then he/she can take another name from reserve section. If due to different complication of respondent, could not reach 10 respondents during visit at home or data collection, then it was an opportunities to make conduct from outside of list. Every working day of data collections, all RA could done 5 questionnaires with pay attention. Global Positioning System (GPS) machine made use of keeping a record of the surveyed households and to authenticate the data. In absence of GPS machine we used in SMART phone.

Apart from household questionnaire, WMO questionnaires were also interviewed from the study area. WMO interview was done by field supervisor at same villages from executive committee members of WMO. Informal committee like gher

committee, gate committee, beel committee was interviewed where there was no formal committee. It was proposed that we have to conduct 41 WMO questionnaire but we were interviewed only 28 WMO questionnaires due to unavailability of WMO. WMO questionnaire were used in English version.

2.8 Data Management

There were 29 team members of this study. Each day three team went to collect data from the field and total team members of data enumerators were 15 excluding 3 supervisors. Each team was composed by 5 Research assistants including 1 supervisor. Every working day, three teams conducted 75 questionnaires including 3 WMO questionnaires. It is mentioned that each team confirmed 25 questionnaires and 1 WMO questionnaire. All types of study related activity monitored by IWMI resources personnel.

After returning the field, all the data enumerators of each team cleaned the questionnaire and submitted to Supervisor in the evening meeting. Then, Supervisor verified the questionnaire, whether there any mistake or not. Data entry operators also join with us and shared their finding how we can make error free questionnaire. If there was any mistake, any understanding problem, Supervisor had given feedback to data enumerators to accurate over phone to the respondents. In this way data had been cleaned. After cleaning the data, we stored all questionnaires at data management team.

2.9 Data Entry Procedure:

There were 8 data entry operators of data management team with in mind that they were able to double entry each day collected data. Each day the data entry operators entered into CSpro software 150 questionnaire including double entry. After entering each the data, they were submitted the file with their supervisor. The supervisor was checked and compared the double entry to find out error data. Then the supervisor was provided the error list to the data entry operator. The data entry operators checked their file within each group through questionnaire. At the process, each day they were provided error free data..

2.10 Ethical Approval

All participants provided verbal consent prior to being interviewed. If a participant was under 18 years old, her guardian was also asked to provide permission. Participants who could not give us information then select other members of the household.

2.11 Quality Control

Quality of the data tries to strictly maintain through some process. For maintaining the quality of the data, we tried to uphold 3 second rules, avoid outsider during asking to respondent, stop mobile phone or silent, first done questionnaire of data collectors checked by supervisor one by one. Supervisor of each team also aware of the data enumerators about how they handle respondents, rapport building, throwing questions, whether they skip some portion or not, they are jovial to collect data. Supervisors observe them time to time during interview and if there was any lacking, then supervisors let understand them. After one week, each team was revised and

interchanged group members. This way we tried to maintained quality control during data collection.

3. Field Situation of Polder Areas

Polder 28/1

Polder	District	Upazila	Union	Mouza	Village	Total Household	Sample Size
28/1	Khulna	Batiaghata	Jalma	Sanchibunia	Chara	132	25
28/1	Khulna	Batiaghata	Jalma	Sanchibunia	Dargatola	114	25
28/1	Khulna	Batiaghata	Jalma	Sanchibunia	Nijkhamar	228	25
28/1	Khulna	Batiaghata	Jalma	Sanchibunia	Sanchibunia	551	25
28/1	Khulna	Batiaghata	Jalma	Soilmari	Soilmari	364	25
28/1	Khulna	Batiaghata	Jalma	Banshbaria	Banshbaria	209	25
28/1	Khulna	Batiaghata	Jalma	Rajbandh	Ghola	322	25
28/1	Khulna	Batiaghata	Jalma	Rajbandh	Joykhali	227	25
Total					8	2147	200

In polder 28/1, the study has been conducted 7 villages. These are Nijkhamar, Chara, Ghola, Dargatola, Sholemari, Banshbaria and Joykhali. Most of the villages are closed to the urban area like Nijkhamar, Banshbaria. Near about 175 households, we have seen during visiting. Most of them are related with services holder and other small business. A very few number of peoples involve at agriculture. They told that one's upon a time they had a lot of land but due to increase of demands they have sold it. Also they told that now in the field of agriculture have no benefit. We didn't get actual cost end of the cultivation. So they are going to left from primitive occupation.

Most of houses are made of bricks and tin. All of the people are Hindu. A few number of people about Muslim we have seen in this polder. But they are strong and powerful to establish their own rights which not tolerable. Those who are cultivate land for paddy with other crops, we could under understand to talk with them, they grow different types of paddy like ranisellor, motishail, kumri, jotai balam and bashful. Farmers of these villages cultivate aman crops but production of aman crops is decreasing day by day per bigha. Paddy is not growing well. Only 10 to 12 *Mongrow* each bigha. They are using in the field faset, dab and uria fertilizer to more production and development of land but these fertilizers cannot improve the soil fertility.



In Rabi season, peoples try to grow in IRRI 28 type's paddy. In this areas land are suitable for *Gingha*, *Kumra*, *Dal* and *Korlla* cultivation. *Gingha* is more profitable all of the crops in *rabiseason*. But most of the peoples don't grow in commercially. They just grow for family demands. A farmer told that a personal or community conflict is the main causes to

grow in more production. Other *rabi* crops (sesame, pulses) are damaged due to early and excessive rain. Some farmers said that they got nothing after harvesting sesame.

Farmers of all villages are interested to cultivate IRRI rice, wheat, maize and others hybrid *rabi* crops but they think there is no environment, soil quality for these crops cultivation. They want to produce sunflower, maize more. Because, it is possible to market or sell that crops due to nearest reside in Khulna city. But we are filling in tension that most often our crops have stolen by theft.



Picture: Sesame field

Regarding this polder, all the year round, all canals are kept full of water. So water logging is the main problem here. This areas water cannot move anywhere. It is observed that, water logging problem is not so mentionable in Shoilmari village but this problem exists much in Banshbaria. Most of the canals related to the villages are covered by soil. Most of the cases, over the canal a lot of tree and other dirty are available. There are no initiatives to remove it or to active this canal for lay out water from canals. They adding that this why we cannot grow a lot of crops but our neighbors union grow 18 to 20 *Mon* crops each *Bigha*. Since 7 or 8 years ago the canal was excavated by BWBD. Now we have done the same work willingly or voluntary.

Many canals have been leased for 5 to 10 years by leadership peoples. Here musclemans and political leader are more active and strong to use this canal. Taking proprietor of canal, they do always bit with community people in every starting of the year. *Rui*, *mrigale katla* and *puti* fish are cultivated in canals. These canals are divided into different parts of fish field. They catch fish from canal by net or *barshi*.



Picture: on the ways of canal people grow kachushak

Sluice gates do not work properly in both Banshbaria and Sholemari villages. Width of the canals becomes narrow and water quality of the canals is decreasing gradually in case of both villages. Banshbaria village is close to the city and most of the people are educated. Sluice gate condition is good but canal becomes silted causes water flashing out/in problem arise that affect *aman* crops cultivation.

Rabi crops (sesame, lentils) did not cultivate last 2-3 years in Banshbaria village due to scarcity of irrigation water. Among the nine parts of Ramdia gate, 2-3 parts of the gate works properly and other parts are blocked with accumulated soil. It is monitored that villagers of this area are facing scarcity of pure drinking and bathing water. Many

times gate is operated by the chairman of the village without the consultation of farmers.

The water management system was not active. During visiting at Ghola, Nijkhamar and chara, most of the areas of this people are not able to say regarding water supply and gate operation and management system. During perception question they told that we don't know maize and our land is not suitable for cultivate. So how we do cultivate this crop? Our land is high but we don't get sufficient water in summer season for wheat cultivation. Although weather is not comfortable for this areas. We are very much interested to dig narrow canals beside land but what is the benefit? If don't get much water in necessary time.

Due to plotting system agricultural land decreases gradually in Snchibunia. Land is selling for housing purposes and land size also decreases. Most of the canals are leased out for fishing purposes that hinders the water flashing out/in in this locality. Some powerful occupied the canal for their fish cultivation causes water movement decreases. Water flashing out/in problem arises particularly water cannot flashing out properly that leads to create water logging. Volume of crops production reduces gradually even some farmers do not get their expected amount of crops. As a result, some are selling their agricultural lands, some let go from framing and involve in other occupation. They do not depend on river water especially in Tele mug dal. It is cultivate depends on rain.

In Shoilmari village, there is a water management group to govern the gate and other water management issues but in reality, it is actually inactive. Most of the people do not know about its existence and activities. There is no formal committee in Banshbaria village. Gate committee plays role to govern gate, embankment, canal, conflict and other water related matters. The people living besides the gates operate gates and community people give fishing rights instead of money for maintenance. Sometimes, gate operator works as a volunteer. Embankment of Shoilmari is too vulnerable to cope with the natural hazardous than Banshbaria. Farmers of the villages opined that if WMO work properly to control the canals and gates with active participation from locality, then water related problems will be reduced.

Here in that areas people's crisis in food security at three month as *Ashsin*, *Kartik* and *Agrahaion*. In that time the scope of work are very few and it goes decreases' day by day. Most of them are often goes to Khulna city for working but they do not go outside of the city or others places. Thus, this way they try to cope with poverty. During food security, they reduce the number of food intake and buy goods at cheap rate.

During data collection, we observed that most of the families who are less economic condition, there both husband and wife are joining in domestic activities. They want to share their demands each other. Respondents of Banshbaria village involved others income generating activities like poultry, livestock rearing, and superstore due to near the city. Women in Shoilmari participate in agricultural activities with their husband. It is seen that all types of house related activity done by female and agriculture related activities done by male. It is observed that nearly all farmers think women can lead to the production of hybrid crops and they are able to participate in any decision making process.

Comments from Respondents of 2S/1 Polder

1. Water logging exists in all season (Banshbaria) but there is no opportunity to drain out water due to much difference between low and high elevation of land
2. Width of the canals becomes narrow and gates are blocked due to soil accumulation in front of the gates
3. Water scarcity in dry season and canal siltation increases every year
4. Marketing of crops are delayed as a result of bad road transportation system although there is a market for wheat, maize crops
5. Activities of WMO should be practical and active that increases the community participation, conscious about agricultural activities, water related issues

Polder28/2

Polder	District	Upazila	Union	Mouza	Village	Total Household	Sample Size
28/2	Khulna	Batiaghata	Jalma	Choyghoria	Bodnakhali	89	25
28/2	Khulna	Batiaghata	Jalma	Choyghoria	Chokhrakhali	257	25
28/2	Khulna	Batiaghata	Jalma	Choyghoria	Choyghoria	323	25
28/2	Khulna	Batiaghata	Jalma	Jalma	Uttar Jalma	108	25
28/2	Khulna	Batiaghata	Jalma	Denarabandh	Denarabandh	64	25
28/2	Khulna	Batiaghata	Jalma	Jharbhanga	Jharbhanga	327	25
28/2	Khulna	Batiaghata	Jalma	Mathabhanga	Mathabhanga	299	25
28/2	Khulna	Batiaghata	Jalma	Mathabhanga	Putimari	620	25
28/2	Khulna	Batiaghata	Jalma	Raingamari	Gojalmari	111	25
28/2	Khulna	Batiaghata	Jalma	Raingamari	Joypur	81	25
28/2	Khulna	Batiaghata	Jalma	Raingamari	Raingamari	174	25
28/2	Khulna	Batiaghata	Jalma	Tentultala	Tentultala	558	25
Total					12	3011	300

In polder 28/2, we surveyed in 12 villages (Bodnakhali, Chokhrakhali, Choyghoria, Uttar Jalma, Denarabandh, Jharbhanga, Mathabhanga, Putimari, Gojalmari, Joypur, Rangemari, and Tentultala) and 325 households. This polder belongs to the Jalma union of Batiaghata Upazila.

The enumerators has opportunities to meet with the households by asking question during data collection and observation. Here the people live in nuclear family. They have no costly ornaments. The infrastructures of household were mud and tin especially at Badnakhali. Most of the Badnakhali village's habitants are involved with agricultural activities. In Gajalmari and Denarabandha villages of people are concerned with small business and services. Someone of them practiced in prawn cultivation. Someone left this village due to erosion of river at Bodnakhali and Denarabandha. They are always facing with natural calamity.

The condition of land is almost same in this control polder. They use *bigha*, *khata* and *decimal* for land measurement. Most of the areas the types of land are *bele doash*. They grow on the field *aman* paddy and others crops. Only two seasons they cultivate to meet their family demands. A few numbers of farmers cultivate in aman but all of them are cultivate in *rabi* season like *Dal*, *Ginga*,

Bangi, and sunflower. Tele mug is the main crops in this polder in *rabi* season but they complained, they do not get sufficient money to end cultivation. Most of the time crops are damaged for unnecessary rain and water logging. They have no crops storage or big crops container at household. So they do not get market value. They do not sell aman paddy in the market, most of them are storage for consumption



Picture: 7 field of Tele mug dal

purposes. When they faces food crisis at family, they buy rice from market. Their coping strategies with food shortage are that reduce food intake, buy cheap rate food and sell household logistic. A few numbers of respondents do not want to tell about his/her family condition and situation especially in food crisis. Their main income source is agriculture and prawn cultivate.



Picture: 8 Lost sunflower crops

A very few number of people have own tube well. Both drinking and bathing, they use outside water which established by Government or other agency. In Denarabandh, especially who live in beside Soilmari River they are always face lack of safe drinking water. They collect drinking water from a distance. During observing in polder, most of them have no sanitary latrine. The main canal are situated far away from their cultivate land. They have to face a lot of village's politics to bring water for cultivation. Some are interested and

some are not feeling to dig canal beside land. Taking this issue they reach in sensitive quarrel.



Picture: Canal becomes silted and parallel to the land bed in Joypur



Picture: Rangemari canal become motionless due to blocked

In Rangemari, road communication is so narrow that any transport cannot move in this road. Width of the canal is also slender and water of the canal becomes motionless. In Joypur, lack of irrigation water and salinity intrusion increases due to increases the canal water salinity. As a result farmers of the village cannot use this water for irrigation. Saline water easily comes from the river because gate door are damaged. Soil fertility decreases because of excess and low rain. Due to saline water delay seed bed making. Most of the farmers opined that production system is backdated causes quantity and quality of the crops diminishes.



Photo: Canal becomes narrow in Joypur



Photo: Damaged gate near Mathabanga in front of Rupsha river

Mathabanga village is large in size but road is narrow. In this village, most of the farmers have farmers' identity card from Ministry of Agriculture and they are well-known to all as a farmer. Farmers do not get actual product price by selling crops even sometimes they cannot overcome the production cost. It is observed during survey, farmers of the villages assume farming will be stopped due to continuous losses and they cannot carry on this activity near future if the situation cannot be changed. Majority of the farmers cultivate in leasing out the lands and owners of the land always think their own profit not a farmer. There is a scarcity of agricultural labor in all over the polder because many villages of this polder are near to the city and labors are migrated more from these villages for searching work causes wage of the agricultural labor rises.



Picture: Gate becomes useless near Mathabanga

In Jharbhanga village, nearly everyone is affluent and they involve not only farming but also other business. This village gives birth from two old men and all the villagers are in the same race, they are connected to each other. Maximum house is brick and cement made. They cultivate *aman* but not in *boro* due to irrigation water scarcity. They say that, if it is possible to establish deep boring, then water scarcity problem may be reduced in dry season.

Perceptions about crops, all are interested to cultivate hybrid wheat, maize, sunflower, *rabicrops*. Some are not interested due to unfamiliar with these crops. They told that we did not cultivate it ago. So how can we start to cultivate it and marketing and selling system what will be? We do not know the cultivation system of seed and crops management during cultivation. Some lands are deep and some are horizontal. Water can't move or flush out anywhere. If we cultivate wheat, need more water for better production but from where we get water in dry season? Our canals are not good for water supply. In that cases we need deep tube-well. If any agency could teach us give all logistic of agriculture, then we try to cultivate these crops. In Bodnakhalli areas of farmer, shared with us that they are interest to cultivate in *Zirra*. It is valuable and

costly because our land is comfortable to cultivate this crop. We expect that if any authority could manage seed and fertilizer for this crops that we would be benefited.

Women contribute to the family in all areas. They want to increase their dignity and empowerment in each side of development. So they need support. We make ensure gender balance in everywhere. During survey, such types of word we listened from respondents. Now we are live in scientific age. We participate beside male in every sector of household. They help to male in the field of agriculture and domestic activities. Also they join in different types of meeting, seminars and Government related activities. They play great role in the field of household about decision making beside male. We have seen and understood to talk with female that loan, education and domestic animal related activities done by them. It is mentionable that they are interest to join a small numbers of groups like fish, animal but they do not get reliable information. If we could ensures the communication system in community level so their participation and empowerment would be increased.

In Jharbhanga, Mathabhanga, Joypur, there is no formal committee to manage canal, gate. In Snchibunia, there has a water management organization but it is inactive. Farmers of the villages want a new committee to be formed to manage the water related issues in this polder.

Comments from Respondents of 28/2 Polder

1. Agricultural land reduces because of increasing plotting business in this polder
2. Farmers are not getting their actual product price even they cannot overcome production cost. It is noticed during field survey, some farmers are angry about farming; they want to quit agricultural activities
3. Farmers think their livelihood position cannot be changed with farming
4. Need congenial environment for agricultural activities
5. Water scarcity, canal siltation, damaged gate are the common problem all over the polder
6. Powerful control the canal for fish cultivation that creates conflict between fish and rice farmers
7. Need to establish deep tube-well to get pure drinking water
8. Our drinking water is saline. We cannot drink it easily
9. Require re-excavation of canals and reconstruction of sluice gate
10. Community people want to involve with income generating activities
11. WMO should be active

Polder 30

Polder	District	Upazila	Union	Mouza	Village	Total Household	Sample Size
30	Khulna	Batiaghata	Batiaghata	Auskhali	Auskhali	80	25
30	Khulna	Batiaghata	Batiaghata	Basurabad	Basurabad	216	25
30	Khulna	Batiaghata	Batiaghata	Batiaghata	Batiaghata	195	25
30	Khulna	Batiaghata	Batiaghata	Bherendabunia	Bherendabunia	98	25
30	Khulna	Batiaghata	Batiaghata	Chakshlemari	Chakshlemari	114	25
30	Khulna	Batiaghata	Batiaghata	Hatbati (Baro)	Hatbati (Baro)	1042	25
30	Khulna	Batiaghata	Batiaghata	Hetalbunia	Hetalbunia	886	25
30	Khulna	Batiaghata	Batiaghata	Hogolbunia	Hogolbunia	445	25
30	Khulna	Batiaghata	Batiaghata	Khalsibunia	Khalsibunia	165	25
30	Khulna	Batiaghata	Batiaghata	Kismat Fultala	Kismat Fultala	328	25
30	Khulna	Batiaghata	Batiaghata	Par Batiaghata	Par Batiaghata	147	25
30	Khulna	Batiaghata	Batiaghata	Phulta la	Phulta la	252	25
30	Khulna	Batiaghata	Gangarampur	Barunpara	Masiardanga	80	25
30	Khulna	Batiaghata	Gangarampur	Debitala	Debitala	377	25
30	Khulna	Batiaghata	Gangarampur	Kasiadanga	Kasiadanga	182	25
30	Khulna	Batiaghata	Gangarampur	Katamari	Katamari	107	25
30	Khulna	Batiaghata	Gangarampur	Katianagla	Amtala	326	25
30	Khulna	Batiaghata	Gangarampur	Katianagla	Gondhamari	92	25
30	Khulna	Batiaghata	Gangarampur	Katianagla	Katianagla	391	25
30	Khulna	Batiaghata	Gangarampur	Per Salua	Per Salua	132	25
30	Khulna	Batiaghata	Gangarampur	Boyarbhanga	Boyarbhanga	532	25
					21	6187	525

In polder 30, the study has been carried out in 21 villages under 2 Unions named Batiaghata and Gangarampur. In this polder, most of the households are hindu and they live in joint family. Most of houses are made of mud and tin. In some where we observed a few numbers of bricks houses in this locality. In the exchange of land they use the measurement as *bigha*, *katha* and decimal. *Bigha* and *katha* are same but decimal is varies from place to place. In this locality there 90 percent people are farmer and they are involved with agriculture beside they work as day labor in off season. Most of the farmers cultivate in leasing to others land and they have fewer plots to cultivate own that is why they do not lease out or share crop out to others. Farmers think that agricultural system has dependent on environment most recently and this system is extremely susceptible to climate change in the vein of excessive rain, lack of rain or drought, salinity intrusion.

The maximum farmers of this polder only can cultivate *aman* paddy during *aman* season. In Rabi season, they cannot grow IRRI rice due to lack of irrigation water and just cultivate sesame, lentils and few vegetables but they cannot cultivate all year round. Most of the time *rabi* crops cultivation faces extreme environmental problem. If it is possible to bury deep boring to the paddy field, water scarcity problem will decrease in dry season.

In this polder, Most of them, all the year round they grow only aman paddy. Some of them are grow in *boro*. It is very rare we have seen during surveyed. Each bigha they grow 10 to 12 Mon. it can be increased that if they flush out the water from land. Due to excessive water on the land farmer do not get huge paddy. In summer season, they grow *mugdal* and *till*. In dry season, they use water from narrow canals which spreading beside on the land. A types of influential people like land lord or chairman and members capture the all canals and they cultivate fish in the canals which is unexpected. They established bamboo net over the canals and catch fish to meet their family demands. As a result, the flow of water of these canals always hindered.

There is a conflict among farmers about high and low elevationof land. Practicing of shrimp and other fish cultivation is mostly seen in Batiaghata, ChakSolemari, Kasidangha and Per-Salua villages. In Batiaghata, farmers are practicing mixed culture more. In Phultala village, farmers face two vital problems. These are water logging problem in rainy season and lack of irrigation in dry season. Besides Phultala, water logging, lack of irrigation water, salinity intrusion, and water flashing out/in problems are the common problems all over polder.



Photo: Canal and gate in ChokSolemari village



Picture: Gate is blocked in Kasiardanga



Picture: Kismet fultala where people catch fish by using bamboo nets



Picture: Water logging at Hogulbunia

Canal becomes silted gradually mainly in the areas of Phultala, Katiangla, ChakSolemari, Per-Salua. It is observed that, ChakSolemari village is surrounded by river and the communication system is extremely hazardous. Road transportation

system is very bad both ChakSolemari and Per-Batiaghata. In rainy season, road becomes muddy and very slips. Villagers move to inside and outside of the village by foot in long root about 5-6 km. Farmers of these villages use canal water for irrigation



Photo: Saline water easily comes into this damaged embankment in Kasiadanga

only for 5-6 months which comes from river Sholemari. But in dry season, canal water becomes saline due to increasing salinity in river water and that time canal water is not for uses. Embankment is really damaged and becomes low-lying gradually mainly in Kasiadanga village. Saline water easily comes into the agricultural land through damaged embankment. Fish cultivation diminishes highly due to high salinity intrusion in the land and pond. In this village, lots of

lands possess chairman and his brothers. Powerful man (Biswas bari) controls gate for own shrimp cultivation that is why crops and fish cultivation of other farmers hamper extremely and farmers of this areas become angry and hopeless day by day. Canal of Kasiadanga village lease out that is why, water cannot move in the land properly.

River Jhopjhapia is close to the village Per-Salua. But, saline water comes from river beside embankment. This water flooded agricultural land of the villagers and salinity intrusion increases. Due to this salinity, fruit and other trees of the village decreases even there is no fruit trees grow up recently. Villagers think that if it is possible to excavate a canal around 6 feet between the river and embankment, then saline water falls in *Ghter Khal* to again river through this canal and cannot inundate the agricultural land. Some important *Khal* are leasing out that extremely hampers water movement. Canal inside the village becomes silted and soling road makes on this causes water flashing out/in problem arises.



Picture: Damaged sunflower field in Per-Batiaghata

Perceptions or attitudes of farmers regarding crops are positive. Farmers' perception regarding crops cultivation, there is no suitable soil for wheat, maize cultivation all over the polder. Some of the farmers of Phultala, Batiaghata try to cultivate maize in their field but production volume is not so mentionable. They are interested to produce various *rabi* crops like wheat, maize, pulses, IRRI rice but they cannot know how to produce hybrid crops properly. Most of the farmers of this polder assume that women of their household will be able to lead production of seed for High Yielding Variety (HYV) rice and *rabi* crops. Nearly everyone prefers sunflower cultivation to maize and wheat. But, sunflower is totally damaged due to heavy rain in case of Per-Batiaghata, Per-Salua. Most of the farmers of this polder produce sesame but they do not get a single grain after harvesting crops. It is observed that nearly all farmers of

this polder assume that planting the *rabi* crop earlier will help reduce the risk of damage from an early monsoon and that will not affect the quality and quantity of the crops harvest but it is not possible because after aman harvesting need time to dry land before *rabi* crops planting. They also think field channels can easily drain water from their plots quicker but they are not interested in building the field channels in their own ground. Some farmers of this polder are aware that rice seedlings can be transplanted using machines rather than hand and they are interested in using machines to transplant rice seedlings to their own land.



Picture: Gate near Per-Salua

They also gave information to us by using their practical knowledge and to see the household situation. That was very imperative for cultivation any crops in this area. In some cases they were give answer to us intentionally but it was very few. Some of them told these types of crops are not suitable for cultivation. Our land is very high or horizontal. Where water is need much more but we could not supply on the other hand where water is no need but could not remove so how can we cultivate high yielding crops. What marketing system or selling system will be we are ignored? We are not familiar with crops cutting machine.

Water management and supply system are not good for cultivation. Most of the canals of the land in this area are full of soil. People cannot get sufficient water during harvesting in season. Influential people of the village, make artificial canal ahead of the narrow canals. They cannot grow crops in good. They have just grown only in the land. If they could not proper nursing the land it may be damaged due to heavy rain.

Water logging is the main problem of this area. The water management association or WMG is exists but they are unable to bring a better solution. We could understand to talk with WMG members and treasures of this organization that most often they take initiatives to remove the problem but do not see in light of hope for good result. Also they talked with Bangladesh water development board but they are failure to get respected solution. In the time of necessary they cannot moved the water from land. Due to heavy rain, they can store a lot of water in these canals and also use this water on crops for better cultivation. Most often saline water comes from river and mixed into sweet water. They told that if we will manage or protect salinity of water that we get a good result on crops. We can grow a lot of *rabi* crops like watermelon, sunflower, maize. We can change our socio-economic condition, happiness and prosperity.

Most of the year of this villages people, they do not have working space. They get only 6 month opportunities for working her/his locality. Another time he/she spends outside of the area. In this area, all of them are very poor and day labor. A definite day in a week they meet in together to sell myself working for food. It is called “weekly zone”. It may be market or important place. From that place, day labor or working people sell own self exchange of only 250 or 300 hundred BDT. Thus this way they

have gone through different types of area for working. Their living situation are varies men to men. Some one of them is stay in 1 or 7 days. Some one of them is stay from 1 month to 4 months till. Especially when they are passing in very odd situation their household lives fall in complexity or food security. This way they tries to solve or to cope with this problem.

The condition of sanitation and hygiene was not healthy for rural people. In this polder, a very few number of tube well we have seen but it was not sufficient for villages people comparatively. Every day they had to collect drinking water from distance by using their foot. Among of them are using in filter. They have to face difficulties in rainy season. All the year round, they are sick for abdomen pain. There is no MBBS or trained up doctor who is capable to manage worse situation. It is very significant scenario especially for pregnant mother and children. A number of people open suffocate on the road beside. They have no latrine. If some has but it is not hygiene or healthy due to lack of proper maintained.



Picture: 16 a picture of unhygienic latrine

During surveyed in polder 30, Most of the gate are inactive or too small that could not supply as much as water when villagers need. Sluice gate condition is not proper to collect water for cultivation. A small amount of water always store/logging in front of gate which spread dirty flavor to near household people. It is hopeful word that authority takes good initiatives to remove this course. It is the result of some inexperienced worker activities. There were water management groups but these were motionless after IPSWAM project. Now, water management association divides into 4 groups under Blue gold project. Blue gold provides training about livestock rearing, fish cultivation, *gher* training, and nutrition, training to women about vegetables gardening in Batiaghata and Per-Salua village. According to the farmers of Per-Salua village, Blue gold re-excavate canal but it is not a proper way. One side is re-excavating while other side is silted that is why canal cannot serve the villagers all year round.

In Kasiadanga village is surrounded by road in both sides causes water cannot drain out/in leads to water logging. Amtola gate cannot flash out/in water properly. Kasiadanga *gher khal* is very important to the villagers but it is leased out that is why water scarcity problem reaches horrendous condition. Many important canals of this polder are blocked due to siltation and lease out the canal for fish cultivation and lack of proper maintenance. However, width of the canal (Kasidanga, Per-Salua, Per-Batiaghata) is extremely narrow causes people does not use this water for their needs. Gate cannot operate properly and sometimes it controls powerful land owners to their own will.

Sometimes people near the gates operate gates and community people give them fishing rights. There is no formal election for water management groups (WMG). Community people gather in a place and they selected the Chair-person, secretary, members. The nominated members of the Executive Committee meet formally but they cannot able to solve water related problem at all. Some of the members of the household migrate to the city and other area for searching job and many want to be migrating for better livelihood because farming do not provide better livelihood. Some farmers do not cultivate due

to much production cost. For the most part of the respondents of this polder argued that all the household activities are done by women and agricultural and government activities are completed by men. Men take the final decision regarding agricultural inputs, types of crops to grow, marketing, expenses, participation to various programs but women also participate to the decision making process. Farmers stored their paddy only for 6-8 months, other time they buy rice to market for consumption. Most of the respondents of the surveyed area have one or two room house which is made by muddy wall with tin/straw roof. Majority of the households use government or other tube well for drinking, cooking purposes and pond water for bathing and other activities. Most of them do not tube well of their own. The villagers are facing drinking water scarcity. They use ring slab for sanitation. In Per-Batiaghata, Per-Salua and ChakSolemari villagers are facing extreme electricity problem. It is observed during field survey that women are involved in catching fish from the river. In this polder, other income generating activities like livestock and pigeon rearing practices also.

During surveyed we have seen that a huge debt tree beside road. We could understand to talk with villages' people that if any agency or authority takes initiatives to organized or storage debt that a number of people might relief from this poverty. Every year a plenty number of debt grows in tree but most of them is lost due to proper nursing. If we do encourage the village's people that it may be a source of income generating activity. They are also cultivating prawn in this area. A lot of prawn *gher* we have seen during visiting in this field at Hogulbunia.

Comments from Respondents from Polder 30

1. Water scarcity in dry season and water logging in rainy season are the common problem in this polder
2. If it is possible to cultivate IRRI rice at least 1 Bigha of land, then it will be possible to consume whole year that cannot be possible with 5 Bigha of aman rice
3. If we could cultivate a lot of high yielding crops our land that brings my family success and happiness which makes ensure to empowerment of women in the organization
4. Many team come to us and capture our information by using their laptop or notepad but never development our forehead
5. All of them are hunger for money but not for working
6. Why do you ask about food crises? Will you give us?
7. Water scarcity will reduce by making deep boring in the agricultural field
8. Canal siltation increases that is why water drainage problem becomes unsolved
9. Conflict arises among farmers due to differences between high and low elevation of land
10. Due to lack of modern agricultural machineries, inputs, production volume of the crops do not increase
11. Production cost is higher even farmers do not get actual price of the crops
12. Quantity of aman paddy decreases gradually due to salinity intrusion
13. Distance between gate and canal is more causes gate becomes useless (Per-Batiaghata)
14. Need to re-excavation of canals (Kasiadanga) and sluice gates re-construction on the basis of priority
15. There is no agricultural support for farmers
16. Ensure safe delivery unit at locality for enhancement of pregnant women.

4. Best Practices

Farmers of the entire polders wished to cultivate IRRI rice and other *rabi* crops and some farmers practice to cultivate IRRI rice in some plots (Banshbaria, Joypur). They use water from pond with pumping machine for irrigation purposes. It is observed that many farmers involve not only agricultural farming but also other income generating activities like poultry rearing, livestock rearing. Some farmers dig field channels near their land to drain the water (Batiaghata, Banshbaria). Where there are no formal committee or inactive committee, people near the gate operate the gate voluntarily (Mathabhangha, Shoilmara). Some women of the polder handle the agricultural cultivation directly and some women earn by catching fish in the river (Per-Batiaghata, Rangemari).

5. Challenges Faced during Data Collection

The significant problems which we are faced during survey are presented below.

1. It was too difficult to conduct survey due to excessive rain
2. Road communication was a major problem in most areas there was so narrow road and mud-covered road that was not in a position to transport any vehicle. Due to rainy season, road becomes extremely muddy and slips that was not in a position even work.
3. Sometimes women were the main respondents because male household head were not available during survey times. As they were not aware of the details production cost, land size, information regarding water management, it was a difficult and time consuming task to collect information from them.
4. In some cases, actual farmers were absent in the household sample lists. In Mathabangha village, among actual and reserve list only 7 were farmers. Then we had to collect farmers list instantly with the help of the villagers. It created lot of problems.
5. Most of the time respondents were interested to provide information but after sometime, they were restless.
6. Nearly every time, villagers frequently asked us whether they got benefits from this survey or not. This created a lot of disturbance.
7. In Choksholmari village, we reached in walking by 2 and half hour by foot due to bad communication system.



6. Concluding Remarks

Bangladesh is one of the vulnerable countries in the world due to climate change. The word 'food security' is now one of the concerning issues because of frequent cyclone, drought, flood, salinity intrusion. Water becomes scarce resources now a day due to increasing salinity in the land and water. Water is everywhere but usable water decreases gradually. This study tries to manage this water for improving food security, nutrition and livelihoods of the community in the coastal zone. This study tries to observe the water management status, condition of canal, gate, embankment, crops pattern, land size, migration situation, and household decision. Related with this study, we surveyed some of the villages of polder 28/1, 28/2 and 30. It is monitored that, most of the cases canals become silted; gates are damaged, saline water come into damaged embankment. Nearly everyone cultivate *aman* crops but they want to produce hybrid rice crops, IRRI rice crops and other *rabi* crops. Farmers desire to improve their livelihood system by adopting modern agricultural production system. Therefore, change is hard. It is always difficult for any locality, and costal area is no exception. Whatever, with all in together, we have done the study successfully. Dedication, team spirit and intellectuality keep always beside with us. We didn't compromise with quality during data collection or field work. We were firm about our decision which makes us very easy and accountable. We hope that it will to know the situation water management of coastal area and also help to bring the change of community development.