

**Gender Based Water Governance to Cope with Salinity Intrusion:
A Study on Coastal Area in Bangladesh**

Priodarshine Auvi

Registration No: 153

Session: 2014-2015

The thesis is submitted in fulfillment of the requirements for the Degree of Master
of Philosophy (M. Phil.)

Under the supervision of

M. Anwar Hossen (PhD)

Professor



Department of Sociology
University of Dhaka, Bangladesh

April 2019

Declaration

This work has not been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no materials previously published or written by another person except where due reference is made in the thesis itself.

Priodarshine Auvi

Registration No: 153

Session: 2014-2015

Department of Sociology

University of Dhaka

Certificate

This is to certify that the thesis entitled “**Gender Based Water Governance to Cope with Salinity Intrusion: A Study on Coastal Area in Bangladesh**” is hereby submitted by Priodarshine Auvi, student of M. Phil., Registration No: 153, Session: 2014-2015, department of Sociology, University of Dhaka in fulfillment of the requirements for the Degree of Master of Philosophy (M. Phil.). It is also certified that the research work embodied in this thesis is original and carried out by her under my supervision. No part of the work has been submitted for any other degree by her.

She is permitted to submit the thesis.

M. Anwar Hossen (PhD)
Professor
Department of Sociology
University of Dhaka

Acknowledgement

This thesis was conducted in fulfillment of the requirements for the Degree of Master of Philosophy (M. Phil.) from the department of Sociology in the University of Dhaka. First of all, I thank almighty Allah for helping me all the way of my M.Phil. journey and completing my thesis uninterruptedly and on time. I also wish to express my sincere appreciation to several people without whom it would not be possible to pursue my M.Phil.

I am grateful to Dr. M. Anwar Hossen, Professor, Department of Sociology, University of Dhaka, my supervisor, for accepting me as an M.Phil. student and making my goals achievable. I am greatly benefitted from his expertise and insightful suggestions. I also appreciate his contributions to improve my writing skills, research questionnaire and methodology as well as findings analysis. He always helped me to reach the insight of thinking and learning process. I thank him for relentless reading of my write up and supporting me for making logical sense of findings and data analysis. He always had time for me and I found him insightful discussion enlightening and resourceful.

Mr. Taposh Mitra from Shushilan, who generously helped me and allowed me to conduct field work at one of their project sites. He not only introduced me to the community people but also made all the arrangements for conducting the fieldwork smoothly. I sincerely acknowledge the generous support from Shushilan, during smooth implementation of research work.

I express my sincere gratitude to my parents for their never-ending love, support and prayers. They shaped my life and encouraged me to fulfill my educational ambition. And also, I would like to convey my heartfelt thanks to my husband who supported me a lot throughout the journey. I would not be able to finish this thesis on time if he would not support me adequately.

There are many other people who helped me in various ways. It is completely unintentional if I have failed to mention any individual. I sincerely thank all of them.

Abstract

The southwest part of the coastal area in Bangladesh is to be identified as environmental handicap by climate change factors. It is exacerbating existing water insecurity, with significant gender consequences. Because of climate change the sea-level is intensifying that results in high salinity intrusion and enhancing the vulnerability of coastal belt people especially women. Changes in water availability, access, scarcity and security play critical roles in shaping the ways that individuals, communities and country are tackling existing and predicted climate change. Increase of vulnerabilities, marginalization, and sufferings of saline prone people affect the social strata if the water governance system is not well-functionalized. Intersectionalities of social difference, especially along gender and class lines, differentiate the ways in which impacts of water scarcity due to high salinity intrusion. For example: in Bangladesh women are the “prime user” of water and as the prime user they are responsible for maintaining basic household hygiene and keeping themselves and their children clean without contaminating the stored water, they need for drinking and cooking. However, during the decision-making process pertaining to water governance their voice is not heard and they hardly participate in any kind of public meeting at rural level. In a report of UN-Water, 2005 it was mentioned, in Coastal area women and girls often spend up to 6 hours every day fetching water. To cope with this salinity intrusion women, need to give extra time to manage their productive, reproductive and community role in terms of better water governance where men involvement is also a crucial thing to make the community sustainable.

The objectives of this study are to identify the challenges in gender based water governance to cope with salinity intrusion, to define the roles of different stakeholders in water governance system to deal with salinity focusing on gender, and to find out the possible remedies to strengthen a gender based water governance system to make the community more resilient and sustainable. Here, Borokupat village under, Atulia Union at Shyamnagar Upazilla in Satkhira Zilla has been chosen as the study village. A household survey was carried in the presence of both women and men from five types of drinking water source user namely protected pond, Pond Sand Filter, rainwater harvesting, tube-well and supply water.

In this study gender analysis played a critical role to identify the water-related productive and reproductive tasks, as climate change has exacerbated both ecological degradation for example: water shortages and water-related natural hazards including floods, cyclones, thereby transforming gender and water geographies. Following gendered implications of water related vulnerabilities due to salinity is particularly important as patriarchal norms, inequities, and inequalities often place women and men in

differentiated positions in their abilities to cope with intense changes in socio-ecological relations and changing waterscapes. This chapter explores the nexus of gender and water to demonstrate how different groups of people are vulnerable due to salinity that leads water scarcity in coastal area of Bangladesh as well as to determine the impact of gender balance water governance system to bolster the process of developing a resilient community.

Abbreviations

AAO: Assistant Agriculture Officer
BWDB: Bangladesh Water Development Board
BCCSAP: Bangladesh Climate Change Strategy and Action Plan
BBS: Bangladesh Bureau of Statistics
BWE: Back Water Effect
BP: Blood Pressure
CBRM: Community Based Resource Management
CEDAW: Convention on the Elimination of all forms of Discrimination against Women
CDMP: Comprehensive Disaster Management Program
CVD: Cardiovascular Diseases
CCSLR: Climate Change and Sea Level Rise
CC: Climate Change
DFO: Department of Fisheries Officer
DLO: Department of Livestock Officer
DFID: Department for International Development
DMB: Disaster Management Bureau
DPHE: Department of Public Health
DoA: Department of Agriculture
DoL: Department of Livestock
DoF: Department of Fisheries
DDM: Department of Disaster Management
EKN: Embassy of the Kingdom of Netherlands
FGD: Focused Group Discussion
FAO: Food and Agriculture Organization of the United Nations
FAP: Flood Action Plan
GoB: Government of Bangladesh
GAD: Gender and Development
GWP: Global Water Partnership
GPWM: Guideline for Participatory Water Management
GBM: Ganges Brahmaputra Meghna
GHG: Greenhouse Gases
GIZ: German Development Cooperation

GWA: Gender Water Alliance

GDP: Gross Domestic Product

GNP: Gross National Product

HH: Household

HYV: High Yielding Variety

IPCC: Intergovernmental Panel on Climate Change

INGO: International Non-Governmental Organization

IWRM: Integrated Water Resources Management

INSTRAW: International Research and Training Institute for the Advancement of Women

IECO: International Engineering Company

IBRD: International Bank of Reconstruction and Development

IDF: Iswaripur Development Foundation

IPM: Integrated Pests Management

ICM: Integrated Crop Management

IUCN: International Union for Conservation of Nature

IPSWAM: Integrated Planning for Sustainable Water Management

IFAD: International Fund for Agricultural Development

KII: Key In-depth Interview

LGI: Local Government Institutions

LGED: Local Government Engineering Department

LCS: Labor Contracting Society

MDGs: Millennium Development Goals

MoWR: Ministry of Water Resources

MOWCA: Ministry of Women and Children Affairs

MoP: Ministry of Planning

NGO: Non-Governmental Organization

NWPo: National Water Policy

NWMP: National Water Management Policy

NWP: National Water Plan

NAPA: National Adaptation Programme of Action

O&M: Operation and Maintenance

PP: Protected Pond

PSF: Pond Sand Filter

PWM: Participatory Water Management

PRSPs: Poverty Reduction Strategy Plans

PRA: Participatory Rural Appraisal

PCVA: Participatory Capacity and Vulnerability Assessment

SES: Socio-Ecological System

SIWI: Stockholm International Water Institute

SIDA: Swedish International Development Agency

SDGs: Sustainable Development Goals

SLR: Sea Level Rise

SAF: Sub Assistant Fisheries

SSWRDSP: Small-Scale Water Resources Development Sector Project

SADD: Sex and Age Disaggregated Data

UNDP: United Nations Development Programme

UNICEF: United Nations Children's Fund

UN: United Nation

UP: Union Parishad

USAID: United States Agency for International Development

UNESCAP: United Nations Economic and Social Commission for Asia and the Pacific

UNESCO: United Nations Educational, Scientific, and Cultural Organization

WHO: World Health Organization of the United Nations

WID: Women in Development

WAD: Women and Development

WAPDA: Water and Power Development Authority

WUG: Water Users Group

WMO: Water Management Organization

WMG: Water Management Group

WMA: Water Management Association

WMF: Water Management Federation

Table of Contents

Chapter 1: Overview	1
1 Overview.....	1
1.1 Introduction.....	1
1.2 Background of the Study.....	2
1.3 Research Objectives.....	5
1.4 Research Questions.....	6
Chapter 2: Literature Review	7
2 Literature Review.....	7
2.1 Socio-Ecological System (SES) Theory	7
2.2 Global Water Statistics.....	9
2.3 What is Water Governance	9
2.4 The Development of Water Policies	11
2.5 Causes of Salinity Intrusion	14
2.6 Inclusion of Women in Development Approach	18
2.7 Gender Frameworks and Gender Mainstreaming	20
2.8 Gender Analysis in Water Sector.....	22
2.9 Gender in Water Policies and Practice.....	25
2.10 Water and Gender: Perspective from Bangladesh	27
2.11 Water Policies in Bangladesh	29
2.12 History of water projects in Bangladesh.....	31
2.13 Paradigm shift in the 1990s: Community participation for upkeep of infrastructure	32
2.14 Politicized and depoliticized participation.....	34
Chapter 3: Context of research location.....	36
3 Context of research location	36
3.1 Salinity Intrusion in Coastal Area of Bangladesh	36
3.2 Study Area	36
Chapter 4: Research Methodology.....	39
4 Research Methodology	39
4.1 Selection of Study Area	39
4.2 Survey Method.....	41
4.3 Qualitative Method	42
4.3.1 Key Informant Interview (KII):	42
4.3.2 Focus Group Discussions (FGD)	43
4.3.3 Case Studies and Participant Observation.....	45
4.4 Quantitative Method	45
4.4.1 Household Questionnaire Survey.....	45
4.4.2 Methods of Analysis	45

Chapter 5: Findings and Analysis	47
5 Findings and Analysis.....	47
5.1 Demographic Data Analysis from the respondents in Borokupat village	48
5.2 Challenges in gender based water governance to cope with salinity intrusion	50
5.2.1 Influence of high salinity intrusion in gender relationship in coastal area of Bangladesh..	50
5.2.2 Water Governance in Coastal Area of Bangladesh.....	58
5.2.3 Community Gender Analysis in Water Governance in Coastal Area of Bangladesh	70
5.2.4 Women in Saline Prone Agricultural System in Coastal Area of Bangladesh.....	84
5.2.5 Women in fisheries in coastal area of Bangladesh.....	93
5.2.6 Health impact of people for salinity intrusion in coastal area of Bangladesh.....	103
Chapter 6: Case Studies	107
6 Case Studies	107
6.1 Water women in Borokupat village, Bangladesh.....	107
6.2 Provati Rani, the Radiance of Hope.....	108
6.3 Exclusion of women in water management process	110
Chapter 7: Role of different stakeholders in water governance	112
7 Role of different stakeholders in water governance.....	112
7.1 Role of Local Government.....	112
7.1.1 Existing adaptation measures taken by the Government	116
7.2 Role of NGOs in Water Governance System.....	117
7.3 Role of Water Management Organizations.....	119
7.3.1 Model illustration to create a collaboration between government and non-government sector in water governance to deal with salinity	122
7.4 Role of Community People in Water Management	123
7.5 Women’s vulnerability in the Community due to saline intrusion	124
Chapter 8: Recommendations	126
8 Recommendations.....	126
8.1 Securing women’s access to land and water	126
8.2 Multiple-use water systems.....	127
8.3 Mainstreaming gender for empowerment	127
8.4 Gender-sensitive approach design and targeting.....	128
8.5 Sex-disaggregated data collection and analysis	128
8.6 Gender-sensitive indicators.....	128
8.7 Gender-responsive budgets	129
8.8 Capacity-development among stakeholders.....	129
8.9 Documenting and sharing existing knowledge	129
8.10 Collaboration, Cooperation and Coordination	130

8.11	Inclusion of gender in water policy and guideline	130
8.12	Proper monitoring strategy.....	131
8.13	Advocacy and networking	131
8.14	Use of different tools for context analysis	131
8.15	Cost analysis in designing the adaptive technology.....	132
8.16	Community Participation	132
Chapter 9: Conclusion.....		133
9	Conclusion	133
Chapter 10: Reference.....		135
10	Reference	135

List of Appendices

Appendix 1: Survey questionnaire.....	141
Appendix 2: FGD for Rice Farmers (Both Men and Women).....	147
Appendix 3: FGD for Shrimp Farmers (Both Men and Women)	148
Appendix 4: FGD for Housewife Group (Women Only)	150
Appendix 5: FGD for Crab Producer (Both Men and Women- Mixed Group).....	151
Appendix 6: KII with BWDB Representative	153
Appendix 7: KII with Fisheries Officer	155
Appendix 8: KII with WMG President	156
Appendix 9: KII with WMG Women Representative.....	157
Appendix 10: KII with UP Chairperson	159
Appendix 11: KII with Local NGO Representative.....	161
Appendix 12: KII with Agriculture Officer	163

List of Figures

Figure 1: Arnstein’s ladder of participation.....	34
Figure 2: Village: Borokupat, Union: Atulia, Upazilla: Shyamnagar, Zilla: Satkhira.....	38
Figure 3: Schematic Presentation of research methods and tools used.....	40
Figure 4: Total number of family that incomes/expenditure ranges between.....	48
Figure 5: Food and Water Security Cycle due to salinity intrusion in coastal area	52

Figure 6: Support needed from government and nongovernment organizations in coastal area of Bangladesh.....	57
Figure 7: Percentage of water users from different sources.....	68
Figure 8: Percentage of cost for the maintenance of fresh water sources/each household	69
Figure 9: Aspects of Gender Analysis in Water Governance	71
Figure 10: Performance of different water supply options for domestic purpose in different times	82
Figure 11: Person involved in drinking water collection in coastal region.....	83
Figure 12: Drinking water purification materials used by coastal people.....	83
Figure 13: Respondents' perceptions of trend of salinity during last 26 years in the study area, by percentage	86
Figure 14: Change in rice production in the study area over the last 20 years	86
Figure 15: Percentage of respondents facing food crisis during different months of the year.....	87
Figure 16: Percentage of respondents on causes of reduction in rice production	88
Figure 17: Existing coping/adaptation measures (non-field) to deal with overall impact of salinity intrusion on rice production in the study area in Borokupat village, Shyamnagar, Satkhira.....	89
Figure 18: Water source used for fish cultivation in different times (Household Survey, 2018)	94
Figure 19: Number of women farmers in the crab farming activities.....	101
Figure 20: Community perception of the responsibility for water governance.	113
Figure 21: Existing adaptation measures to deal salinity intrusion in rice fields.....	117
Figure 22: Process of participatory water management (Source: Ministry of Water Resources, 2001) ...	120
Figure 23: Model for an integrated community-based approach to reducing safe drinking water scarcity in southwestern Bangladesh. Source: Abedin, Habiba and Shaw, 2014.....	123

List of Tables

Table 1: Key features of socio-ecological system structures and functions.	7
Table 2: Overview of the main characteristics of Gender Frameworks for Analysis	24
Table 3: Insights of major policies for water management in Bangladesh.	30
Table 4: Institutional stakeholders for Key Informant Interview (KII)	43
Table 5: The list of the participants for FGD.....	44
Table 6: Yearly income/expenditure of surveyed family.....	48
Table 7: Age of the Participants.....	49
Table 8: Level of education (Sex Disaggregated Data)	49
Table 9: Adaptation and coping measures at different levels in Borokupat village under Satkhira district67	

Table 10: Access-Control profile for water related resources and services	73
Table 11: Access and Control profile over Benefits	76
Table 12: Analysis of Roles and Responsibilities of Men and Women.....	80
Table 13: Water sources of coastal people for fish cultivation.....	93

List of Pictures

Picture 1: Tidal flood cause of salinity intrusion in coastal belt of Bangladesh	15
Picture 2: Technology for safe drinking water in coastal belt of Bangladesh.....	56
Picture 3: Different rainwater harvesting systems in southwestern Bangladesh	56
Picture 4: Conservation of pond water. The signs read, washing hands, legs, and ablution are strictly forbidden (Ordered by the authority)	66
Picture 5: Collection of pond water	66
Picture 6: Faulty management of embankment and river erosion if favorable to salinity intrusion	66
Picture 7: Nilima Rani Mondol, 38, working as a day laborer in agricultural field in Borokupat village, Shyamnagar, Satkhira	93
Picture 8: Saline water enters into Shrimp Gher and make salinity intrusion.....	96
Picture 9: Water women in Borokupat village.....	108
Picture 10: Provati Rani in her garden, using saline tolerant seeds and technology	110

Chapter 1: Overview

1 Overview

1.1 Introduction

Water is a finite resource, but salinity is making water scarcer and that is the reason it needs to be effectively managed. Women play traditional roles as water managers, store keepers, users and actors, and they, together with men, have the right to manage water in an effective way. Women should actively engage in the management of depleting water resources. As salinity is making their life more vulnerable by collecting as well as ensuring pure drinking water from a distant place for their family and household chores. Salinity is not only the reason to create health hazard but also, there are lots of opportunity costs associated with the time in collecting water, and time spent away from education and occupational pursuits; all of these are considered to affect both an individual's and a community's development potential (UNDP 2006). In Bangladesh, as in many developing countries, women carry the burden of water collection. Internationally, it has been estimated that 64% of water collection duties fall to women (WHO & UNICEF 2011). However, this demands a profound commitment from those engaged in the water sector, to ensure attention to gender at all levels, especially at the organizational and institutional level, as this is where the relevant policies are formulated and practices are shaped.

To address this issue this research tries to identify different roles of women including productive, reproductive and community pertaining to water in their everyday lives. Here Borokupat village under Atulia Union at Shyamnagar Upazilla in Satkhira Zilla was chosen as a sample village to recognize women's role as well as their conditions and social positions related to overall water governance system. As coastal areas are vulnerable due to salinity intrusion that leads to water scarcity and water logging are the main challenges of this vulnerable peoples' lives. Researchers claim that salinity is a significant water problem in this region of Khulna division. Khan et al. (2011, 2014) demonstrate significant risk of pre/eclampsia and gestational hypertension in women in the Shyamnagar Upazilla of Bangladesh; rates were higher in coastal residents compared to non-coastal areas. Khan also shows that women consuming tube well drinking water were at higher health risks than those who used pond water or rainwater (Khan et al. 2014). Health impacts were also found to be considerably higher due to salinity in the dry season than in the monsoon season (Khan et al. 2008).

Women are engaged in all sorts of work including agriculture, fishing, fetching drinking water, washing, cooking, looking after children and the elder persons, and livestock rearing that are all related to water from dawn to dusk. But when it is about taking a decision about water allocation and usage, women are hardly invited to participate in any public meeting, or to get involved in any sort of decision-making process at all. It is the men who always take the decision in water governance system. However, the water policy of Bangladesh is well addressed about the different engagement and issues related to water but involvement of women and their participation in decision making process are not well defined (Benneyworth et al., 2016).

“Water Governance” is something very complex for the women who did not get adequate opportunity to go to school or to get higher education. Many of the village women are sufferers of early or forced marriage and lost the confidence to raise their voice against any irregularities in their family and society. But it is true that “Women” are the prime users of “Water” in their family and society (Hanchett et al., 2014). This two “W”s always complement each other but hardly recognized by the patriarchal society.

Therefore, the objectives of this study are to identify the challenges in gender based water governance to cope with salinity intrusion, to define the roles of different stakeholders in water governance system to deal with salinity focusing on gender, and to find out the possible remedies to strengthen a gender based water governance system to make the community more resilient and sustainable.

1.2 Background of the Study

Societies that are heavily dependent on natural resource bases are particularly at risk of multiple stressors and events driven by a changing climate, especially in water-related hazards (Thomas and Twyman 2005; Adger et al. 2009). Scholars have argued that ecological changes attributed to climate change in Bangladesh are already apparent (Mirza et al. 2003; O’Brien et al. 2004; Huq et al. 2005). The ways that hydrological, geomorphological, and biophysical changes affect regions and localities have to be closely studied and thereby inform the ways social vulnerabilities and adaptation options are assessed. The Intergovernmental Panel on Climate Change (IPCC, 2007) predicts that freshwater shortages in South Asia are likely to be compounded by increasing uncertainties of flooding (from rivers, flash floods, and sea surges). There will be worsening of both climate processes (sea level rise, salinity, water scarcity) as well as climate events (e.g.,

floods, cyclones, storms, tsunamis) in the near future (Mirza et al. 2003; Huq et al. 2005). Uncertainties, irregularities, and failures in rainfall and beneficial floods will be combined with more extreme and frequent storms, cyclones, devastating floods, salinity, and riverbank erosion. Given the intimate relationship between societies and water, the implications will be profound.

This coexistence of both overwhelming amounts of water (floods, storm surges, cyclones, riverbank erosion, waterlogging), as well as inadequate water (pollution, drought, salinity, desertification) define the relationship that most of the context in Bangladesh have. This fluidity in relations to water, one of necessity and of threat, is an invariable factor in everyday life and livelihood in the agrarian and riverine areas. This is particularly evident in water-related productive and reproductive tasks in agrarian societies that constitute the majority of the developing world. The relationship between water and gender are foregrounded through two dramatic transformations: socio-ecological transformations attributed to climate change and historical patriarchal societies that are also facing challenges in gendered power structures. As scholars have pointed out, access, control, use, and knowledge of resources are gendered, thereby making any changes in natural resources from climate change play out in different ways for different livelihood outcomes for men and women in any context.

Gender initiatives in the sector emanated from the notion that men and women have different needs and roles regarding water within and beyond the household, hence water (un)availability at the household level would affect men and women differently. The gendered division of labor in most of rural Bangladesh is such that within the household women are responsible for food preparation, childcare, and domestic hygiene, whereas men's specific water needs relate to livelihood generation, such as agriculture, fishing and other water-dependent productive activities which vary according to the specific local context. Thus, domestic water forms an integral part of women's practical gender needs (Kabeer, 1994) and it is, therefore, in the interest of women to have affordable, stable, and sufficient access to domestic water to enable them to pursue their domestic roles and responsibilities. As the prime managers and users of domestic water at household level (Elmendorf and Isely, 1983; van Wijk-Sijbesma, 1998; Mandara et al., 2013a), women should be able to influence community water management and decision making. However, it took some time before this was acknowledged and steps were taken (Narayan, 1995; Harvey and Reed, 2004; Singh, 2008; Seager, 2010). Factors obstructing women's effective engagement in the management of rural water services have been widely documented in academic and policy literature. Among others, women's demanding domestic workload and the

social-cultural barriers they face stand out as major constraints (Hemson 2002; Singh 2008; Bhandari and Grant, 2009; Cleaver and Hamada, 2010; Todes et al., 2010; Udas, 2012; Mandara et al., 2013a). These constraints reflect norms and traditions that shape social structures, form masculine and feminine identities, govern the division of labor and reinforce social hierarchy (Agarwal, 1994; Rao and Kelleher, 2005; Singh, 2008; Cleaver and Hamada, 2010).

In the literature, the optimism prevails that women's participation in decision making and management makes water services more gender-responsive (Fisher, 2006). Women's representation in village water management became mandatory in the 1980s, when the development community realized women's critical role in reaching the targets of water for all under the 1981-90 International Drinking Water Supply and Sanitation Decade (van Wijk-Sijbesma, 1998). In Bangladesh, women's representation in the local management structures became a requirement of development agencies (Harvey and Reed, 2004; Harris, 2009; Furlong, 2010). Thus, women's entry into these local decision-making spaces was 'invited' and 'mandated' by policies, rather than being their own active choice. Still, little is known about how women's representation in village water management structures is achieved and translated into participation. Local social-cultural settings with their specific gender relations and roles were not much taken into account in implementing women's representation in local decision-making bodies (Kabeer, 1994; Rao and Kelleher, 2005; Singh, 2008; Udas, 2012). It was assumed that individuals would enact free choice and advance their interests once a level playing field was formally established. However, such a level playing field cannot be taken for granted, because "gender is historically contingent and constructed, simultaneously embedded in social institutions and cultural meanings" (Lamphere et al., 1997: 4).

However, the National Water Policy in Bangladesh does not mention the key roles and practical interest of women in rural water provision. Though, a reservation system was adopted to ensure women's representation in the formal water management structures at village level, particularly in the Water User Group (WUG) to cope with the salinity intrusion in coastal area of Bangladesh. The Water User Group (WUG) has three tiers like: Water Management Group (WMG) at village level, Water Management Association (WMA) at union level, and Water Management Federation (WMF) at upazilla level where 30% women representatives need to be ensured. Although the general policy prescribes women's representation in these structures, it has to be implemented in areas with diverse culture, norms, traditions and beliefs relating to gender (Guijt and Shah, 1998; Hemson, 2002; Singh, 2008). In many countries, having women in local water management

bodies challenges the pervasive socio-cultural notion that such bodies are a public, hence male domain, and use of domestic water is a private, female matter (Hemson, 2002; Singh, 2008; Bhandari and Grant, 2009; Udas, 2012). This can be explained by traditional stereotypical notions which have a bearing on gender roles that govern the division of labor and on how men and women relate in the private and public arenas. Given that "women have often been associated with the private sphere and men with the public one" (Parpart et al., 2000: 208), incorporation of women in public decision-making spaces does not ensure that their influence and requirement will match that of men.

The above background exposes a missing link between the policy mechanism and the factors that restrict women's participation in water governance at village level. This begs the question whether women's representation in these structures will truly bring about positive change for women. The fact that women are represented in Water User Group (WUG) does not mean they are accepted as decision makers and that they have voice, influence and decision-making power in the same way as men. Reservation for women can also be 'exploited' politically and do not guarantee that women's needs are met. Just as it cannot be said that male representatives are necessarily blind to the concerns of women, it can also not be assumed that women's representation will lead to better outcomes for women in general. Furthermore, women may not always act in the interests of other women when they occupy official positions (cf. Meena, 2003; Kabeer, 2005; Todes et al., 2010).

Against the backdrop of this discussion, this paper addresses three key questions. First, what are the challenges community people facing in maintaining a gender-based water governance to cope with salinity intrusion? Second, what are the roles of different stakeholders in water governance system to deal with salinity focusing on gender? And third, what are the possible ways to get rid of these challenges as well as to strengthen a gender-based water governance system to make the community more resilient and sustainable?

1.3 Research Objectives

In the light of the previous discussion this study examines the ways in which local people manage the water related issues in their everyday life. And in managing the water issues whereas salinity intrusion is too much high due to natural disaster and geographic location this study explains the women's role in specific three areas (productive, reproductive, and community) as well as the

obstacles they are facing in playing a vital role in decision making process pertaining to water and the possible recommendations to get rid of these challenges. The objectives of the study are to:

- Identify the challenges in gender-based water governance to cope with salinity intrusion emphasizing on women's roles (productive, reproductive, and community) that enable or inhibit engagement in decision making processes.
- Define the roles of different stakeholders in water governance system to deal with salinity focusing on gender including policy formulation and implementation processes to protect the livelihoods of the community and to ensure water security.
- Find out the possible remedies to strengthen a gender based water governance system to make the community more resilient and sustainable through investigating the issues related to the harnessing and implementation of the water governance system at local, institutional and national levels in relation to Borokupat village of Atulia union, Shyamnagar upazilla, Satkhira zilla.

1.4 Research Questions

Keeping the objectives in back drop followings are the research questions of this study that leads in exploring the community people's practices and identifying the possible remedies to strengthen a gender-based water governance system:

- What are the challenges community people facing in maintaining a gender-based water governance to cope with salinity intrusion emphasizing on women's roles (productive, reproductive, and community) that influence the decision-making process?
- What are the roles of different stakeholders in water governance system to deal with salinity focusing on gender including policy formulation and implementation processes to protect the livelihoods of the community and to ensure water security?
- What are the possible ways to get rid of these challenges as well as to strengthen a gender-based water governance system to make the community more resilient and sustainable highlighting the example of village Borokupat under Atulia union at Shyamnagar upazilla in Satkhira zilla as the study area?

Chapter 2: Literature Review

2 Literature Review

Water has always been a highly-contested resource. Under contemporary population and developmental pressures, issues of ownership and control are becoming increasingly controversial. As Wittfogel commented presciently in the 1950s, ‘control of water is inevitably control of life and livelihood’. As soon as humans moved away from hunter-gatherer lives, the planned control of water provided the opportunity for ‘despotic’ patterns of government and society (Ward, 1997: 32). Many writers have noted the relationship between water, social agency and political power, but relatively little attention has been given to the issue of gender in human interactions with water. Similarly, research has rarely considered the gendered meanings encoded in water, or how these are manifested in material terms.

2.1 Socio-Ecological System (SES) Theory

Socio-Ecological System (SES) theory was pioneered in the 1980s by the Resilience Alliance, a voluntary organization of scientists of various disciplines, to explore the SESs’ dynamics and their possible evolutions, but there are several scientific schools interested in their study. These theories are based on concepts as adaptive cycles, resilience, adaptability, transformability, and hierarchy (panarchy), and aim to provide knowledge basis to manage complex adaptive systems and to achieve sustainable development in theory and in practice. The knowledge of these aspects should improve natural systems management and their capacity to support human and natural capital (Zurlini, G. et. al. 2008). The novelty of these theories concerns natural, disturbed, and managed ecosystems, identifying which are the key features of ecosystem structures and functions (Table 1):

Change	Change is episodic, with periods of slow accumulation of natural capital punctuated by sudden releases and reorganizations of biotic capital
Spatial Attributes	They are neither uniform nor scale invariant. There are several different ranges of scales, each with different attributes of architectural patchiness and texture and each established and sustained by a specific set of abiotic and biotic processes
Stability Domain	Ecosystems do not have a single equilibrium and homeostatic controls that keep them near it, rather, multiple equilibrium commonly defining different functional states within the same stability domain
Policies and Management	Policies and management that apply fixed rules, independently of scale, could lead systems to lose resilience

Table 1: Key features of socio-ecological system structures and functions.

- Change is episodic, with periods of slow accumulation of natural capital such as biomass, physical structures, nutrients, punctuated by sudden releases and reorganizations of this biotic capital, as the result of internal or external natural disturbances, or human-imposed catastrophes. Rare events, such as hurricanes or the arrivals of invading species, can unpredictably shape system structure at critical times or location, leading to an increase in fragility. In this way, these rare events can modify the future of the systems for long periods, even if irreversible or slowly reversible states can exist; once the system flip into another state, only an explicit external management intervention could allow the system to come back to its previous self-sustaining state, but its full recovery is not assured.
- Spatial attributes are discontinuous at all scales, from the leaf to the landscape to the whole planet. There are several different ranges of scales, each with different attributes of architectural patchiness and texture and each established and sustained by a specific set of abiotic and biotic processes.
- Ecosystems do not have a single equilibrium and homeostatic controls that keep them near it, but rather multiple equilibrium commonly defining different functional states within the same stability domain. Normal movements of state variables maintain structure, diversity, and resilience. Stochastic forces and interactions between fast and slow variables mediate the movements of variables among those equilibrium.
- Policies and management that apply fixed rules (e.g., maximum sustainable yield), independently of scale, could lead systems to lose resilience, that is, systems break down in the face of disturbances that previously could be absorbed.

The literature on social learning attempts to make operational many of the complex epistemological issues around the nature of knowledge and the process of learning. A useful and less theoretical definition underlines that *“social learning means more than merely individuals learning in a social situation . . . (they) envision a community of people with diverse personal interests, but also common interests, who must come together to reach agreement on collective action to solve a mutual problem. . . it is the process by which changes in the social condition occur – particularly changes in popular awareness and changes in how individuals see their private interests linked with the shared interests of their fellow citizens.”* Social learning is intended to help improve the quality and wisdom of the decisions when faced with complexity, uncertainty, conflict, and paradox, and the notion has begun to be applied in a variety of complex decision-making contexts, including environmental management and planning. Environmental planning and management are often described as complex and highly uncertain and, from this

perspective, management cannot be seen as the search for an optimal solution to a single problem but rather as an ongoing process of adaptation, learning, and negotiation. Thus, to manage complex adaptive systems, it is necessary to create a learning atmosphere, encourage systemic thinking about complex problems, discourage competitive behavior among stakeholders, and focus on ‘desirable and feasible change’ rather than attempting to achieve absolute consensus on management issues. An example is given by the application of social learning to water management, considered as the capacity of different authorities, experts, interest groups, and the public to manage their river basins effectively. Often, limitations of existing institutions, to consider multi-scale, participatory forms of governance for groups involved in water management are present. These applications show that social learning processes can improve stakeholders’ awareness and participation in environmental deliberation and decision making and therefore contribute to practical change in environmental management as well as institutional change (Zurlini, G. et. al. 2008).

In this section the literature review tries to define all the gender and water related governance issues from the socio-ecological perspectives. Where water is considered as an ecological resource and gender is considered as social. Governance plays a vital role in between to identify the gaps and challenges of ensuring water for all in the entire sectors including individual, community, institutional, and structural.

2.2 Global Water Statistics

Water interventions in development have changed over time since the 1950s, when the central role of water in public health was identified during the ‘health for all’ campaign. They have always been a central part of the development agenda and water was accepted early on as a ‘basic need’; in 2002, the United Nation (UN) defined it as a ‘basic right’. Yet, in spite of decades of commitment to meeting local water needs, global water coverage varies significantly between regions and continents, and 1.1 billion people remain without access to acceptable water supplies. Only 50 per cent of the world’s population has access to piped water; the figures are only 4 per cent for Africa, 12 per cent for South Asia and 8 per cent for South-East Asia (UN, 2002).

2.3 What is Water Governance

Water governance relates to the range of political, social, economic and administrative systems that are in place to develop and manage water resources and the delivery of water services at

different levels of society (Rogers & Hall, 2003). Or put more simply, water governance is the set of systems that control decision-making with regard to water resource development and management. Hence, water governance is much more about the way in which decisions are made (i.e. how, by whom, and under what conditions decisions are made) than the decisions themselves (Moench et al., 2003). Water governance covers the manner in which allocative and regulatory politics are exercised in the management of water and other natural resources and broadly embraces the formal and informal institutions by which authority is exercised. The relatively new term for discussing this combination of formal and informal institutions is distributed governance. There is a profoundly political element to water governance and as such systems of water governance usually reflect the political realities at international, national, provincial and local levels. As a result, the more general definition of governance (as opposed to water governance) is also contested as those who promote different visions of the future tend to define governance in terms which are consistent with their own vision and no other (Green, 2007). So, Neo-Liberals define bad governance very specifically in terms of the existence of inadequate markets and excessive government. The problems of governance are to Neo-Liberals limited to removing the constraints which prevent the operation of a market-based economy and of minimizing the role of government. Conversely, others define governance from the perspective of a democratic deficit, defining governance therefore in terms of transparency, accountability and subsidiarity. Consequently, there are obvious benefits in adopting a definition of governance which describes what it is without prescribing what it should be. One of the most frequently cited definitions of governance is thus:

“The exercise of political, economic and administrative authority in the management of a country’s affairs at all levels. Governance comprises the complex mechanisms, processes, and institutions through which citizens and groups articulate their interests, mediate their differences, and exercise their legal rights and obligations” (UNDP 1997).

Governance has received increasing attention from DFID in recent years as signified by the publication of the 2006 White Paper: “Eliminating World Poverty: Making Governance Work for the Poor”. This paper along with a series of speeches by the Secretary of State for International Development recognized the depth of the historical roots of governance problems in poor countries; the need to help governments to exercise real authority, as well as to become more democratic, participatory and law-regarding; the limits on the ability of aid donors to contribute to solving these problems through direct interventions; a practical grasp of the differences among

a range of African countries often treated as a homogeneous mass; a genuine willingness to rethink what are known in the business as ‘aid modalities’; and an awareness that many governance problems are seriously exacerbated by international factors over which rich countries have some control (Moore and Unsworth, 2006).

According to Stockholm International Water Institute (SIWI) August 2016 report, there are four fundamental dimensions of water governance to consider when analyzing governance dynamics:

Social: The equitable distribution of water resources and services among various social and economic groups, and its effects on society. Apart from being unevenly distributed in time and space, water resources and services are also unevenly distributed among various socio-economic groups in both rural and urban settlements.

Economic: Efficiency in water allocation and use and the role of water in overall economic growth. Effective poverty reduction and economic growth depend highly on water and other natural resources. Improving water governance will improve durability and sustainability which results in more efficient investments in water.

Political: Equal rights and opportunities for water stakeholders to take part in decision-making processes. Participation facilitates more informed decision making, more effective implementation and enhances conflict resolution. A more effective involvement of commonly marginalized citizens, such as indigenous people or slum dwellers in water-related decision making can greatly improve outcomes.

Environmental: Sustainable use of water and related ecosystem services. The sufficient flow of water of appropriate quality is critical to maintaining ecosystem functions and services that build upon them. Unfortunately, water quality is declining in many regions due to insufficient safeguards in the way it is used by intensive agriculture and in large urban and industrial areas.

2.4 The Development of Water Policies

The early development focus was on supporting centralized, government-run public sector departments, and water was no exception. Male engineers, largely following blueprints drawn from water provision in the wealthier countries of the North, ran projects. While women were understood to bear the burden of poor water supplies, they did not feature in water policy or

delivery systems in the 1950s and 1960s. The focus shifted in the 1970s and 1980s, when the obvious fact that women were the managers of domestic water, and usually the carriers of it as well, was recognized. As clearly identified water users they were seen to have the knowledge required to maximize the value of water supply improvements and they were formally accepted as a constituency in water development and management. The water sector was therefore among the first to recognize women's potential contribution to development. Key agencies committed themselves to meeting the needs of women and promoted their participation in water supplies and water management (INSTRAW, 1985). These two decades also saw a widening of concerns beyond the provision of drinking and domestic water, to include environmental issues around water, and women were often defined as the guardians of that environment. However, the United Nations, during its development decade on water, 1981–90, again focused only on drinking water and sanitation and 'aimed for clean drinking water and sanitation for all by 1990' (Joshi, 2002: 49). The involvement of women was promoted, largely for economic reasons: women's participation was expected to increase the efficiency of water projects, because of their interests in achieving reliable supplies of domestic water. They were trained as caretakers, health educators, motivators and hand pump mechanics (Ghosh, 1989). They were also expected to be active in income generation, to use the time saved from collecting water productively (INSTRAW, 1985). The costs, constraints and barriers to their involvement were not seriously discussed. The 1990s witnessed ambiguities in water policy, generated by a number of different development trends (Joshi, 2002: 59). These included the rejection of the role of the state in public provision, which was seen as having been costly and inefficient throughout the 1970s and 1980s, and the cuts in public sector spending imposed through structural adjustment programs. The market, often defined as both private sector and non-governmental actors, was to provide basic services instead, and government's role was to enable and regulate private sector provision, and not to provide water directly. Water provision could best be met within the neo-liberal economic agenda. Privatization, decentralization and demand management (enabling consumers rather than suppliers to set the levels of water supply, according to their needs and ability to pay) became the central modalities (World Bank, 1993). There was a global commitment to 'water for all', and community participation, gender (usually meaning the inclusion of women) and empowerment were all recognized as essential to achieving this (Coles and Wallace, 2005).

These approaches were formally endorsed in 1999 when over a hundred countries agreed to the Dublin principles. These affirmed water as 'an economic good', which is finite and vulnerable but essential to life. They prioritized privatization, water pricing and cost recovery to ensure project

efficiency, while emphasizing participation at every level. Women were defined as central in providing, managing and safeguarding water, a role reinforced in Agenda 21, drawn up at the Environmental Summit in Rio the same year. The potential disjuncture between the economic and social goals, and the complex challenges of water provision in contexts of inequality, were not widely discussed within the sector (Joshi, 2002). Most recently, the focus has been on the role of water in poverty alleviation and women's empowerment. Water is defined as a right; the current World Water Vision is that almost everyone will enjoy safe and adequate water and sanitation provision by 2025 (World Water Council, 2000). This is to be achieved within the economic approach aimed at achieving the full-cost pricing of water services to ensure continued provision. The current policies do not seem to reflect evidence from the field. There is little good research into the social issues involved in the provision of water in poor countries. Most formal evaluations are superficial, counting heads and tap stands; few set out to analyze the impact of water projects on social relations and, consequently, who does or does not have access to water, how it is used and who benefits. There has been little systematic learning about how projects work and about what happens to improved water supplies after five to ten years (Coles and Wallace, 2005).

Although the specific circumstances are important, there is still too little exchange of information on how to make the most of women's expertise when developing new water points. It remains relatively unclear what approaches help to promote positive change for women in different contexts; history and experience show, however, that achieving improvements in the status of women is a long-term process that will continue beyond the working lives of the present generation. The production, distribution and consumption of domestic water for drinking and household use tend to be largely separate from other aspects of national fresh water provision. Yet domestic water accounts for only 10 per cent of consumption and needs to be understood within the larger context. The bulk of water is used for agriculture (65–70 per cent) and industry (20–25 per cent); much of this may be wasted through overuse because pricing structures often favor agricultural and industrial users above smaller household consumers and because the private sector 'demands increasing consumption while contributing little to the conservation of resources' (Barlow and Clarke, 2002: 126). This issue of conservation is critical, yet little attention is currently paid to it throughout the water sector. As provision shifts from governments and international geological bodies to private agencies (both for-profit and Non-Governmental Organization [NGO]), a vacuum is appearing over whose responsibility it is to map and monitor the geology and rates of replenishment of water globally (Davies and Davies, 2002).

2.5 Causes of Salinity Intrusion

There are multiple reasons of salinity intrusion in the coastal area of Bangladesh. It includes natural, socioeconomic and political systems. All these systems are interlinked to each other. This section describes how these systems play a role in increasing salinity intrusion in the inland part of the country.

Natural Systems: The natural systems include geographical location, sedimentation, sea level rise, cyclone, storm surge and tidal surge.

Critical Geographical Location of the Country: Alluvial and deltaic sediments of the Ganga, Brahmaputra and Meghna rivers build the Bengal Basin, the eastern part, which is known as Bengal Flood Plain (Morgan and McIntire, 1959) the territory of Bangladesh. The country lies between the Himalayas in the north and the Bay of Bengal in the south. The basin of three river systems with an area of 1.6 million square kilometers passing through India, China, Nepal, Bhutan and Bangladesh, drains to Bay of Bengal through Meghna estuary. Water salinity in the coastal zone highly depends on the ice melting of the Himalayas and the discharge of these mighty rivers (Coleman, 1969). The annual average discharge of these three rivers is 1.5 million cases which are generally characterized by seasonal variation. The peak flow occurs in the monsoon which is 80% and lean flow occurs in winter/dry season which is 20 % (Coleman, 1969). Hence the salinity also varies with the onset and recession of the monsoon. Decreasing in ice melting reduces river water discharge and consequently enhances the salinity in the coastal zone of the country.

Sedimentation: The two Himalayan rivers, the Ganges and Brahmaputra, are among the most sediment-laden rivers in the world (Milliman and Meade, 1983). The GBM system carries 2.4 billion tons of sediment to the Bay of Bengal through the country. Part of the sediment goes to the Bay of Bengal and part of its deposits on the river beds and builds char lands. This fluvio-morphological activity reduces fresh water discharge to the estuary which leads to increased salinity in the tidal rivers and canals. Sedimentation in the tidal rivers of the southwestern area of Bangladesh is the main reason of the problem of water logging. These troublesome sediments have blocked the rivers, canals and caused upstream drainage congestion and flooding with saline water (Milliman and Meade, 1983).

Sea Level Rise: Due to various human activities, carbon dioxide and other greenhouse gases (GHG) are accumulating in the earth's atmosphere, resulting in climate change. Rising temperature expand the ocean volume in two ways. Firstly, it melts mass volume of ice of the polar region and secondly, it causes thermal expansion of water of the ocean. Wigley and Raper (1987) commented that the relative contributions of thermal expansion and ice melting to this sea level rise are uncertain and estimates vary widely, from a small expansion effect through roughly equal roles for expansion and ice melting to a dominant expansion effect. These two factors increase volume of ocean water of the earth and rise in the sea level. And sea level rise is one of the major causes for salinity intrusion in the coastal belt of Bangladesh (Wigley and Raper, 1987).

Cyclone and Storm Surge: According to Intergovernmental Panel on Climate Change (IPCC) third assessment report, frequencies of tropical cyclone in Bangladesh will be intensified. The peak intensity and precipitation may increase to worsen the situation of the inland and riverine flooding. Moreover, the higher mean sea level will intensify the storm surges (Ali, 2010). Hence the highly growing population is becoming more vulnerable to tropical Cyclones (Berz, Corn, 2001). Bangladesh experienced the deadliest cyclones in 1970, 1990, and 1992, 2007, 2009 (Ali, A., 1996). The coastal zone of the country is still carrying salinity which intruded during Sidr and Aila Agriculture land and fresh water of ponds, canals and rivers are still saline contaminated and increase the sufferings of the coastal population.

Tidal Flooding: Bangladesh faces semi diurnal tide i.e., two flood tide and two ebb tides in a day in a 6-hour consecutive time interval. Coincidence of heavy rainfall and flood tide occurred during monsoon urban area located in the coastal part of our country faces flooding due to water logging. During the monsoon period it make high tide and overflow saline water surrounding the coastal region (Ali, A., 1999).



Picture 1: Tidal flood cause of salinity intrusion in coastal belt of Bangladesh

Back Water Effect: Backwater effect is a special type of saline water movement which takes place at the mouth of the river when fresh water is not enough for counterpart tide water moving towards river from sea. (Ali, A., 1999) identified different causes of backwater effect, among them i) South west monsoon wind ii) astronomical tides iii) storm surge are responsible for backwater effect in the mouth of the Meghna estuary. He further argued that sea level rise is the non-dynamic and long-term cause of backwater effect. Back water effect (BWE) is commonly pronounced in Bangladesh, particularly in the Meghna River estuary, through which about 90% of the river water in the country discharges into the Bay of Bengal. It is particularly important during flood seasons. Therefore, floodwater inside the country continues to accumulate, bringing more areas under inundation and increasing the length and depth of inundation in areas already inundated, thus further aggravating the flood situation that already exists (Ali, A., 1999).

Changes in Ground Water Flow: According to (Ali, A., 1996), when groundwater levels in aquifers are depleted faster than they can recharge this is directly related to the position of the interface and determines the amount of saltwater that can intrude into the freshwater aquifer system. Since saltwater intrusion is directly related to the recharge rate of the groundwater, this allows for the other factor that may contribute to the encroachment of seawater into the freshwater aquifers.

Socioeconomic Systems: Socioeconomic systems include anthropogenic activities such as shrimp farming, weak infrastructure and their poor maintenance, increased GHG emission, temperature rise and so on.

Continuous Shrimp Cultivation in Agricultural Land: Shrimp aquaculture has raised serious concern about the impact of saltwater intrusion into the surrounding agricultural lands (Flaherty, Szuster, Miller; 2000). The spectacular rise of the demand of brackish water shrimp (*Penaeus monodon*) in the international market has stimulated the merest of its production. Presently its culture has taken a massive horizontal expansion and engulfed almost the entire coastal belt of the country (Karim, 2000). Shrimp culture reduced the availability of cropping land by increasing soil salinity. The practice of shrimp culture needs saline water as an input to the shrimp pond as a result salinity intrusion increase with expansion of shrimp culture. The extent of salinity in groundwater is also increasing because of continuous shrimp cultivation in the fresh agricultural land. Use of tube wells in coastal areas is not common, and most people use pond water or rainwater during the monsoon season. But in the dry season, it is difficult to procure potable

water and they need to walk considerable distances to use water from a river or canal and expand saline water (Karim, 2000).

Weak Structure and Poor Maintenance: Bangladesh government introduced polders to its coastal zones with the aid of the Netherlands in 1960s (Choudhury, 2000). Bangladesh has 5,017 km embankment protecting the polders in coastal areas of the Bay of Bengal. The primary goal of launching polderization in Bangladesh was to protect the coastal inhabitant from regular natural disasters and to boost the agricultural production (Shaw, 2006). Bangladesh Water Development Board (BWDB) formerly known as Water and Power Development Authority (WAPDA) is in charge of maintaining and conducting the rehabilitation project of the polders (Thomas, 1974). But due to the poor maintenance, coastal polders in many places have started creating salinity intrusion to the agricultural fields. The BWDB has categorized 51 polders as "most vulnerable" and another 55 polders as "medium vulnerable". To cope with vulnerability, it is necessary to rehabilitate damaged infrastructure of the polders. Most of the sluice gates have been damaged through which saline water continuously enters into the inland. In addition, shrimp farmers cut the embankment to get saline water in their shrimp fields which also make the embankment weak. This weak embankment is easily damaged due to tidal pressure, particularly during full moon and the saline water enters in the polders (Choudhury, 2000).

Anthropogenic Climate Change Induced Factors: Climate variables, such as precipitation, surface runoff, and temperature can play a big role in affecting saltwater intrusion. With lower precipitation amount and warmer temperature, the recharge rate will be much less due to lack of groundwater present and increase evaporation (Ranjan, 2007).

Political Systems: The political systems include weak water governance systems at local level, cross-boundary river policy, construction of barrages by the neighboring countries, etc.

Weak Water Governance Systems at Local Level: Weak water governance systems at local level are another cause of salinity increase. Because salinity intrusion is not only natural phenomenon; it's also a human one. Numerous human activities: such as untimely water use, unplanned shrimp culture, insufficient or poorly maintained infrastructure, and inadequate management systems can result in salinity intrusion.

Cross Boundary River Policy: A total of 57 major rivers of Bangladesh have entered the country, of which 54 rivers are from India and 3 rivers are from Myanmar (Afroz and Rahman,

2013). But among the 54 rivers coming from India more than twenty-five rivers face one or more upstream diversion basically in dry months. For this reason, water scarcity during non-monsoon months cause of salinity increase in soil and water of coastal belt off Bangladesh. During the post-Farakka period, salinity in the south-west region of Bangladesh increased significantly (Afroz and Rahman, 2013).

Lack of Capacity of Local Government: Local government reforms in Bangladesh evolved very distinctly according to the needs of the ruling elites (Kirsten, 2000). With the change of government, the policy of local government also kept changing. As a consequence, LGIs have not had any opportunity to act as effective tiers of governments with mandates and funds to carry out their roles and responsibilities. Independent reviews observed that Bangladesh has not been successful in establishing a decentralized system of governance and accountability. A World Bank review of the decentralization process in 19 countries ranks Bangladesh lowest in the decentralization scale (Williams, McLean, and Kerr, 1998). Due to lack of capacity of LGIs, cannot take initiative to protect coastal polder, embankment, road and any kind of infrastructure as well as unplanned shrimp culture.

Structural Intervention in Upstream Neighboring Country: The magnitude of salinity intrusion in coastal areas depends on a sensible balance between upstream freshwater flow and salt water from the sea. The water withdrawal system of human intervention in terms of the barrage and dam in the upstream neighboring country, have already affected upstream fresh water flow (Mirza, 1998). The interface between freshwater and saline water is influenced by geology, hydrogeology, ground water heads and groundwater well pumping rates. But fresh water is important issue to counterbalance salinity intrusion at the upstream water intake. Due to geographical situation Bangladesh is most vulnerable to water withdrawal system by the upstream neighboring country. Farakka barrage is one of the worst factors for the decreasing water flow condition for internal river system of Bangladesh (Mirza, 1998).

2.6 Inclusion of Women in Development Approach

In the 1970s, understanding of the roles and needs of women and men, their interrelationships and the power differential between them began to deepen. The critical need to address these in development was recognized. Discussions were influenced by feminist theory in Europe and the USA. Gender theory in development evolved out of thinking by key writers such as Oakley and

Boserup in the 1970s, who distinguished between biologically determined sexual attributes and gender, separating out the ascribed roles and expected behaviors, shaped by culture and history, given to men and women from birth. The early 'women in development approach' (WID) shifted the focus of development from women as passive recipients of projects towards women as actors in development. Women's roles were recognized beyond the domestic sphere, in production, social and community work (Moser, 1993). Previously women had been largely recipients of welfare approaches to development. Over time analysis deepened to include women within their networks and relationships, their positions within households, communities and at national level, and how their status was maintained and reproduced (Agarwal, 2000).

There was a growing concern to change existing patterns, which showed high levels of female subordination. Women's empowerment was introduced: how to enable women to break their shackles (Mukhopadhyaya, 1984) and fulfil their potential. For some this was an economic imperative, for others it was a question of women's human rights. To achieve change, recognizing the specificity of women's condition and position in each culture and society was essential. Gender roles and positions could not be understood without careful analysis. Knowledge developed around the ways in which class, race, wealth and religion also shaped women's experiences and society's expectations of them (Kabeer, 1994; Molyneux, 1985). Women scholars and activists from the South challenged 'white dominated' understandings of feminism and contributed to the recognition that gender relations were deeply rooted both culturally and historically, and that addressing them required knowledge of each context (Kandiyotti, 1988). Women were no longer defined as a homogeneous interest group, although gender relations and the dominance of patriarchy were universal (Whitehead, 1979). The work of gender academics and gender advisors and activists cross-fertilized, although not always very easily (Wallace and March, 1991). New issues, previously overlooked in women in development agendas, emerged from field experience of working with women and gender issues. There was a shift away from working with women alone to address their problems, especially their subordination and lack of power in many societies. The new gender approaches were designed to address inequalities between women and men, and worked with men as well as women, in the community and within institutions beyond the community level because power inequalities were evident at the meso and macro levels, as well as at household level (Elson, 1991). Work took on board both the causes and the effects of women's relative powerlessness and approaches were promoted to enable them to have access to previously unacceptable forms of interaction and communication. These approaches included the recognition of domestic violence against women

as a development issue, accepted in a UN convention (CEDAW) in 1979, women's need for control of their own bodies, and the importance of helping women to find 'their voice' and to represent themselves in public fora. Women's right to equality, central to gender analysis, became enshrined through the International Covenant on Economic, Social and Cultural Rights, which came into force in 1976.

The dominant narrative of development, which was predominantly male, was challenged in academic circles and in practice. International and national policies, and organizations at every level down to the household, as well as cultural and religious norms in different societies, were seen as perpetuating gender inequalities. Work to tackle these inequalities was taken up internationally in 1975–85 with an international UN decade for women and a conference in Nairobi to celebrate the end of that decade. Policies and principles promoted there were consolidated ten years later in Beijing, in the comprehensive Platform for Action, which most governments endorsed. This has been monitored through 'Beijing plus five' and will be reviewed in 2005, under 'Beijing plus ten'. So far, the results are disappointing. Interest, especially from donors and Northern governments, has waned since the mid-1990s (Painter, 2004). Some significant gains have been made, however, in other forums, especially in international health at the Cairo Conference on Population and Development in 1994 where women's rights to control their sexual and reproductive health were agreed, following massive struggles and opposition (UN, 1994).

Gender theory arose out of, and informed, different international social movements for change for women. It was intended to transform both male and female roles, leading to change in institutions and individuals. Only in this way would it ensure that women, and indeed others subordinated by class, caste, poverty and religion (previously ignored and marginalized) could have a voice. It demanded that women be treated as equal participants in the development process, and that ways be found to enable this to happen (Coles and Wallace, 2005).

2.7 Gender Frameworks and Gender Mainstreaming

Gender theories were complex because gender relations are shaped by history and geography, and are rooted in different social, cultural, economic and political structures. This complexity led to a felt need within the development sector for more manageable ways of explaining and addressing gender issues that could be easily understood and implemented alongside existing ways of

working. Frameworks for understanding women's roles and interests, their responsibilities and social position, were developed for use by development practitioners (Moser, 1993; Molyneux, 1985; Kabeer, 1994; Levy 1998). Methods for analyzing the hierarchies of women's participation were developed (Longwe, 1991) and practitioners introduced gender analysis into Participatory Rural Appraisal techniques (Welbourn, 1991; Guijt and Shah, 1998). Institutional 'packages' were developed 'to mainstream gender', which included the adoption of frameworks, training, disaggregated data collection, the recruitment of gender specialist advisers and sometimes the establishment of gender units. Over time gender became increasingly regarded as a technical 'problem' to be solved by applying the tools provided by these frameworks, with the risk of oversimplification and eventually distortion. The experience, analysis and commitment associated with the rise of gender theory and practice were glossed over, the challenge was blunted, and the concept of empowerment often lost its focus on social transformation. Many voiced their concerns about this 'mainstreaming' approach:

"... gender analysts fear [that] the dangers of mainstreaming gender as practiced currently misinterprets and reduces gender to women/men – stripping away the consideration of the relational aspects of gender, power and ideology and of how patterns of subordination are reproduced . . . while valuable insights and empirical evidence are provided, gender issues are delinked from the feminist transformatory purpose. (Joshi, 2002: 42)"

To retain its dominance, the dominant culture must not only adopt a mask of progress, but also incorporate some minor elements of change. It must absorb, assimilate new demands, so that it can remain dominant. Gender became the responsibility of everyone, but sometimes, in practice, of no one. Gender mainstreaming work focused primarily on communities, less on gender hierarchies within organizations, and provided little space for challenging dominant development values. Most institutions attempting to deliver gender mainstreaming remained hierarchical and relatively insensitive to gender internally. The use of gender frameworks certainly enabled modest improvements for some women, and gender specialists continue to work on improving them.

However, the preliminary gender analysis essential for gaining an understanding of the local cultural context was often skimmed on, and the radical rethinking of purpose and process to ensure that women, as well as men, can influence the concept and design of development initiatives was often missing. As a result, while gender is a term that is widely used, it is often

poorly theorized and ill defined, and gender policies are weakly implemented (Coles and Wallace, 2005).

2.8 Gender Analysis in Water Sector

Gender relationships are diverse, dynamic and complex and various gender-analysis frameworks have been used to analyze this complexity, e.g., the Harvard analytical Framework (or gender roles framework); the Moser Framework (or triple roles framework); the Social Relations Approach (or framework); the Gender Analysis Matrix; the Women's empowerment Framework and the Capacities and Vulnerabilities Analysis Framework (Warren, 2007). Some of these frameworks have also been applied to analyze gender and water relationships. Their major features are synthesized in Table 2.

Such frameworks have various theoretical underpinnings and give prominence to distinct aspects of gender relationships, for instance, the gender division of labor or the analysis of relationships between men and women and also tend to be associated with different objectives, e.g. efficiency or empowerment (Warren, 2007). Research on gender and water relationship has largely focused on particular elements, such as the division of tasks and labor between men and women, rights and access to water and women's participation in decision-making through their involvement in water management organizations. Common research questions have been: how are tasks shared between men and women and between productive and reproductive uses of water?; who has access and control over resources and benefits?; how do current access mechanisms include/exclude men and women?; and who makes decisions over water management? (Crow and Sultana, 2002).

Considerable progress has been made in understanding the gendered dimensions of water use, but simplistic assumptions on women's needs and preferences still prevail in mainstream development discourses (Cornwall et al., 2007, Parpart, 1993). A striking example is the common belief that women prefer to spend less time fetching water in order to use their time for income-generating activities. This rationale has driven most interventions on drinking water. Whereas this holds true under certain settings, several case studies have shown that women do not always follow this type of rational behavior (Cleaver, 1998, O'Reilly, 2006). Labor is not always and not only a burden but also carries a social function and cultural meaning. Designers and implementers of water projects often have not considered that labor division follows temporal and complex

patterns which have to be understood in their cultural context and have often assumed that there is a universal recipe for women's well-being. Similarly, a common postulate within the increasing trend in the devolution of water management to communities that has marked the agricultural sector for the past decades, is that a greater participation of women in local WMOs would result in women's empowerment. However, several studies have challenged some of the common assumptions underlying the concept of women's participation (Clement, 2012).

Framework	Source	Assumptions	Focus of Analysis	Key Variables	Limitations
Harvard Analytical Framework	Overholt et al., 1985 (developed by Harvard Institute of International Development and USAID Office of Women in Development)	It is efficient and economically sound to invest in both women and men. Activities are either productive or reproductive	Analyses the differences between men's and women's activities, access and control over resources	1) Activities and needs, 2) access and control over resources and benefits, 3) influencing actors	No consideration of power relations and other social divisions such as ethnicity or class; Local perceptions not included; Roots of gender inequality not addressed; Oversimplified vision of gender relationship; Static
Capacities and Vulnerabilities Analysis Framework	Anderson and Woodrow, 1989	Development is a process through which capacity is increased and vulnerability reduced	Focuses on capacity and vulnerability	1) Material and physical resources; 2) Social relations and organizations; 3) Motivation and attitudes towards change	Designed for use in humanitarian interventions and disaster preparedness
Moser Framework	Moser, 1989	Women have three roles: productive, reproductive and community management	Links women's role with the development and planning process	1) Women's activities and roles; 2) gender practical and strategic needs; 3) access to and control over resources; 4) impact of development approaches on	No consideration of other social divisions such as ethnicity or class; Static; Gives antagonistic vision of different development approaches;

				women's roles and needs	
Gender Analysis Matrix	Parker, 1993	All requisite knowledge for gender analysis exists among local people. Gender Analysis is transformative as so far it is done by local people themselves	Self-identification of problems and solutions by the community	1) Project objectives evaluated at four levels: women, men, household and community; 2) Impacts of project on men's and women's labor practices, time, resources, social roles and status	Since it is a participatory approach, results might be biased by the relationship between funders and the community
Social Relations Approach	Kabeer, 1994	Development is not economic growth but well-being. Social relations determine people's access to resources, their claims and responsibilities	Analyses how institutions (the state, the market, the community and household) produce certain social relations which result in inequities	Rules, activities, people, resources, power	Bias towards structure with analytical unit as institution might lead to a neglect of minority groups within the institution
Women's Empowerment Framework	Longwe, 1995	Women's inequality and poverty result from structural oppression and exploitation	Assesses the levels of equality and empowerment and the level of recognition of women's issues in development projects	Five levels of equality, ranked from least to most: Welfare, access, conscientisation, mobilization, control	No consideration of other social divisions such as ethnicity or class; Static; neglects rights and responsibilities; Poor at identifying causal factors for empowerment

Table 2: Overview of the main characteristics of Gender Frameworks for Analysis
Source: International Labor Organization (1998) and March et al. (1999)

2.9 Gender in Water Policies and Practice

Women are defined as essential providers and users of water. They are expected to play multiple roles in the provision of water, sanitation, improved health, and increased productivity— because they are effective instruments in water provision, ‘the cost effectiveness and positive impacts of a gender approach in the water sector have been amply demonstrated’ (World Water Forum, 2003: 1). Most policies tie women tightly to the socially ascribed gender roles they play in relation to water in most poverty contexts. Within the present economic paradigm, women’s social and cultural roles and status are poorly analyzed and their ability to pay for water is often simply assumed. Their subordination and the consequent barriers to their active involvement in influencing water programs are barely addressed. There is limited attention to women’s rights to water and what these would mean in practice in poor communities where women’s status is often very low, although the need to do more to realize women’s empowerment is acknowledged (World Water Forum, 2003).

Gender is often equated with ‘women’ in the water sector. Where attempts are made to go beyond this, gender is increasingly conceptualized simply as ‘women and men’. Gender work is expected to ensure that both women and men are involved and benefit and often the focus is firmly back on men (Joshi, 2002; Gender and Water Alliance, 2000). Gender concepts of power inequality and the importance of transformation to ensure that women achieve positive and lasting changes in status are largely absent (Joshi, 2002).

The international water sector, including the World Bank, DFID, Global Water Partnership and World Water Forum, endorses privatization as the key approach to providing water for all. While the debates continue, often heatedly within some NGOs and think tanks that promote alternatives based in participation and community ownership (TNI, 2004), the focus on privatization, with its emphasis on the economic value of water and the need for full cost recovery, has affected work right across the water sector. Yet the concept of private ownership and control fits ill with deeply held values that water is a gift of God, a public good, and a human right. From a gender perspective, evidence increasingly shows that the private sector is not regulated or bound by the global commitments to gender equality, women’s empowerment and providing water for all. Water is a highly lucrative sector and water companies have limited interest in meeting the needs of the poor, including women (Polaris Institute, 2004; Aegisson, 2002). Access to water is based primarily on an ability to pay, not on need or rights. While governments are charged with

regulation of the private sector, they lack capacity and political influence over transnational companies (Gutierrez et al., 2003). The poor have no power over these companies and their participation is not essential to the work. Many predicted the inability of 'for profit' water companies to meet the needs of the poor in very poor countries; the evidence now supports their analysis: 'privatization could not deliver the promised efficiency and improvements to access to clean drinking water for the poorest. Escalating prices and non-fulfilment of promised investments were common features of privatization' (TNI, 2004: 1). 'Privatization is one aspect of the world water crisis that is having a deeply negative impact on the livelihoods of women' (Grossman et al., 2004: 1).

The World Bank still promotes privatization and cost recovery 'despite evidence that such policies reduce access, raise the price of water for the poor, exacerbate inequalities and reduce local control' (World Bank Watch, June 2004); the European Union's new water facility (2004) also supports private sector water investments through subsidies from public funding and development aid.

The water sector, like all development sectors, currently delivers support to countries through direct budget support to national governments. How the money is to be used is agreed through the Poverty Reduction Strategy Plans (PRSPs), which aim to ensure aid reaches the poorest. These plans, while officially owned by developing country governments, follow the parameters set out in structural adjustment programs and may be heavily donor-led. Research has shown that these plans are light both on water provision (DFID, 2004) and on gender analysis: they largely lack commitment to women's needs and rights (Whitehead, 2003).

Since 2000, the UN Millennium Development Goals (MDGs) have also been key in shaping development thinking and practice. These set clear international development targets and have generated a great deal of political support worldwide; they serve as a focus for assessing global progress in meeting a range of basic needs which has been lead to Sustainable Development Goals (SDGs), 2030 where "water" is prioritized under target 6 and "women" in target 5. In MDGs, the water target does not incorporate a gender perspective - its focus is on coverage rather than access or equity. The links between the different development targets are weak, and issues such as how girls' roles in fetching water may affect their access to education - a key to fulfilling their potential - are not addressed (DFID, 2004). But in SDGs, the gap between water and women was tried to get reduced through addressing, "By 2030, achieve universal and equitable access to

safe and affordable drinking water for all”. Here the term “all” is being used for men, women, girls and boys of all ages, including people with disabilities.

2.10 Water and Gender: Perspective from Bangladesh

According to Crow and Sultana, 2000 concerns of water use and management in Bangladesh, a country of high population density, seasonal fluctuations of water, and general subordination of women, bring concerns of gender issues into the domain of water resources planning in rural Bangladesh. In rural areas, municipal supply of water is not present, and access to water may be more problematic, more differentiated, less secure, and frequently requires substantial expenditures of work time and money. According to Crow and Sultana, 2000, access to water is achieved through a range of social relationships falling into four main modes of access:

1. Ownership - of land, providing access to groundwater or a water course, and a pump;
2. Market access - purchase of water, e.g. from the owner of a pump;
3. Common property access - obtaining water from river, pond or public tank through some communal rights of access;
4. State-backed provision - local or national government projects, e.g. municipal tap water, or pumped water in an irrigation project.

Each of these modes of access has particular characteristics, or social dimensions: cost; labor-time; decision-making (agency); historical trajectory or long-term dynamics; response to external shocks. For each category of access, it is possible to identify social conditions which ensure water security (adequate quantity, quality, and reliability) for some households and enterprises, and water deprivation for others. In most rural regions of Bangladesh, access to water is obtained through all four modes mentioned above. The access to water of both households and enterprises may then be highly differentiated by material and other social divisions. Rich and influential households may have preferential conditions of access, and different sources of water, to those of poor households. The quality, reliability and costs of water, for a particular household, will be influenced by a range of characteristics including conditions of the water source, the geographic location of the household or enterprise in relation to the water source, past social investments in water infrastructure, and the social, economic and even political position of a household or enterprise (Crow and Sultana, 2000).

From this disaggregation of the social relations of water, it is clear that material inequalities influence water security and deprivation through a range of processes operating at different social

levels. These processes include property relations, inequalities of income, state provision, rules of access to common social property, and social status. Conditions of access to water for many poor households constrain both health and livelihood. Poor households generally get access to unsafe water, and their access may also be insufficient to sustain potential livelihoods, for example irrigated agriculture. A recent review of participatory poverty assessments in several African countries concluded that better water supplies were consistently perceived by the poor as a high priority (Booth et al., 1998:7). What may be less obvious from the discussion so far is that gender relations interact with material inequalities to influence access to water. Gender relations influence the social relations of access to water in at least three ways. Firstly, there are, in all societies, gender-based divisions of work. In many societies, women have primary responsibility for organizing and undertaking domestic work (Elson 1995, 259). This work includes a range of activities: maintaining daily life (cooking, cleaning, washing clothes), managing the health of the household, and caring for and raising the children. So, where household access to water requires significant input of work time, the women and children of a household frequently do this work. Women tend to work longer hours than men do in many societies (Pearson, 1992). The work involved in gaining access to water may then lead to difficult choices. Access to higher quality water might have to be forgone, for example, in order that children in the household can be kept safe or other household chores completed on time. Young women and girls may be kept away from school to undertake the time-consuming daily task of collecting water. Water collection is a major part of the work of women in rural areas of Bangladesh (Shamim and Salahuddin, 1994). There is little systematic data on this work, but fragmentary evidence from Africa and Asia suggests that the time women spend collecting water can be very significant. In Senegal, women spend 17.5 hours per week collecting water. In Mozambique, they spend 15.3 hours per week collecting water in the dry season. In the Baroda region of India, women spend 7 hours per week collecting water. Observations from Nepal confirm the important role of female children in the collection of water, with girls of 10 and over devoting almost 5 hours per week to the task (United Nations, 2000). In Bangladesh, women and girls have been found to walk between 2 and 5 hours each day to fetch water (Shamim and Salahuddin, 1994). Second, in most of the world, and certainly in South Asia, the overwhelming majority of productive assets, that is, land, factories, and finance, are owned or controlled by men. This means that those forms of access to water that involve ownership of property tend to be dominated by men. Women also generally experience disadvantaged access to markets (Sen, 1996), including markets for water. In addition, decision making in state offices, and in communal institutions (Agarwal, 1997; 2000), tends to be dominated by men. There are thus reasons to believe that decision making is male dominated of

social access to water (Crow and Sultana, 2000). Third, policy discourse and local norms may situate economic uses of water in a male domain and domestic uses in a female domain. Then the subordination of women, giving men as a group more social and economic power, may influence priorities for public investment and collective decision making in water. Uses of water identified with men, such as irrigation, may then be better represented and more knowledgeably discussed in societal forums at all levels than uses of water identified with women, such as drinking, cooking, and washing (Crow and Sultana, 2000).

2.11 Water Policies in Bangladesh

Integrated Water Resources Management (IWRM) is considered as one of the main policy paradigms in water resources management (Gain et al., 2016). According to Global Water Partnership, IWRM approach promotes the coordinated development and management of water, land and related resources considering the three pillars of sustainability, i.e., economy, equity and environment. Among the developing countries, Bangladesh is facing ever-growing multiple challenges in managing flood risks, climate change impacts, water demand, supplying safe drinking water, improving water quality, reversing the decline of fisheries, and protecting natural ecosystems, in particular coastal wetlands and marshes (Animesh et. Al, 2017). Bangladesh ranks as the sixth most vulnerable country in the world for floods and the first for tropical cyclones but has also severe regional water deficits during the dry season (Gain et al., 2016).

The government approved a 25-year National Water Management Policy (NWMP) in 2004 to facilitate the implementation of the National Water Policy (NWPo). The plan provides guidelines to develop programs for better management of water resources in the country. The main elements of the NWMP are its multi-use approach to water (not just flood protection but also irrigation, drinking water and other uses) and its emphasis on “soft” approaches incorporating socio-economic dimensions instead of just hard engineering approaches (NWMP, 2001). The Bangladesh Water Act was enacted in 2013 to integrate the management, development, utilization and protection of water resources (GoB, 2013). Basic water availability has been recognized as a fundamental right for people in the act. Implementing any water resources project without considering biodiversity, aquatic environment, spawning areas of fishes and natural drainage system is prohibited in the law. This Act has emphasized the optimum use of water resources, water rights and conservation of nature.

In order to ensure sustainable development for all people, the Government of Bangladesh has also prepared the Vision 2021 (MoP, 2010) and Seventh Five Year Plan (MoP, 2016) for coordinated

management and planning of different activities in the country. Insights of key policy documents are summarized in Table 03 below:

Key Policies	Year	Insights of Key Policies
IECO Master Plan	1964	shifts from fragmented management to top-down centralized approach; high engineering approach for flood control, drainage and irrigation; major focus is on surface water
IBRD Report	1972	besides engineering approach, introduction of small-scale water resources projects; the conjunctive use of both surface and groundwater
National Water Plan (NWP) phase I	1983–1986	projected the future demand for water by different sectors
FAP reports	1989–1995	introduced “stakeholder involvement” in water management
National Water Plan (NWP) phase II	1991	introduced catchment scale planning and carried out comprehensive assessment for water resources
National Water Policy	1999	accelerating the development of sustainable public and private water delivery systems, with appropriate legal and financial measures and incentives including formulation of water rights and water pricing
National Water Management Plan	2004	multi-use approach of water resources; provides guidelines for implementation of water management programs
Coastal Zone Policy	2005	developed based on Integrated Coastal Zone Management (ICZM) approach for management of coastal regions of the country
NAPA	2005	developed adaptation strategies following sustainable development goals and objectives through participation of stakeholders
BCCSAP	2009	integrate climate change issues to support economic growth and poverty reduction
Vision 2021	2010	development scenario for achieving a higher standard of living through better education, social justice, protection of environment
Seventh Five Year Plan	2016	a key focus on strategies, policies and institutions to help guide the private sector in helping Bangladesh achieve the goals set in Vision 2021
Bangladesh Water Act	2013	enacted to integrate the management, development, utilization and protection of water resources
Sustainable Development Goals	Agenda 2030	Bangladesh is committed to achieve SDGs with an emphasis to Target 5 and 6 by 2030

Table 3: Insights of major policies for water management in Bangladesh.

2.12 History of water projects in Bangladesh

The current practice of Community Based Natural Resource Management (CBNRM) in the water sector of Bangladesh is closely tied to a long-standing discourse of people's participation and the perceived top-down mentality of government engineering departments. For example, the Bangladesh Water Development Board (BWDB) held key responsibility for irrigation, flood control, and drainage in Bangladesh from the 1950s to the late 1990s. It constructed over 100 embankments across the coastal zone in the 1960s to protect coastal communities from flooding, established irrigation systems and employed local gatemen called "*khalashis*" for the operation of sluice regulators. This initial construction was seen as an infrastructural investment in the hands of engineers, without any participation from, or consultation with, local communities. Nevertheless, the embankments, known as polders, with their canals and sluice gates became fundamental in the struggle against flooding and salinity intrusion while they simultaneously established themselves as a key source of water for agriculture, aquaculture, and other productive activities.

In the 1970s and 1980s, donors focused on projects that moved from top-down mega constructions to small-scale local interventions. Donors such as the Swedish International Development Agency (Sida) and the Embassy of the Kingdom of Netherlands (EKN) introduced and financed participatory projects to be implemented by the Bangladesh Water Development Board. They were to use social mobilization NGOs to organize excluded and marginalized groups to take part in income-generating maintenance work through local groups named 'Target Groups' for the poor and 'Landless Contracting Societies'. This trend continued until the early 1990s and includes the Early Implementation Project (1972-1995), the Land Reclamation Project (1978-1991) and the Delta Development Project (1981-1991) (Dutta, 1997; Duyne, 1997). It was further emphasized that the landless and the poor were to become active in the decision-making processes of water management. The emphasis on social equity and challenging power inequalities through focusing on the poor reflected a wider movement of participation at the time. The 1970s and 1980s saw a proliferation of social mobilization NGOs that promoted women's empowerment and the strengthening of the rights of the landless. Notable NGOs were Nijera Kori ('we do it ourselves') and Gono Shahajjo Sangstha (GSS, 'People's Help/Aid Organization') that effectively encouraged their members to compete in local government elections and/or engage in local politics (Hashemi, 1996; Thörlind, 2000). These examples illustrate the early interest in participation emerging in the 1980s within the NGO community, strongly influenced by Robert

Chamber's (1983) idea of 'putting the last first' to promote a power shift among stakeholders (Williams, 2004).

2.13 Paradigm shift in the 1990s: Community participation for upkeep of infrastructure

Swedish and Dutch donors were funding both social empowerment NGOs and participatory water management projects, where the politicized participation in the former affected the discourse of participation in the latter. However, as Mollinga (2008) points out, 'participation' is a central theme in water policy discussions and has obtained several different meanings over time. There are thus divergent views on participation, how it is defined, whom it is expected to involve, what it is expected to achieve and how it is to be brought about (Agarwal, 2001). Over the 1990s and 2000s, a depoliticized concept of participation consolidated in the donor community, who came to prefer service delivery to social mobilization as the latter became too politically contentious (Wood, 1994; Hashemi, 1996; Edwards and Hulme, 1997; Holloway, 1998; Sogge, 2002; Rahman, S., 2006; Dewan, 2009). By the 1990s, participatory discourse rapidly became part of the official aims and objectives of governments and international development agencies (Williams, 2004). In his later book, Chambers (1997) argued that participation through the incorporation of local knowledge transforms top-down bureaucratic planning and may even reverse deep-rooted patterns of social power and hierarchy. As Agarwal (2001) points out, a central idea of people's participation in development is the inclusion in decision-making of those most affected by the proposed intervention.

However, the shift away from social mobilization changed the meaning of participation to one that increasingly obscured power inequalities. Depoliticized terms such as 'stakeholder consultation' replaced the use of 'Target Groups' that had explicitly focused on the poor and the use of 'Labor Contracting Societies' removed the focus on the landless from 'Landless Contracting Societies'. The early 1990s saw a growing tension between these competing meanings of participation. On the one hand, civil society and NGOs promoted participation as 'an end in itself', reflecting the legacies of the 1970s and 1980s where empowerment was an end (Dutta, 1997; Duynne, 1997; Hanchett, 1997). On the other hand, donor-funded projects began to increasingly advocate participation as a means to an end, the end being involving communities for maintenance and upkeep of water infrastructures. In the latter, participation was relegated to public consultation, while it was used as an excuse for transferring responsibilities without

delegating actual decision-making power (Hanchett, 1997: 278; Cornwall and Gaventa, 2001). Williams (2004) also suggests that enlisting and demonstrating 'popular participation' became a crucial measure of scheme success and a key condition of donor approval in development projects. This 'mainstreaming', he argues, has spread participation to a wide range of development policies and programs of international agencies and governments from the global south alike (Williams, 2004).

This latter depoliticized and 'mainstreamed' version of participation came about in a context of a wider decentralization agenda, where 'community participation' included the devolution of responsibility over operation and maintenance (O&M) from the state to communities, while state agencies such as the BWDB were being simultaneously weakened. For example, in 1992, the World Bank recommended that the Land and Water User Directorate would be closed, ending the unit that provided BWDB with the staff and expertise to interact with local water users and farmers (MoWR, 2005). The BWDB Act of 1998 reduced staff size from 24,000 to 8000, replacing government-employed gate operators with operators who were to be appointed and paid by communities, while many of the staff that had worked with the empowerment projects of the 1980s retired and were not replaced. The National Water Policy of 1999 formally transferred responsibility over O&M to WMOs (MoWR, 1999). Despite a considerable reduction in size and the closure of Land and Water User Directorate, BWDB was now required to engage with communities on matters of water management (MoWR, 2000). As a result, both the BWDB and the Local Government Engineering Department (LGED) have relied heavily on donor-funding to implement participatory projects in order to comply with the National Water Policy and the Guidelines for Participatory Water Management (GPWM) (MoWR, 2001).

Despite the National Water Policy's attempt towards decentralization, in the GPWM no formal mention is made of local government institutions beyond that they 'raise awareness' of water management issues and supporting, facilitating and coordinating assistance to the concerned WMOs (MoWR, 2001). It frames a decentralization agenda where the central government transfers powers to private actors, in this case WMOs, rather than democratically elected local institutions (Larson, 2003). As will be discussed later in the article, local governments are nevertheless highly active in water-related issues and coordinate various development projects and social programs in local areas. The creation of water management organizations in order to implement projects may therefore, as Summers (2001) points out, duplicate the functions of local government in a way that detracts funding and legitimacy away from existing democratically elected local institutions.

2.14 Politicized and depoliticized participation

The problem of water management is inherently political and as such attempts to keep politics out of it is futile and even counterproductive. As Mollinga (1998) aptly put it: "water management and use are contested at all these levels, that is, that water control needs to be understood as a political process". As have been noted in other development contexts, management reform processes are often captured and reshaped at the local level, where patterns of formalized participation tend to reflect existing power asymmetries rather than evening them out (Mosse, 2005: 19; Molle, 2008: 132). Mosse (2004) points out that it is often assumed that development practice is driven by policy. He suggests that the things deemed as 'good policy' legitimizes and mobilizes political support, while in reality the same things make the same aim difficult within its chosen institutions. For example, while 'participation' is seen as a 'good policy', it may be difficult to implement. Rather, critics argue that policy labelled as 'participatory' or 'community-driven' provides more effective instruments to advance external interests and agendas while further concealing the agency of outsiders, or political manipulations of local elites (Cook and Kothari, 2001; Mosse, 2001). Considering the different meanings and uses of 'participation', Arnstein's (1969) ladder of participation (figure 1) will be used to differentiate between the different levels of politicized and depoliticized participation in which water management organizations operate.

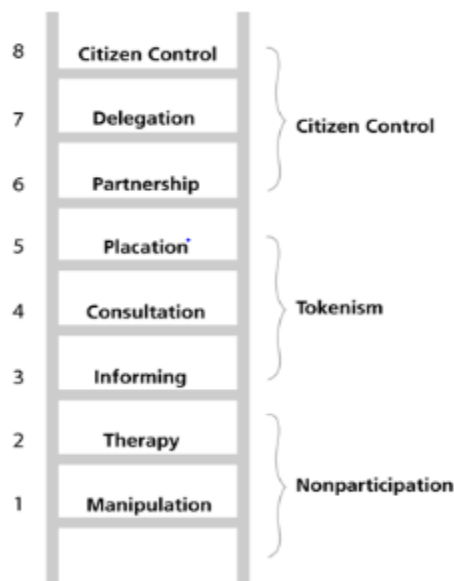


Figure 1: Arnstein's ladder of participation

The lower half of the ladder reflects a depoliticized approach to participation, or 'tokenism', where participation is limited to information, consultation, and placation. The top of the ladder

envisages participation similar to that of the empowerment work of social mobilization NGOs of the 1970s and 1980s, where the redistribution of power enables citizens presently excluded from the political and economic processes ('have-nots') to be deliberately included in decision-making. This is directly tied to discussions of citizen power, where Ribot et al. (2006) define citizenship as the right and ability of people to be politically engaged and shape the fate of their polity. As such, high levels of citizen power may therefore also correlate with democratic participation. The next section discusses how the Guidelines for Participatory Water Management (GPWM) with its depoliticized framework and limited conceptualization of participation is prone to tokenism.

Chapter 3: Context of research location

3 Context of research location

3.1 Salinity Intrusion in Coastal Area of Bangladesh

The coastal zone is extremely vulnerable to a number of rapid and slow-onset events that affect rice production and related livelihoods. Currently, cyclones accompanied by storm surge and increased salinity intrusion into fresh water and soils are the most catastrophic phenomena for coastal communities, especially in Satkhira, a vulnerable coastal district. At least nine major cyclones have hit the coast in the last 50 years. But in the last decade, the number of cyclonic events from the Bay of Bengal has increased.

Cyclone Sidr in 2007, cyclones Nargis and Reshmi in 2008 and cyclone Aila in 2009 caused huge damage in Bangladesh. The government of Bangladesh estimates that the total cost of damage from cyclone Sidr was US\$1.6 billion (DMB, 2010). Cyclone Sidr killed more than 3,000 people; it also directly affected about five million families and crops of about 0.7 million hectares (Rabbani et al, 2010; DMB, 2010). According to the Bangladesh Bureau of Statistics (BBS), cyclone Sidr caused damage to more than 0.1 million tons of rice crop in Khulna (one of the most affected 12 coastal districts) (BBS, 2009). Cyclone and storm surges induced by climate change force saline water into agricultural lands along the coast, which damages crops not only in the year the cyclone hits, but for several years afterwards. This has also happened in the area that was studied for the present research, Shyamnagar upazilla in Satkhira zilla. Saline water intrusion caused by cyclone Aila in 2009 led to loss and damage to rice crops in many villages in the area. Some recent studies indicate that salinity intrusion in both soil and water might increase further because of escalating intensity of cyclone and storm surge (Ministry of Environment and Forests, 2005; Rabbani et al., 2010; SRDI, 2010). Out of seven sub-districts, Shyamnagar is the largest, with an area of about 2,000 km (more than 50% of Satkhira). At least 75% of Shyamnagar lies under the area of Sundarban (BBS, 2008).

3.2 Study Area

Borokupat is one of the biggest villages of Atulia union under Shyamnagar upazilla in Satkhira zilla. The village is situated at south side of the Union Parishad and 5 Kilometer long. A big river named 'Khalpatua' has blown away touching its 5 Kilometer east side which is a tributary of the

Ganges, that flows into the Bay of Bengal. According to *Population and Housing Census 2011*, there is a total of 2268 people (1141 are men, and 1127 are women) from 473 households are living in the village. Around 70% people are dependent on fish culture for their primary occupation. The most common livelihoods are in agriculture, fishing, pisciculture, etc. (Banglapedia, 2003). The main crops of this village are rice (Aus, Aman and Boro), wheat, jute, sugarcane and vegetables. It has a hot summer from mid-March to early June, and a mild winter between late November and mid-February. Approximately 36% households are extreme poor, 34% poor, 16% lower middle class, 10% middle class and 4% households are rich. The poor and extreme poor household concentration is higher than the national average. Exposure of disaster is very high in this area. The main hazards are salinity, embankment damaged, cyclone and erratic rainfall. The village was damaged and affected by the storm surge for tropical cyclone Aila in 25 May 2009 with huge loss and damages of all their houses, embankment, natural resources, traditional livelihood, road, etc. There are 2 primary schools, 1 Non-Government Organization (NGO) operated school, 1 secondary school, 1 mosque, 2 temples, 9 tube-wells, 2 Pond Sand Filters (PSF), 76 small ponds, 12 medium ponds (7-33 decimal) and 12 large ponds in the village. Most of the ponds were contaminated by saline water during the disaster. Increased saline intrusion inland and water bodies has created persistent hazards for the villagers. As per *Union Parishad office*, around 55% household (HH) have access to safe water. According to *Census 2011*, among 473 households of Borokupat village 303 have hygiene latrines whereas the rest of 170 are unhygienic latrines.

The community people of this village were engaged in social forestation within 6-Kilometer-long embankment of Khalpatua river, which has reduced the intensity of storm surge, cyclone, dam damaged, and protection of flooding in the village Borokupat. These villagers often influence Bangladesh Water Development Board (BWDB) and Government Administration for dam repairing in a planned way where they play an important role in decision making to control the salinity as well as to reduce the risk of erosion and disasters. They also created a contingency fund of BDT. 482,710 for their community development through influencing the local government officials. One (01) Solar Operated Pond's Sand Filter (PSF) has ensured the safe water access of 21% peoples of the village. The 6 large ponds' re-excavations have promoted the scopes of safe water access for 25% people.

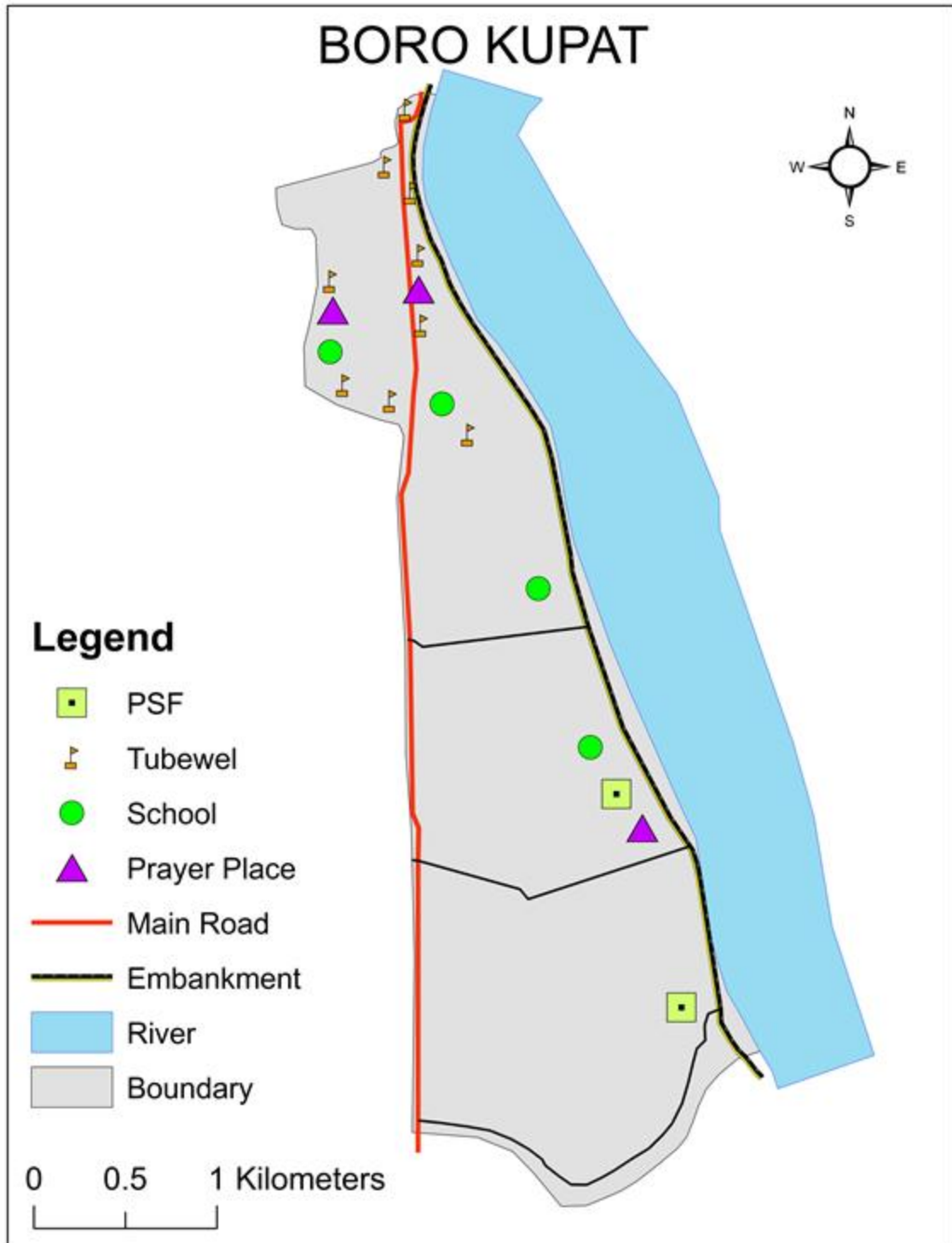


Figure 2: Village: Borokupat, Union: Atulia, Upazilla: Shyamnagar, Zilla: Satkhira

Chapter 4: Research Methodology

4 Research Methodology

4.1 Selection of Study Area

Both quantitative (household survey) and qualitative tools (focus group discussions, key in-depth interviews, case studies, transect walks, and participatory observations) were used to explore the impacts of salinity intrusion in the people's life of Borokupat village under Atulia union, Shyamnagar upazilla in Satkhira zilla. This village was chosen based on the distinctive of salinity intrusion due to effect of natural disaster like cyclone "Aila" in 2009 as well as the geographic location. Here majority of the land is under salt water where "shrimp" and "crab" are two significant livelihoods that people are living on. This village has 473 households engaged in a range of occupational activities like: agriculture, fishing, pisciculture. Around 70% people are dependent on fish culture for their primary occupation with an emphasis on shrimp and crab farming. Soil and water salinity are the major concern of this village due to its location on the bank of a large tidal river, which makes it highly exposed to multiple coastal hazards. Cyclone "Aila" severely affected the village and it remained inundated with saline water for several months.

A total of 100 households were surveyed in the presence of both male and female from five types of drinking water source user namely Protected Pond (PP), Pond Sand Filter (PSF), rainwater harvesting, tube-well and supply water. Households were selected by a systematic random sampling procedure. The survey questionnaire was designed to capture relevant data and information from the study village. It covered the socio-economic profile of study households, awareness and understanding of water governance issues and the consequences, effect of salinity intrusion, strategies to cope with the salinity intrusion, understanding of women's condition and social position in water governance issues, barriers they are facing to be an active part of decision-making process, community perception regarding women's participation in water governance issues. The survey questionnaire was developed in a peer-review process to ensure it was consistent with the subject and local issues, was translated into Bangla (the local language).

In addition, village representatives provided and validated the data/information gathered in focus group discussions and key in-depth interviews conducted in the study village. The qualitative

tools, including focus group discussions and key in-depth interview helped to gather details on the subject and verify responses from the survey. Suitable participants for the focus group discussions were identified from the household survey. A systematic research protocol was followed to avoid possible bias. Secondary data and literature were reviewed to complement the primary data gathered during the fieldwork.

Following structure was used to analysis the survey method and data to support the study findings:

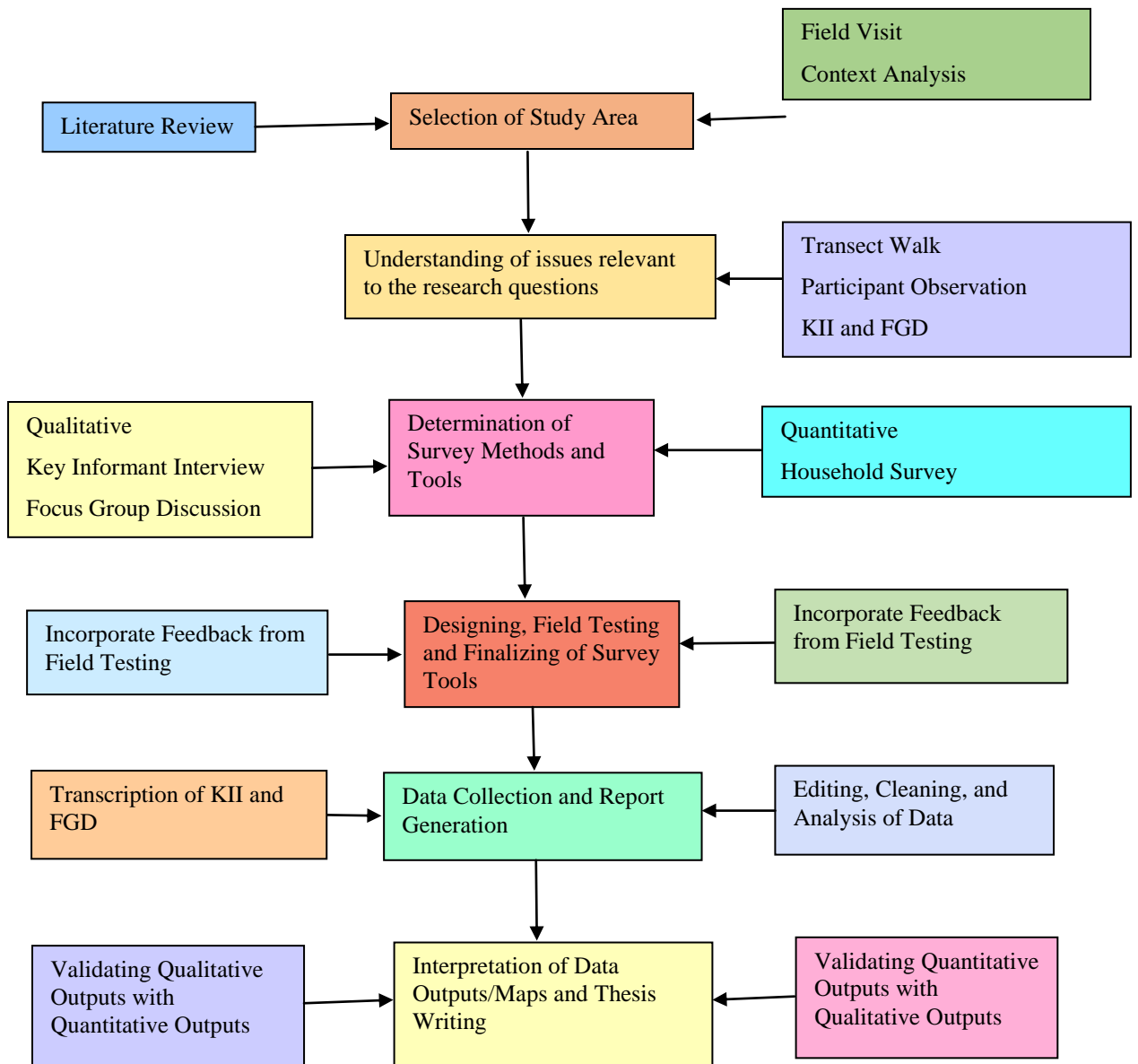


Figure 3: Schematic Presentation of research methods and tools used

4.2 Survey Method

The qualitative research approach played a central role in describing and understanding people's and social or occupational groups' particular situations, experiences, and meanings before developing and/or testing more general theories and explanations (Frankel and Devers, 2000). It allows the study to explore the socio-ecological context, widen the understanding of issues around water governance, guided this study to develop an "experience-based" perspective relevant to the research objectives. The approach is well captured by Sofaer in 1999:

The qualitative research..... is often developmental; it begins with exploratory study and gradually moves toward more structured research design as knowledge increases (Sofaer, 1999).

Qualitative research involves the systematic use of a variety of empirical materials, case studies, personal experience, life stories, interviews, observational, historical, interactional, and visual texts that describe routine and problematic moments and meanings in individual lives. It uses a broad spectrum of interconnected methods to provide a better understanding of the research questions (Massucci, 2013). On the relative value of qualitative versus quantitative methods of field data collection, Carvalho and White (1997) commented:

The quantitative approach typically uses random sample surveys and structured interview to collect data- mainly quantifiable data- and analyzes it using statistical techniques. By contrast the quantitative approach defined as one that typically uses purposive sampling and semi-structured or interactive interviews to collect data- mainly data, relating to people's judgements, attitudes, preferences, priorities, and/or perceptions about a subject- and analyzes it through sociological or anthropological research techniques.

They conclude the both methods have strengths and weaknesses. The strengths of quantitative method include making data aggregation possible, providing data and results whose reliability is measurable and allowing simulation of different policy options. The weaknesses include sampling and non- sampling errors. Missing what is not easily quantifiable and failing to capture intra-household issues. By contrast the strengths of qualitative methods are that they allow for a more contextually grounded and richer definition of concepts such as "drivers of change" in complex social ecosystem systems, they give more insight into causal processes, and provide more accurate and depth of information ("thick description") on certain questions. Their weaknesses include lack of generalizability and difficulties in verifying information. Carvalho and White in

1997, and McGee in 2000 characterize quantitative approaches as having breadth and qualitative approaches as having depth. This study combines both approaches in an attempt to ensure a balance between the diversity of local experiences and changes and the specific and in-depth particularities of such experiences and changes.

4.3 Qualitative Method

4.3.1 Key Informant Interview (KII):

Water governance is a new topic of research, more particularly in rural setting where the word water governance seems abstract to the majority of local community. As a means of tapping local people's understandings of water governance, the reasons behind the salinity intrusion, conventional gender gap in the social system to cope with salinity, one of the methods used was Key Informant Interview (KII). KII is an established qualitative survey tool that involves face to face discussions/interviews with local persons who have good knowledge of the area, can provide important insights into local worlds and can also assist as gatekeeper, facilitating access to people, events, and information (Jimenez, 1985). Using an open-ended, semi structured checklist-based interviews, KII enabled the process of conducting the study to gain many insights into local problems and issues, to raise questions, and to analyze phenomena from different perspectives (Bogdan and Taylor, 1975; Okamura, 1985). These informal interviews were important in designing FGD checklists, adjusting the number of focus groups to be discussed and finalizing the structured interview schedule (Bryman, 1988).

10 KII were conducted by using semi-structured checklists with representatives of various institutional stakeholders at the field level (Table 04). A range of techniques were available during conducting the KII. These were informal talks, personal interviews, formal written questionnaire, telephonic interviews, group interviews or community forums, and public hearings (McKillip, 1987). But, for this study informal talks and personal interviews were mostly focused in conducting the KII.

In this study, Key Informant Interview (KII) was done with the representative from Bangladesh Water Development Board (BWDB) to get an overview of the present situation and probable impact of salinity of this area in people's lives and livelihoods. KII with the local government officials was done from the department of agriculture and fisheries to highlight their thoughts and observations on water- governance related issues in relation to gender. KII was also done with the

representatives both men and women from Water Management Groups (WMG) and Water Management Association (WMA) to know the actual situation of water issues, salinity intrusion and the existing gender gap in the community.

At the outset of all interviews the objectives and purpose of the study were clearly shared with them along with receiving their consent before further proceeding. Checklist was used as a guide during interviewing respondents at government, water user groups, NGOs and the community level including facilitating FGD sessions. Table: 04 provides a summary of the number and types of main stakeholders involved in the KIIs.

Institutions/ Stakeholders	N= 10
Representative from Bangladesh Water Development Board (BWDB)	1
Local Government Officials from Agriculture Department	1
Local Government Officials from Fisheries Department	1
Representatives from Water Management Group (WMG)	2 (1= Male, 1= Female)
Representatives from Water Management Association (WMA)	2 (1= Male, 1= Female)
Atulia Union Parishad Chairperson	1
Representative from Local NGO	1
Representative from Government Project	1

Table 4: Institutional stakeholders for Key Informant Interview (KII)

Interview time was around 60 minutes for each of the participants and it was 90 minutes for the representatives of water management group and association. An approach can be illustrated with the following example, where a person stated the soil salinity is still a problem after 09 years, he was asked questions such as: “how did you know that there is still salinity in the soil?” “To what extent does salinity affect crops and which crops are more sensitive to such salinity?” The checklists to conduct the interviews were in Bangla and the discussion was also in Bangla. Later the discussion was analyzed and summed up as the findings of the study for concluding remarks.

4.3.2 Focus Group Discussions (FGD)

The Focus Group Discussion (FGD) is one of the most commonly applied rapid assessment tools in the Participatory Rural Appraisal (PRA) toolkit, in which participants brought together for a

group discussion on a specific matter/subject. In this study, people of the same occupational group discussed issues and concerns following a guiding checklist of key themes. When combined with other qualitative tools like transect walk, historical trend, FGD provides more in-depth information on various social and developmental issues (Morgan, 1997). FGDs were conducted with different occupational groups in Borokupat village to substantially complement the objectives and the questions of the research.

There were 08 FGDs conducted at Borokupat village with a combination of 8- 12 people from various occupation like: rice farmers, shrimp farmers, crab producers, honey collectors, and housewives. All the groups were homogenous where both men and women were participated actively and shared their concerns. Through these FGDs, gender issues were emphasized through discussing in a homogeneous group for getting authentic reflection from for a better water management. Throughout these occupational criteria, five types of drinking water source like protected pond, Pond Sand Filter (PSF), rainwater harvesting, tube-well and supply water were also being addressed within the same group.

The usual duration of FGD were around 120 minutes including introduction and explanation of the purpose of the session. The checklist of the FGD along with the discussion was in Bangla. A Gender and Power Analysis was conducted with the groups during the FGD to get an authentic information about the status of women in water governance sector.

Occupational Group	N= 80 (FGD Participants)
Rice Farmer (Men Group)	10
Rice Farmer (Women Group)	10
Shrimp Farmer (Men Group)	10
Shrimp Farmer (Women Group)	10
Crab Farmer (Men Group)	10
Crab Farmer (Women Group)	10
Honey Collectors (Men Group)	10
Homemaker (Women Group)	10

Table 5: The list of the participants for FGD

4.3.3 Case Studies and Participant Observation

Three case studies on relevant issues have been selected that include the drivers of changes in village water management system over time like embankment construction, maintenance of sluice gate, and conservations of state-owned canals and rivers in Borokupat village and their impact in livelihoods through engaging women in the entire process. At the same time, one case study has been shown as an example of “gender blind” water management system and its impact in the entire livelihoods of the community. Three specific case studies have been selected during the FGDs that represent the natural community practices and the norms, beliefs, and values of the village. Case studies has helped this research to identify the hidden and invisible social issues to support the findings for analysis.

Participant observation was another qualitative tool applied at various times, especially during KII, FGD, and case studies collection. Merriam in 2009 suggested that, a participant observation should consider the observation and participant observation research on a continuum that depicts the role between the observer and the observed. In this research, informal information was also collected by conducting participant observation throughout the field visit.

4.4 Quantitative Method

4.4.1 Household Questionnaire Survey

A simple random sampling was done for conducting the household survey. A total of 100 households were selected from 473 households in Borokupat village. The household survey was designed to capture data on socio-economic, demographic, water related issues and constrains, approaches to get rid of the constraints, impact and level of salinity intrusion, women’s role in water management issues, traditional practices of the villagers to cope with the salinity intrusion to secure freshwater, and the livelihoods that leads to food security. Before administering the household survey, questionnaire was tested in the field and necessary adjustment was done based on the findings of field testing.

4.4.2 Methods of Analysis

In addition to the research method mentioned above literature review was done as the secondary data collection process through reading books, published materials, reports, policies and laws, newspaper and journals to provide a theoretical background to the study. An institutional analysis

was done at local level on the roles and responsibilities of various actors engaged in grassroots development. Consents were taken from the participants before applying any sorts of methods both quantitative and qualitative. The objective and purpose of the research was clearly stated to the participants and stakeholders before conducting the household survey, KII, FGDs, and case studies.

Chapter 5: Findings and Analysis

5 Findings and Analysis

The findings of the study have been analyzed focusing on socio-ecological theory by Zurlini, G. 2008 in his writing “Socio-ecological Systems” in Encyclopedia of Ecology. Here, gender analysis has been carried out through focusing on ecological context that is less studied by the researchers. Harvard tools have been used in conducting the gender analysis. The Harvard Analytical Framework is often referred to as the Gender Roles Framework or Gender Analysis Framework that published in 1985 at the Harvard Institute for International Development in the USA. And water governance issues have been defined by the theory of Claudia Pahl-Wostl in 2018 in the book of “Water Governance in the face of global change”. In this book the author developed a conceptual and analytical framework that captures the complexity of real water governance systems while also introducing different approaches to comparative analysis.

There are some arguments that gendered dynamics of environmental change must be analyzed in ways that integrate subjectivities, scales, places, spaces, ecological change, and power relations (Rocheleau et al. 1996; Elmhirst 2011; Hawkins and Ojeda 2011). Broader contexts and constraints that influence gender are crucial to understand and address in processes of environmental/ecological system. Through focusing on the debate this study highlights the different ecological factors to affect social dynamics in a comprehensive method. Gender analysis and water governance system have been analyzed through defining the social dynamics whereas salinity intrusion have been focused through ecological vulnerabilities. The context of gender in agriculture, shrimp and crab production have been analyzed through social, economic and ecological perspectives whereas health issues have been considered both social and ecological point of view.

The consequence of the study is described from demographic ratio which has been identified through conducting the household survey and the overall findings and analysis have been narrated focusing on the objectives of the study. Through analyzing these theories this study tries to create a nexus between ecological changes including loss of crops, assets, livestock, and property in disasters and social changes that affect entire households into a downward spiral of impoverishment and being indebted, leading household members into working as wage labor and often having to relocate for livelihoods.

5.1 Demographic Data Analysis from the respondents in Borokupat village

In the study area, 100 people were surveyed to get the elementary information about the village. Among them 43.60% were women and 56.40% were men. The family size is like 45.1% who have family of 2-4 persons, 49.9% have family of 5-7 people, 4.2% have family of more than 08 member, and 0.8% have only one person in the family. The ownership of living house in Borokupat village is around 88.6% have their own house and all belong to men of the household. 4.6% live in the khasland, 3.6% live in the others land without any rent, 2.8% live in the others land by giving rent, and rest of 0.4% belong to other criteria. The yearly income and expenditure of the following respondents are given below:

	Total number of family that incomes/expenditure ranges between						
Income/Expenditure Range between	30001-40000	40001-60000	60001-80000	80001-100000	Above 100001	Below 30000	Total
Income	5	10	17	20	48	0	100
Expenditure	7	15	14	19	45	-	100

Table 6: Yearly income/expenditure of surveyed family

From the Table 06, it is observed that, about the yearly expenditure of 7% family is within 30001-40000 BDT whereas 5% family have yearly income within this range. 15% family yearly expenditure belong to 40001-60000 BDT whereas 10% have income within this range. Around 14% have expenditure in the range of 60001-80000 BDT and the income of the family within this range is 17%. About 19% have expenditure in 80001-100000 and 20% family income belong to the same range. 45% family yearly expenditure is above 100001 whereas 48% belong to this range for their yearly income. The table 06 is shown in a graphical manner below:

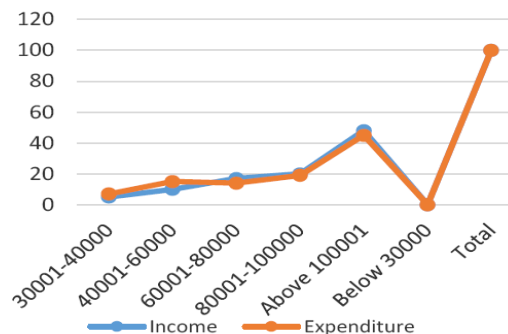


Figure 4: Total number of family that incomes/expenditure ranges between

The mean age of the respondents was 36.35 and a large number of respondents (47.1%) fall in 26 to 33 age group. Among the rest 25.5% were 34-41 age group, 9.8% in 50-57 age group, 7.8% in 42-49 age group and 5.9% were in 18-25 age group, and 3.9% were above 58 years of old with standard deviation 11.42 (Table 7).

Category of the age	Frequency	Percent
18-25	3	5.9%
26-33	24	47.1%
34-41	13	25.5%
42-49	4	7.8%
50-57	5	9.8%
Above 58	2	3.9%
Total	51	100.0%
Mean: 36.35 Std. Deviation: 11.42 Minimum: 18 Maximum: 79		

Table 7: Age of the Participants

Majority of the respondents 53, among them 60% are women and 44.44% are men have read from class 6 to class 10. 17 respondents, 7.27% are women and 28.89% are men have completed their primary education. 11 respondents had no education where 12.73% are women and 8.89% are men. 09 respondents have master's degree with a bachelor where 12.73% are women and 4.44% are men. In addition, 06 respondents have passed SSC (3.64% women, and 8.89% men) and only 04 respondents have completed HSC, where 3.64% are women and 4.44% are men (Table 8).

	Sex				Total
	Men		Women		
	N	%	N	%	
No education	4	8.89%	7	12.73%	11
Primary	13	28.89%	4	7.27%	17
Class-6-10	20	44.44%	33	60.00%	53
SSC Passed	4	8.89%	2	3.64%	6
HSC Passed	2	4.44%	2	3.64%	4
Graduate with Masters	2	4.44%	7	12.73%	9
Total	45		55		100

Table 8: Level of education (Sex Disaggregated Data)

The present study reveals that large numbers of respondents (29%) depends on open water fishing in Sundarbans and 17% were business person. Among the rest 12% were farmer, 10% day-labor, 19% shrimp cultivator and 13% crab producer respectively.

5.2 Challenges in gender-based water governance to cope with salinity intrusion

This section describes the challenges in gender-based water governance to cope with salinity intrusion that identified through qualitative method. In the sub- sections challenges have been identified in overall water governance system emphasizing on women's roles: productive, reproductive, and community that influence the engagement in decision making processes. Here, salinity intrusion has been considered as one of the most exposed factors that hinders the community ecologically from water security. Additionally, the livelihood factors including agriculture, shrimp and crab production have been analyzed through social, economic and environmental factors which are also causing the gender disparity among the coastal belt community as well as women's vulnerability. A rigorous gender analysis has been conducted in water governance process which determines the challenges in social dynamics. Health issues have been considered as a result of social and ecological factor due to high intensity of salinity intrusion. Women and men are not passive victims of water scarcity, but they display a range of strategies and coping mechanisms to deal with ongoing transformations (Dankelman et al. 2008). Women who are facing vulnerabilities related to water and salinity, already making changes to adapt their lives and livelihoods and often are able to articulate what they need (even if they are not fully aware of what is available to them or how salinity is affecting them in their day to day livelihood system. Therefore, this study tries to provide relevant examples that correlate the women's vulnerability due to extensive salinity intrusion that affect in overall water governance and livelihood system.

5.2.1 Influence of high salinity intrusion in gender relationship in coastal area of Bangladesh

As Bangladesh belongs to one of the seaside countries, the adverse impact of saltwater intrusion is significant here. Salinity mainly affects land and water in the coastal areas. With the consequence of climate change, it gradually extends towards inland water and soil. This scenario of gradual salinity intrusion in the coastal area of Bangladesh is very threatening to the primary

production system, coastal biodiversity and human health. The total amount of salinity affected land in Bangladesh was 83.3 million hectares in 1973, which had been increased up to 102 million hectares in 2000 and the amount has raised to 105.6 million hectares in 2009 and continuing to increase (Soil Resources Development Institute (SRDI), 2010). In the last 35 years, salinity had been increased around 26 percent in this country. Salinity intrusion is spreading into the non-coastal areas as well. International Rice Research Institute (IRRI)'s Seed Study, funded by USAID, has identified 12 districts of Bangladesh as salinity affected area through GIS mapping, where Satkhira was found one of the most affected districts due to salinity. The causes of salinity intrusion in the coastal belt of Bangladesh includes critical geographical location of the country, low flow condition of the river by a barrage in the upstream neighboring country, faulty management of coastal polders, sea level rise, cyclone and storm surge, back water effect, precipitation and shrimp culture. Women and girls are the most marginalized group of people who suffer most due to this extreme salinity intrusion in coastal area. As women are the frontier due to their social and family roles and responsibilities. Therefore, they suffer much due to any type of natural hazards like salinity intrusion.

5.2.1.1 Impact of Water Salinity on livelihood operation

The increase level of water salinity is impacting on the livelihood operation in several ways. First, it is making the whole coastal belt's water availability unsecure and pushing poor people's lives to a more vulnerable position than before. Near about four million people in the Sundarbans and its surroundings is now water insecure. Nowadays, saline water becomes the only means of potable water. Second, water salinity also causes an increase in soil salinity which further decreases the agricultural productivity and brings enormous pressure on food security. And lastly, it destroys the ecosystem of the whole area, causing massive threats to the lives of the poor people living in the coastal area.

The salinity problem in Shyamnagar, Satkhira district has been increased drastically after the two great cyclones Sidr and Aila and the consequential tidal surges, which took place in December 2007 and May 2009 respectively. A large number of areas in the coastal belt have been most affected and were devastatingly inundated by sea-saline water after cyclone Aila. From the FGD all the participants mentioned that, millions of people living around this region are struggling with high level saline water and so far, very little efforts have been given by the governments and non-government organizations to restore the place to normality.

In Shyamnagar Upazilla of Satkhira district the available sources of potable water including small ponds, canals, wells and tube-wells are now filled by salty sea water, which causes all the water sources unusable. During the KII and FGD in Borokupat village of Shyamnagar Upazilla the participants mentioned, salinity is affecting their lives in various ways. First, it has reduced their economic opportunity by degrading their land quality and reducing productivity. Secondly, it is lessening the security of food and water. They said that water has become the most precious commodity of their daily life. Lack of pure drinking water is the greatest challenge that they are facing, and they do not know when and how they could recover from this terrible situation. The participants have also mentioned that, Government and NGOs have made some water storage tanks in several places of Aila affected areas but those do not cover all their needs. However, to get a bucket of water from those sources one has to wait several hours and travel a long way to fetch it. Those who are unable to fetch pure water, have to rely on saline water. A middle-aged woman showed her Sharee, which has been faded and become stiff and flimsy because of continuous washing with saline water.

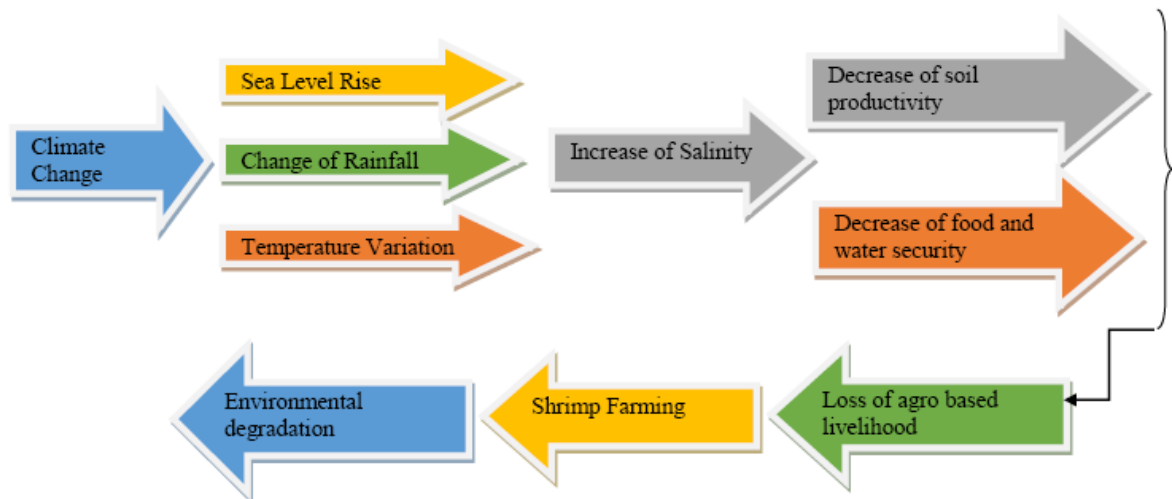


Figure 5: Food and Water Security Cycle due to salinity intrusion in coastal area

5.2.1.2 Impact of women's life due to salinity in coastal area:

Gender is a critical factor in shaping how people access, control and use natural resources (Agarwal 1992; Jackson 1993; Kabeer 1994; Rochele au et al 1996; Cleaver 2000). Scholars have generally noted that women, particularly marginalized and poor women, suffer the most from environmental degradation and natural resources crises. While water crises affect women and

men in different ways, it has been widely argued that women suffer disproportionately from water scarcity and water-related disasters (Jordans and Zwarteveen 1997; Meinzen-Dick and Zwarteveen 1998; Crow and Sultana 2002). However, the experiences and implications of water scarcity vary across social strata and locations and need to be analyzed in context. Gender, class, age and geographical location intersect to influence the relationship that women have with water, which is largely shaped by gender divisions of labor, rights and resources. In rural Bangladesh, domestic water collection and management is predominantly undertaken by women and girls, who spend a considerable amount of time and energy under various conditions on a daily basis collecting drinking water for their families (Crow and Sultana 2002).

From the Focused Group Discussion, it is identified that, it is rare for men to participate in domestic water collection. Certain notions of masculinity and femininity are associated with who does what types of tasks with water: men predominantly undertake irrigation and agricultural water management, while women generally are responsible for domestic water issues. Such socio-culturally defined gender roles are generally not challenged in the broader gender division of labor, even during the present salinity-related drinking water crisis. The workload of women and girls has worsened due to salinity, as greater time, distance and energy is involved in availing safe water. However, while poorer women fetch their own water, wealthier women are able to employ others to fetch water for them; similarly, more senior women in households generally enroll younger daughters-in-law and daughters to fetch water. Most households try to switch to a safe well in order to avoid saline water (often to tube-wells of their neighbors or kin, or from public tube-wells in bazaars, mosques and schools). More poor households are forced to make this switch compared to better-off households; this is largely a result of the fact that wealthier households have greater access to their own (more expensive) deep tube-wells that tap into deeper aquifers that are mostly saline free, while poorer households generally use more affordable shallow tube-wells that are largely saline-contaminated. Contaminated tube-wells meant that people who had hitherto benefited from easy access to potable water via installing a tube-well were now facing the immediate challenge of having to avail safe water from elsewhere. For households that never had their own tube-well to begin with, it often meant having to switch to another nearby safe well or some other safe source. In such waterscapes, women have to negotiate their access to safe water, often on a daily basis; such survival tactics can range from having to maintain a good relationship with or be related to the owner/manager of a water source, give free labor, help clean the area or pay an occasional fee. The physical labor of gendered hardship in water procurement is compounded by social issues such as the need to negotiate

access to water sources, a sense of humiliation in having to use someone else's water source, enduring insults and arguments at water points and a sense of loss of dignity and self-worth. Many women complained about such issues, as well as issues of gendered spaces in accessing water sources that may be far away or in public areas that are overwhelmingly masculine spaces. Problems of collecting water in the dark when the source is outside the homestead, as well as a sense of social insecurity in traveling longer distances, mark the concerns that women and girls have in dealing with the water crisis. This is more so for younger daughters-in-law and unmarried teenage girls, whose mobility in public areas is often of concern to their families (especially male members who worry about safety and family honor). Several trips must be made each day to the nearest water source or surface water body to meet water needs. The distance to be covered can range from a few yards to several hundred yards. Women and girls walk two to five hours each day to fetch water, making several trips each day. The need to maintain a long queue to collect water which also takes away 2-5 hours at a regular basis. Because drinking water is constructed as a domestic responsibility in the female domain, the education of young women gets adversely affected. The burden of carrying traditional water pitchers (Kolshi) on the hip causes difficulty during pregnancy and deformity in posture. In instances where a long walk is required to reach the nearest functioning water source, many families are forced to use closer saline surface water. In some instances, women face restrictions from their own family members in venturing too far to get safe water and are thereby forced to resign themselves to fetching unsafe water for their families. In general, people are willing to share water in moments of crisis, as long as it does not impinge on their needs or the needs of their families. But this varies across people and places. Many are concerned that the safe water might run out if too many people take water from the same source, that owners of safer wells bear the costs of their operation and maintenance while others take water for free, that the owner's courtyard is always crowded and gets very muddy during the rainy season from footprints, that their privacy is affected and that too many people coming to get water creates tensions and arguments that affect everyone in the vicinity. Thus, the salinity has created an environment where social tensions can easily erupt at water sources, whether pre-existing or as a product of water sharing. People can thus play politics over water by leveraging access to and use of water to exercise authority over others. As a result, water comes to have material and symbolic power in a landscape where safe water is accessible through appropriate technology.

Homestead ponds and canals are often the nearest source of water. But these sources are for used for aquaculture, washing clothes and utensils, bathing, washing domestic animals, and even a

place to throw domestic waste. These multiple uses can all contribute to pollution of the surface water source, making it unfit for consumption. Water purification of polluted water is generally undertaken through filtering, boiling, and using water purifying tablets, or through a range of indigenous purification strategies. The ability to purify surface water requires money and time and is often practiced by more affluent households. This has consequences for health that thus vary by class as well.

5.2.1.3 Technology is adapted to reduce the salinity of water

From the field observation it was seen that, several technologies have been adapted to reduce the salinity of water. Adapting to or coping with water scarcity means to live in harmony with the environmental conditions specific to and dictated by limited available water resources. Adaptation is a two-way process, which initially requires the recognition of changes and then responding to change through adaptation (Habiba et al. 2012). For millennia, civilizations have developed in water scarce environments and have cultural skills that make it possible to live under such conditions. To reduce the safe drinking water scarcity problem, different stakeholders adopted various approaches. The specific adaptation and coping actions of individuals, local communities, and institutions (local governments, NGOs, and private sector) are all important because together they can potentially reduce the safe water scarcity in a locality. This section introduces adaptation and coping measures adopted at the individual and community levels in the southwestern region of Bangladesh as well as those supported by various organizations based outside local communities.

At individual level, depending on socioeconomic conditions, a respondent employs measures that are manageable for a single household, whereas at the community level, members of a community share responsibilities and draw benefits from the measures they adopt collectively. For example, small units of ponds with sand filters and rainwater harvesting systems are considered as the most suitable safe drinking water options used by individual households. Large ponds with sand filters and large rainwater harvesting systems are used in communities and are now the only major sources of safe drinking water maintained at the community level. Very few people have the ability to buy purified water from water treatment plants or shops; the majority of residents cannot afford such expenses. Picture 02 and 03 shows the various rainwater systems in severe drinking water scarcity areas that people are now using.



(a) Pond Sand Filter



(b) Deep tube-well with overhead tank

Picture 2: Technology for safe drinking water in coastal belt of Bangladesh



(c) Concrete Container



(b) Earthen Container



(e) Plastic Container

Picture 3: Different rainwater harvesting systems in southwestern Bangladesh

At community level, use of pond sand filtration is the most common practice in moderate water deficit areas. Pond sand filters are promoted by the government, international NGOs, and local NGOs to provide a safe drinking water supply with the cooperation of a community's people. During the Focused Group Discussion (FGD) it was mentioned by the participants that, most of them from severe drinking water scarcity areas use pond sand filters to get safe drinking water with minimal salinity contamination.

At Institutional Level, various local and international NGOs such as Sushilan, Uttaran, ActionAid, Caritas, Concern Worldwide, UNICEF (United Nations Children's Fund), USAID (United States Agency for International Development), and government organizations such as Bangladesh Water Development Board (BWDB), DPHE (Department of Public Health) and

CDMP (Comprehensive Disaster Management Program) are involved in supplying drinking water in coastal Bangladesh. Among them, UNICEF and DPHE carried out the introduction of pond sand filters (PSF) along the coastal belt. The respondents in the study area were asked about the types of adaptation and coping measures supported and implemented by different institutions. Considering the salinity problem, most of them mentioned regarding the PSFs to get safe drinking water that has been built basically in support with the government organizations (for example DPHE) and nongovernment organizations (like Shushilan). Additionally, they also mentioned about the rain water harvesting as one of the most common adaptation technologies they use to get rid of the salinity intrusion in their locality. Besides the pond sand filter and rainwater harvesting technology, many of them also dependent on the use of deep tube wells with overhead tanks installed by the local NGO Iswaripur Development Foundation (IDF), with GIZ (German Development Cooperation) assistance.

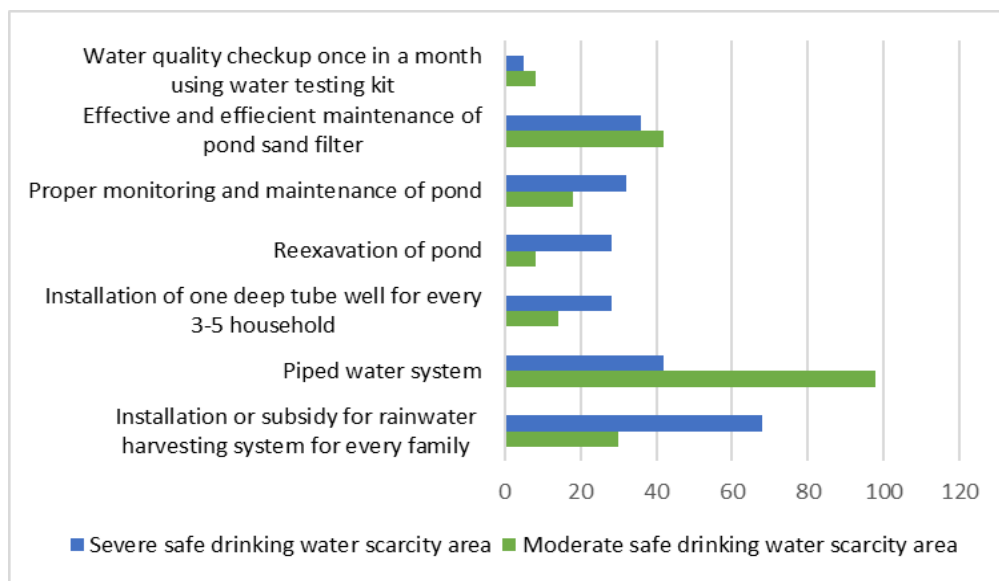


Figure 6: Support needed from government and nongovernment organizations in coastal area of Bangladesh.

From the group discussion it was identified that, the support needed from the government, non-government, and private sector to reduce the salinity of water is, around 64% respondents asked for the installation or subsidy for rainwater harvesting system for every family in severe safe drinking water scarcity area whereas it is 26% in moderate safe drinking water scarcity area. The necessity of piped water system is around 41% in severe safe drinking water scarcity area whereas the number is 89% in moderate safe drinking water scarcity area. In severe safe drinking water scarcity area, the necessity of installation of one deep tube-well for every 3-5 household is

around 25%, whereas it is 16% in the moderate safe drinking water scarcity area. The requirement for re excavation of pond is respectively 25% and 8% in respective two areas. The need for proper monitoring and maintenance of pond is 26% and 18% respectively. Effective and efficient maintenance of pond sand filter is needed 37% in severe safe drinking water scarcity area whereas it is 41% in moderate safe drinking water scarcity area. For water quality checkup once in a month using water testing kit is 3% in severe safe drinking water scarcity area whereas it is 5% in moderate safe drinking water scarcity area.

From the Focused Group Discussion with all type of water users it was repeatedly mentioned that, salinity is the top most vulnerabilities in their life. From the socio-ecological perspectives it has an adverse impact in the society. As due to salinity the workload of women has been increased two/three times that affects in their overall social position along with human condition. The opportunity to go to schools for girl children is decreasing, women are engaged to fetch water from a long distance for a long hour which is hindering their opportunity to participate in any type of meeting or gathering. They are suffering from various kinds of diseases for carrying a heavy water pot from long distance as well as for salinity. As in Bangladesh cooking, washing, cleaning etc. all sorts of water related chores are considered as women's prime job. Therefore, they are the front liner who are exposed with salinity intrusion extensively.

Though the government and non-government sector and the community themselves are taking measures to cope with salinity but all of them are very limited considering their needs and requirements. Further initiatives need to take place from the government level including policy formation to extend support towards this vulnerable group of people to get rid of this life-threatening problem.

5.2.2 Water Governance in Coastal Area of Bangladesh

Water scarcity and salinity intrusion are the factors of ecological affect. However, it has an adverse impact in socio- political context in coastal community especially on women. As women are the front-liner of using saline water due to their stereotype roles and responsibilities in the society but because of social norms, values, and cultural practices they do not take part in any sort of decision-making process pertaining to water governance. This section on water governance have been defined by the theory of Claudia Pahl-Wostl in 2018 in the book of "Water Governance in the face of global change". In this book the author developed a conceptual and

analytical framework that captures the complexity of real water governance systems while also introducing different approaches to comparative analysis.

“Water Governance” is something very complex for the women who did not get adequate opportunity to go to school or to get higher education. Many of the village women are sufferers of early or forced marriage and lost the confidence to raise their voice against any irregularities in their family and society. But it is true that “Women” are the prime users of “Water” in their family and society. This two “W”s always complement each other but hardly recognized by the patriarchal society.

Water governance is much more about the way in which decisions are made (i.e. how, by whom, and under what conditions decisions are made) than the decisions themselves (Moench et al., 2003). It covers the manner in which allocative and regulatory politics are exercised in the management of water and other natural resources and broadly embraces the formal and informal institutions by which authority is exercised. The relatively new term for discussing this combination of formal and informal institutions is distributed governance. There is a profoundly political element to water governance and as such systems of water governance usually reflect the political realities at international, national, provincial and local levels. As a result, the more general definition of governance (as opposed to water governance) is also contested as those who promote different visions of the future tend to define governance in terms which are consistent with their own vision and no other (Green, 2007). One of the most frequently cited definitions of governance is thus:

“The exercise of political, economic and administrative authority in the management of a country’s affairs at all levels. Governance comprises the complex mechanisms, processes, and institutions through which citizens and groups articulate their interests, mediate their differences, and exercise their legal rights and obligations” (Claudia P. 2018).

From the 100 household survey of study area in village Borokupat under Atulia union at Shyamnagar upazilla in Satkhira zilla it is identified that, following services associated with water governance that are important to them: (i) protection from salinity intrusion; (ii) natural disaster management; (iii) approaches to ensure safe water for regular life.

The research participants ensured the using of five types of drinking water source namely Protected Pond (PP), Pond Sand Filter, rainwater harvesting, tube-well and supply water to have

fresh water to get protection from salinity intrusion as a part of water governance. In 90% of household women involved drinking water collection and 65% of households directly consume water from sources. During the FGD it was discussed that, except rain water harvesting and water supply system most of the water sources in the coastal region were affected by natural disaster at different levels.

5.2.2.1 Water User Group

Bangladesh government introduced polders to its coastal zones with the aid of the Netherlands in 1960s (Choudhury, n.d., 1981). Bangladesh has 5,017 km embankment protecting the polders in coastal areas of the Bay of Bengal. The primary goal of launching polderization in Bangladesh was to protect the coastal inhabitant from regular natural disasters and to boost the agricultural production. Bangladesh Water Development Board (BWDB) formerly known as Water and Power Development Authority (WAPDA) is in charge of maintaining and conducting the rehabilitation project of the polders. But due to the poor maintenance, coastal polders in many places have started creating salinity intrusion to the agricultural fields. The BWDB has categorized some polders as "most vulnerable" and some polders as "medium vulnerable". To cope with vulnerability, it is necessary to rehabilitate damaged infrastructure of the polders. Most of the sluice gates have been damaged through which saline water continuously enters into the inland. In addition, shrimp farmers cut the embankment to get saline water in their shrimp fields which also make the embankment weak. This weak embankment is easily damaged due to tidal pressure, particularly during full moon and the saline water enters in the polders.

To strengthen the local community about water governance in support with BWDB the community people formed Water User Group (WUG). The Water User Group (WUG) has three tiers like: Water Management Group (WMG) at village level, Water Management Association (WMA) at upazilla level, and Water Management Federation (WMF) at district level where 30% women representative need to be ensured. Though, a reservation system was adopted to ensure women's representation in the formal water management structures at village level, particularly in the Water User Group (WUG). Although the general policy prescribes women's representation in these structures, it has to be implemented in areas with diverse culture, norms, traditions and beliefs relating to gender (Guijt and Shah, 1998; Hemson, 2002; Singh, 2008). Water User Group is responsible for all sorts of water infrastructure including embankment, sluice gate, in-let, out-let etc. maintenance in their community pertaining to the geographic location and range of work. Though in Water User Group there are 30% of women representation but from the FGD it was

very clear that, women do not have any voice in these groups as well as they cannot participate in any decision-making process. The fact that women are represented in Water User Group (WUG) does not mean they are accepted as decision makers and that they have voice, influence and decision-making power in the same way as men. Reservation for women can also be 'exploited' politically and do not guarantee that women's needs are met. Just as it cannot be said that male representatives are necessarily blind to the concerns of women, it can also not be assumed that women's representation will lead to better outcomes for women in general. Furthermore, women do not always act in the interests of other women when they occupy official positions.

In the constitution of WUG it is clearly mentioned that the different interests on the water use of different group of people specially women, disable person, religion, minority, class, ethnicity will be balanced. However, there is long way to go for proper implementation of this clause in the groups. Different stakeholders in terms of different occupation including agriculture, fishing, boatman, teacher, influential persons of the community are the members of the groups and it is a mixed group consists of diverse group of people. During the KII with the president of Water Management Group (WMG) it was mentioned that, to negotiate the water requirements for different uses they hold their regular monthly meeting and take the decision unanimously. In all sorts of water user group, they have an executive committee which is consists of 09 members whereas out of 09 members 04 should be women. And in the 05 designated position of executive committee at least 02 will be women. The executive committee of the WUGs are democratic bodies accountable to the stakeholders who elect the representatives. However, he also emphasized that, most of the times vice-president and assistant secretary post belong to women. He also illustrated that, there are nine PSFs in 2 unions. And all the PSFs are maintained by a group which is formed with five members (3 female and 2 male) where (1 female caretaker and 1 male caretaker) system prevailed. However, the groups for maintaining PSF are doing well where the women are also active in their role. Nevertheless, most of the time women's representation remains only on paper. In a KII with the women member of WMG, it was mentioned that, most of the time men represent the different users during negotiation for water takes place. It is rare that women's voice is heard during any decision-making process. And people sensitivity is the most important thing to include diverse group of people in WUGs decision-making process as well as to take their needs into consideration. Regular meeting is done in the WUGs, but women cannot take part in those meetings because of the huge household work burden and it increases at a regular due to salinity as well. Because they are suffering from water scarcity due to salinity and they need to do extra work like: fetching fresh water from a distant place, making long queue for

collecting water for long hours, and going different places to do household chores etc, prohibits women to take part in those meetings as they have to spend maximum time in a day engaged in reproductive activities. According to the women member of WMG, the problem can be solved in two ways: first, government to take steps to reduce or control salinity of these areas, and second, male members to take part in household chores as well which is not common in this village. As men are engaged in productive and social work whereas women are engaged in productive, reproductive, and social work but their productive work is not recognized by the family and the society. During the KII she also mentioned that, sometimes women's participation in the WUG is just like a "tokenism". As in the constitution it is mentioned that, 30% women participation need to be ensured in water management system. However, most of the time this 30% reserve seats are filled up by the elite women in the community where the voice of marginalized group of people especially women is not heard.

5.2.2.2 Giving women voice in decision-making for water governance

In the group discussion it was identified that, several WUAs have been created to improve the management of irrigation systems, at least at the tertiary level. These WUAs are democratic bodies accountable to the stakeholders who elect the representatives. However, WUAs reflect the prevailing political and social systems of which they are a part and in which they operate. WUAs play a role in the management of local water resources and influence social dynamics and the access of poor people to productive resources, particularly land and water, but sometimes also credit. Moreover, internal power dependencies and dynamics play a significant role in the distribution of benefits among WUA members. One of the important challenges in the organizational design of the WUAs is the identification of ways to involve women and landless people. During the KII with the women member of WMG it was identified that, women's participation in WUAs is much lower than that of men. However, several studies indicate a greater participation of women in irrigation activities than is often assumed. Other reasons for the absence of women in WUAs include:

- Women's hesitation to be part of organizations dominated by men
- Lack of information available to women
- Lack of gender awareness in the community

Most by-laws restrict WUA membership to the registered landowners in a hydraulic unit who are engaged on a full-time basis in farming. The registered landowners are very often men. Even if

agricultural land is registered under women's names, women are often either represented in the WUAs by their men relatives or are not represented at all. The same applies for households headed by women. When it comes to WUA membership, male relatives replace the women who take part in these activities. Greater participation by women in WUAs has been achieved in cases where membership is open to multiple users of water (not only irrigators, but also livestock owners and fishers).

More recently, policymakers have undertaken efforts to encourage women's participation in WUAs. This may be due to women's lack of confidence in speaking up for their rights and illiteracy and social norms preventing women from taking up any public role. Even if a WUA has a significant number of women members, the time allowed to speak during the meetings is greater for men than for women.

During the FGD a woman member shared that, *"I do all the household chores including fetching drinking water, washing, cooking, looking after children and the elder person, and livestock rearing in my family that are all related to water. But when it is about taking a decision about water allocation and usage, I am hardly invited to participate in any public meeting, let alone getting involved in any sort of decision-making process at all. It is the men who know better than me and they take the decision for our village."*

5.2.2.3 Gaps between National Policy of Bangladesh for Water Management and the Practices

In the national water policy of Bangladesh there is no discrimination for women and the minority group. Rather than women have special quota system to get involved in the water management process which is 30%. Apart from that at least 04 members need to be in the executive committee of water user group whereas the total number of executive committee member is 09. But the reality is all these things are on paper. Those water user groups work very well where they are under any sorts of project or NGO supervision. Without any project or NGO support the WUGs are not functioning basically. However, the water policy of Bangladesh is well addressed about the different engagement and issues related to water but involvement of women and their participation in decision making process are not well defined.

The government approved a 25-year National Water Management Policy (NWMP) in 2004 to facilitate the implementation of the National Water Policy (NWPo). The plan provides guidelines

to develop programs for better management of water resources in the country. The main elements of the NWMP are its multi-use approach to water (not just flood protection but also irrigation, drinking water and other uses) and its emphasis on “soft” approaches incorporating socio-economic dimensions instead of just hard engineering approaches (NWMP, 2001). The Bangladesh Water Act was enacted in 2013 to integrate the management, development, utilization and protection of water resources (GoB, 2013). Basic water availability has been recognized as a fundamental right for people in the act. Implementing any water resources project without considering biodiversity, aquatic environment, spawning areas of fishes and natural drainage system is prohibited in the law. This Act has emphasized the optimum use of water resources, water rights and conservation of nature. The policies are well defined about the diversity inclusion including women throughout the water management process by formation of different groups in different layers but does not mention the key roles and practical interest of women in rural water provision. Women’s participation at tertiary level which is Water Management Group (WMG) is still average but the participation and decision-making process of women is being decreased in the upper tier like: Water Management Association in Union Level and Water Management Federation in Upazilla level. In the upper tiers women are there for marking the quota as the guideline of national water policy but they are not involved in any kind of decision-making process. Because it is obvious that, when it comes about a big platform and to talk in an open forum, it is always men who dominate. And women are also lacking behind from education, information, knowledge, skills, and awareness, so at the same time they do not feel confident to talk in a big forum or to be a part of any decision-making process as well.

5.2.2.4 Weak Water Governance Systems at Local Level

Weak water governance systems at local level are another cause of salinity increase. Because salinity intrusion is not only natural phenomenon; it's also a human one. Numerous human activities—such as untimely water use, unplanned shrimp culture, insufficient or poorly maintained infrastructure, and inadequate management systems—can result in salinity intrusion.

Local government reforms in Bangladesh evolved very distinctly according to the needs of the ruling elites. With the change of government, the policy of local government also kept changing. As a consequence, LGIs have not had any opportunity to act as effective tiers of governments with mandates and funds to carry out their roles and responsibilities. Independent reviews observed that Bangladesh has not been successful in establishing a decentralized system of governance and accountability. A World Bank review of the decentralization process in 19

countries ranks Bangladesh lowest in the decentralization scale. Due to lack of capacity of LGIs, cannot take initiative to protect coastal polder, embankment, road and any kind of infrastructure as well as unplanned shrimp culture. Apart from that, there is a lack from BWDB and LGED to monitor the functionality of these water user groups. Therefore, it leads the leader of the groups not to maintain the policy properly as well as not to follow the diversity including women inclusion clause very well.

In the KII with the BWDB officials and Union Parishad Chairperson both mentioned that, they do not know the National Water Policy very well. And they have also identified that what is mentioned about women inclusion and water management process in the policy they do not have much idea in this. But both of them strongly agreed some changes must be incorporated like: make a separate district for shrimp cultivation which could be done in saline water, government can take initiative to stop entering salty water in the new area further, some necessary steps should be taken to restrict to enter salty water in the soil which creating pressure on agriculture production.

5.2.2.5 Adaptation and Coping Measures of the community to cope with salinity intrusion

Adapting to or coping with water scarcity means to live in harmony with the environmental conditions specific to and dictated by limited available water resources (Pereira et al. 2009). Adaptation is a two-way process, which initially requires the recognition of changes and then responding to change through adaptation (Habiba et al. 2012). For millennia, civilizations have developed in water scarce environments and have cultural skills that make it possible to live under such conditions. To reduce the safe drinking water scarcity problem, different stakeholders adopted various approaches. The specific adaptation and coping actions of individuals, local communities, and institutions (local governments, NGOs, and private sector) are all important because together they can potentially reduce the safe water scarcity in a locality. Following photographs display the existing adaptation and coping measures that are followed by the community to combat drinking water scarcity.



Picture 4: Conservation of pond water. The signs read, washing hands, legs, and ablation are strictly forbidden (Ordered by the authority)



Picture 5: Collection of pond water



Picture 6: Faulty management of embankment and river erosion if favorable to salinity intrusion

At the individual level, depending on socioeconomic conditions, a respondent employs measures that are manageable for a single household, whereas at the community level, members of a community share responsibilities and draw benefits from the measures they adopt collectively. For example, small units of ponds with sand filters and rainwater harvesting systems are considered as the most suitable safe drinking water options used by individual households. Large ponds with sand filters and large rainwater harvesting systems are used in communities and are now the only major sources of safe drinking water maintained at the community level. Very few people have the ability to buy purified water from water treatment plants or shops; the majority of residents cannot afford such expenses.

Adaptation and Coping Practice		Respondent in severe drinking water scarcity area (%)	Respondent in moderate drinking water scarcity area (%)
Individual level			
Salinity	Rain water harvesting	45	3
	Conservation of pond water	62	31
Arsenic	Boiled Pond Water	12	13
	Use of pond sand filter	10	16
	Collecting water far from distance (3–5) km	42	48
	Installing deep tube well	1	5
Drought	Digging of pond	4	1
	Other	6	0
Community Level			
Salinity	Conservation of pond water	28	5
	Rainwater harvesting	13	0
	Use of pond sand filter	19	33
	Digging of pond	23	5
Arsenic	Use of pond sand filter	5	15
	Digging of pond	11	2
Drought	Formation of different water committees	2	3
Institutional Level			
Salinity	Rainwater harvesting system	35	0
	Installing deep tube-well	3	13
	Pond sand filter	30	36
	Installation of deep tube well with overhead tank	8	18
Arsenic	Pond sand filter	10	5
	Installing deep tube well	3	8
	Screening of tube well for contamination	12	40
Drought	Re-excavation of pond	8	0

Table 9: Adaptation and coping measures at different levels in Borokupat village under Satkhira district

Table 9 shows that to combat drinking water scarcity caused by salinity, the respondents from both the severe and moderate drinking water scarcity areas (62 and 31%, respectively) adopted the measure of conserving pond water as the most effective adaptation and coping measure at the individual levels. In addition, 42 and 48% respondents in these areas collected safe water from far distance 3–5 km. Likewise, 45% respondents in areas experiencing severe drinking water deficits have adopted rainwater harvesting as another suitable option by which to cope with a lack of

drinking water at the individual level. They argued that the rainwater harvesting equipment is their own property; hence they can use the preserved water whenever they want. From severe drinking water scarcity areas use pond sand filters respectively to get safe drinking water with minimal salinity and arsenic contamination, whereas 33 and 19% of the respondents from moderate drinking water and scarcity areas utilized the same practice respectively.

The villagers in Borokupat were engaged in social forestation within 6-Kilometer-long embankment of Khalpatua river, which has reduced the intensity of storm surge, cyclone, dam damaged, and protection of flooding. These villagers often influence Bangladesh Water Development Board (BWDB) and Government Administration for dam repairing in a planned way where they play an important role in decision making to control the salinity as well as to reduce the risk of erosion and disasters. They also created a contingency fund of BDT. 482,710 for their community development through influencing the local government officials. One (01) Solar Operated Pond’s Sand Filter (PSF) has ensured the safe water access of 21% peoples of the village. The 6 large ponds’ re-excavations have promoted the scopes of safe water access for 25% people.

From the group discussion it was mentioned that, during monsoon 27% of people use rain water for drinking purpose while in other seasons of the year they use pond sand filter. 21% of households consume water from protected pond. About 14% of households use tube-well as supply water for household chores and about 11% households use bottle water (dram) for drinking and cooking which as well is 20-liter costs 25-30 BDT daily. About 27% people love to collect water from pond sand filter, which is shown in figure 7.

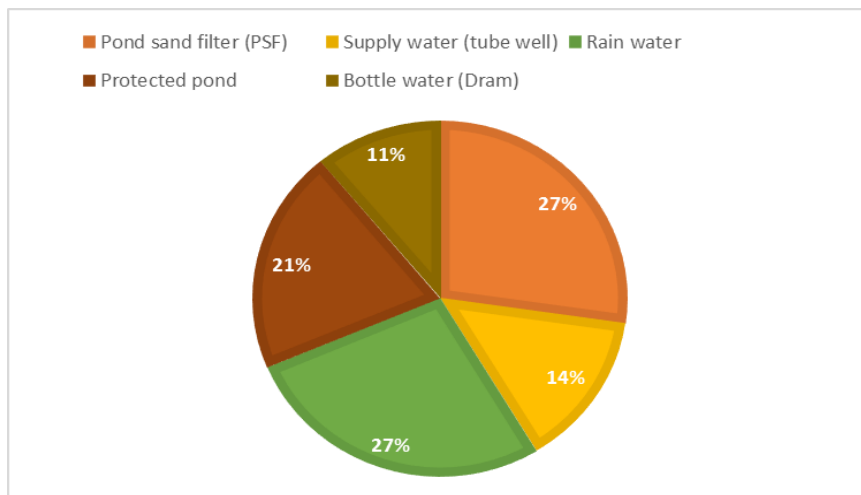


Figure 7: Percentage of water users from different sources

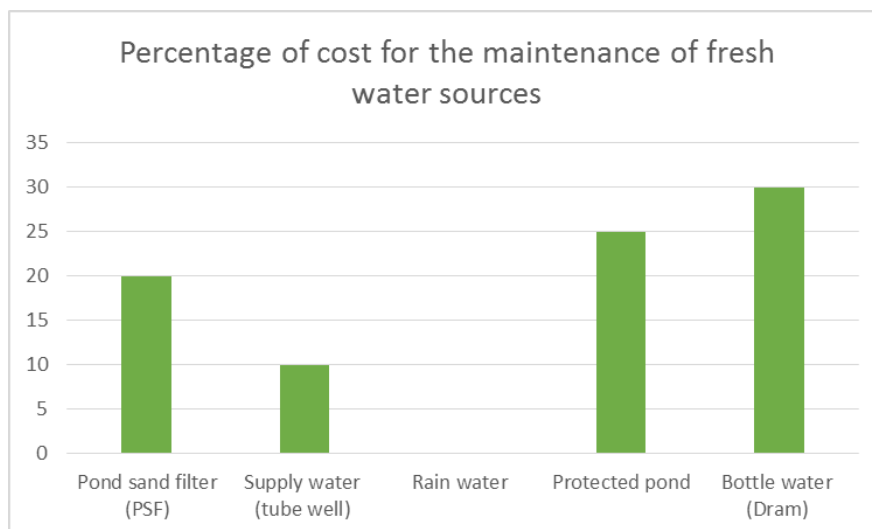


Figure 8: Percentage of cost for the maintenance of fresh water sources/each household

From figure 08 it is shown that, for the maintenance of the fresh water sources each of the household need to spend money to collect fresh water. The maintenance cost varies in different types of sources. In the study village, the community people mentioned that, for the maintenance of Pond Sand Filter (PSF) they need to spend at least 10-20 BDT, for protected pond it is at least 20-25 BDT, for supply water (tube well) it is at least 5-10 BDT (varies based on the type of maintenance work), to get bottle water (dram) they need to spend 25-30 BDT daily for 20 liter of water, which is too expensive for them.

From the above discussion it is very distinguished that, though water scarcity due to salinity intrusion is an ecological affect but it has a large impact in socio- political factor where marginalized women are adversely deprived. Though the policies and legislations are women inclusive but those are on paper only. However, the women from the elite class somehow are represented in this social structure due to their influential male members but for the vulnerable and poor group of women it is long way to reach. Because of social structure of Bangladesh women are considered as the secondary position who have lack of knowledge, skills, awareness, and information. They are still the victim of child and forced marriage with lack of access to higher education. Therefore, their participation in public platform including meeting, decision-making process is still ignored. They are the prime user of water and the most vulnerable due to water scarcity for salinity, but they do not have any access to the decision-making process. However, if the decision is regarding the household water management issues or any sort of small-scale water using issues then women are seen engaging in the process but if it is in a large

scale or village related issues then they are only in numbers not in an effective approach. If the theory of water governance by Claudia Pahl-Wostl is considered, gendered differences in knowledge and experiences in water governance system should be structured and ensured through proper monitoring mechanism by the government and related stakeholders. It should be measured that water governance structure results in reconfiguration of power relations and gender relations in multiple ways in any given context. Gendered implications in Bangladesh are particularly poignant as patriarchal norms, inequities, and inequalities often place women in considerably disadvantageous positions in their abilities to respond to and cope with dramatic changes in socio-ecological relations, but also underscore the complex ways that social power relations operate in communal responses in governance strategies.

5.2.3 Community Gender Analysis in Water Governance in Coastal Area of Bangladesh

Land and water are two essential inputs for agricultural production which is always being hindered in coastal area of Bangladesh especially for women. Without one of them it is impossible to farm, live and livelihood in the rural community. In most places the right to water is inseparably linked to land tenure. As a consequence, the decision-making power on water use and management is also linked to land ownership. This usually means that if people do not own land, they also have no or few rights to water and may be excluded from decision-making on water resources management. Across the country and different contexts women farmers own less land than their male counterparts which contains the country level information on social, economic, political and cultural issues related to the gender inequalities embedded in those rights, sharp disparities in land holdings are apparent in everywhere. However, there are many situations where the men or women actually farming the land do not own it (women farming the land owned by their husbands or in-laws, tenants, sharecroppers, communal farming, etc.), which influences their access to, and use of, water. It is therefore essential to find out how ownership and access to land are arranged and in which way water rights are connected to land.

Whoever gets to access and control the water resources of any geographic region eventually gets a leverage for economic progress. But water as we know is a shared resource and in the process of decision making and implementation, there remains a risk of injustice and marginalization of certain stakeholders, especially those at the lower end of the power structure.

So, all the prevailing forms of marginalization in a society creates vulnerability to certain group of water stakeholders to lose their deserved benefits from water. Similarly, they can be exposed to water induced disaster risks if support mechanisms for resilience are not there for them.

Gender relations often play the role of a catalyst and a reason for marginalization at large, in the overall social, economic and political spectrum. There are multitude of impacts of this phenomenon, but specifically it impacts 6 out of 8 elements of ‘good governance’, which are: participation, inclusiveness and equity, rule of law, consensus, effectiveness and efficiency and accountability (UNESCAP, n.d.). Therefore, to identify the gender issues, the questions to the water governance regime to assess whether it is ‘good governance’ from a gender lens or not.

The following questions were asked to the research participants to have a clear understanding about the access and control over resources especially water related resources of both men and women.

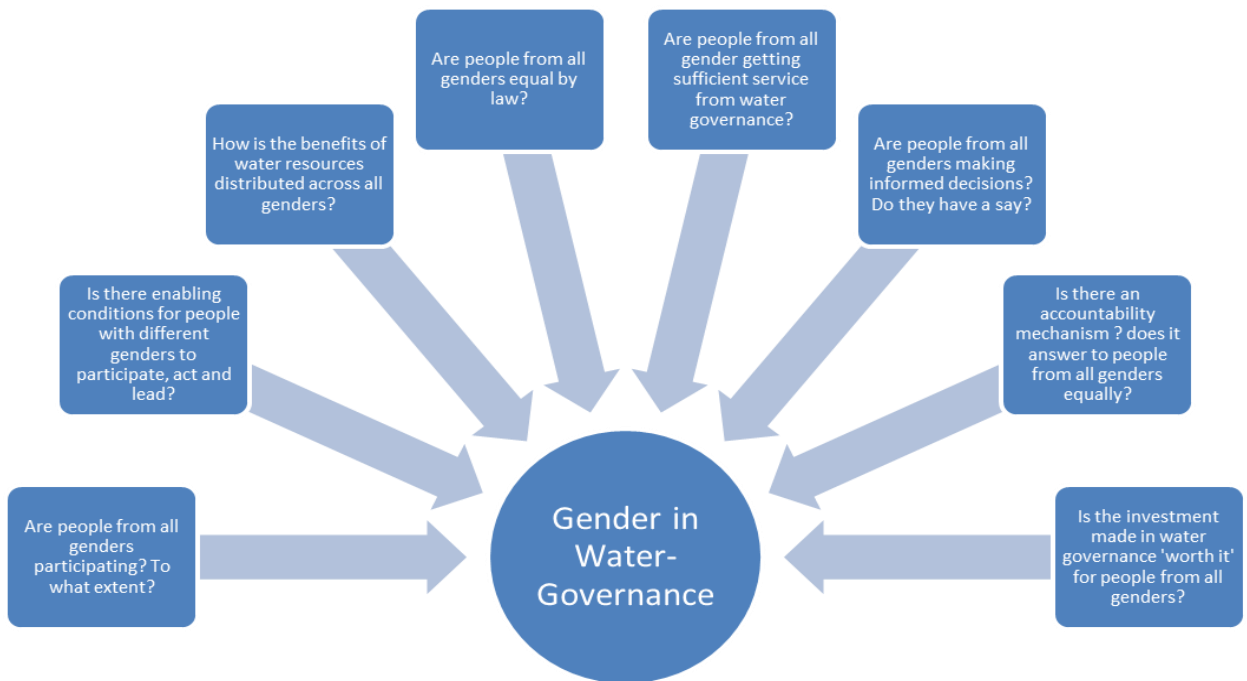


Figure 9: Aspects of Gender Analysis in Water Governance

5.2.3.1 Factors of Gender Analysis

“Gender analysis is (i) a systematic methodology for examining the differences in roles and norms for women and men, girls and boys; the differences within social groups of men and

women based on caste, class, age, race etc.; the different levels of power they hold; their differing needs, constraints, and opportunities; and the impact of these differences in their lives. Gender analysis (ii) also attempts to explain the mechanisms by which gender inequality is maintained (e.g. cultural norms, institutional structures), (iii) as well as the ways with which social groups of men and women act to transform their own existing roles, relationships and processes in their own interest” (MFF, 2018). The analysis talks about the following domains of gender in water governance, which can guide identifying constraints for gender equality and help set strategies to overcome them.

1. Access and control water related resources, which creates differential income and livelihood opportunities for different genders;
2. Gender roles and responsibilities, as practiced in the society in general;
3. Participation and decision-making scopes for different genders in water governance;
4. Cultural norms, beliefs and perceptions that create underlying social construct;
5. The legal and institutional framework related with water governance;
6. Power is considered a cross-cutting theme that influences the five domains from above and within.

5.2.3.2 Access and Control over Water Resources and Services

The research participants have reported their dependence or association with the following resources: (i) drinking water; (ii) water for bathing and household chores; (iii) water for irrigation; (iv) non-saline water for fisheries; and (v) water management system.

They have also reported to the following services associated with water governance that are important to them: (i) protection from salinity intrusion; (ii) natural disaster management; (iii) approaches to ensure safe water for regular life.

Based on the opinion of the participants the following table mentions the access and control over the water related resources and services emphasising on gender perspectives which has been done focusing on Harvard Analytical Framework:

	Men			Women		
	Privileged	Marginal	Minority	Privileged	Marginal	Minority
Access						
Drinking Water	High	High	Low	High	Low	Low
Irrigation water	High	High	Low	High	Low	Low
Water for other domestic use	High	High	Low	High	Low	Low

Fish	High	High	Low	Low	Low	Low
Protection from cyclone and salinity	High	High	Low	High	Low	Low
Control						
Drinking Water	High	Low	Low	High	Nil	Nil
Irrigation water	High	Low	Low	Low	Nil	Nil
Water for other domestic use	High	Low	Low	High	Low	Nil
Fish	High	Low	Low	Low	Nil	Nil
Protection from cyclone and salinity	High	Low	Nil	Low	Nil	Nil

Table 10: Access-Control profile for water related resources and services

The Harvard Analytical Framework has been used to analyze the gender status including human condition and social position in the study area. It is often referred to as the Gender Roles Framework or Gender Analysis Framework. Published in 1985, it is one of the first frameworks designed for gender analysis. It was developed by the researchers at the Harvard Institute for International Development in the USA, working in collaboration with the WID office of USAID, at a time when the 'efficiency approach' to integrating women in development work was gaining prominence in development circles. This framework was designed to demonstrate that there is an economic case for allocating resources to women as well as men. The framework aims to help people to design more efficient approach and improve the overall condition of the community. It is done by mapping the work and resources of men and women in a community and highlighting the main differences.

In the above analysis it is evident that, for accessing to water related resources privileged men and women both have “High” possibilities except fishing for women. Marginalized group of men also have “High” access to the resources whereas marginalized women have “Low” access to the resources. For minority group of people both of them have low access. Whereas the scenario is completely different in terms of control. To control the water resources privileged men have “High” control, it gets “Low” for marginalized group of men and the minority except to control over protection from cyclone and salinity. But for women, privileged group has less control over resources except drinking water and water uses for domestic purpose. And both the marginalized and minority group of people score “Nil” except water uses for domestic purpose, when it comes to control over water resources.

In rural Bangladesh, domestic water collection and management is predominantly undertaken by women and girls, who spend a considerable amount of time and energy under various conditions

on a daily basis collecting drinking water for their families. It is rare for men to participate in domestic water collection. Certain notions of masculinity and femininity are associated with who does what types of tasks with water: men predominantly undertake irrigation and agricultural water management, while women generally are responsible for domestic water issues. Such socio-culturally defined gender roles are generally not challenged in the broader gender division of labor, even during the present salinity-related drinking water crisis. The workload of women and girls has worsened due to salinity, as greater time, distance and energy is involved in availing safe water. However, while poorer women fetch their own water, wealthier women are able to employ others to fetch water for them; similarly, more senior women in households generally enroll younger daughters-in-law and daughters to fetch water. Most households try to switch to a safe well in order to avoid saline water (often to tube-wells of their neighbors or kin, or from public tube-wells in bazaars, mosques and schools). More poor households are forced to make this switch compared to better-off households; this is largely a result of the fact that wealthier households have greater access to their own (more expensive) deep tube-wells that tap into deeper aquifers that are mostly saline free, while poorer households generally use more affordable shallow tube-wells that are largely saline-contaminated. Contaminated tube-wells meant that people who had hitherto benefited from easy access to potable water via installing a tube-well were now facing the immediate challenge of having to avail safe water from elsewhere. For households that never had their own tube-well to begin with, it often meant having to switch to another nearby safe well or some other safe source. In such waterscapes, women have to negotiate their access to safe water, often on a daily basis; such survival tactics can range from having to maintain a good relationship with or be related to the owner/manager of a water source, give free labor, help clean the area or pay an occasional fee. The physical labor of gendered hardship in water procurement is compounded by social issues such as the need to negotiate access to water sources, a sense of humiliation in having to use someone else's water source, enduring insults and arguments at water points and a sense of loss of dignity and self-worth. Many women complained about such issues, as well as issues of gendered spaces in accessing water sources that may be far away or in public areas that are overwhelmingly masculine spaces. Problems of collecting water in the dark when the source is outside the homestead, as well as a sense of social insecurity in traveling longer distances, mark the concerns that women and girls have in dealing with the water crisis. This is more so for younger daughters-in-law and unmarried teenage girls, whose mobility in public areas is often of concern to their families (especially male members who worry about safety and family honor). In some instances, women face restrictions from their own family members in venturing too far to get safe water and are thereby forced to

resign themselves to fetching unsafe water for their families. In general, people are willing to share water in moments of crisis, as long as it does not impinge on their needs or the needs of their families. But this varies across people and places. Many are concerned that the safe water might run out if too many people take water from the same source, that owners of safer wells bear the costs of their operation and maintenance while others take water for free, that the owner's courtyard is always crowded and gets very muddy during the rainy season from footprints, that their privacy is affected and that too many people coming to get water creates tensions and arguments that affect everyone in the vicinity. Thus, the salinity has created an environment where social tensions can easily erupt at water sources, whether pre-existing or as a product of water sharing. People can thus play politics over water by leveraging access to and use of water to exercise authority over others. As a result, water comes to have material and symbolic power in a landscape where safe water is accessible through appropriate technology.

5.2.3.3 Access and Control over Benefits

From the Focused Group Discussion (FGD) the respondents reported that around 50% of men have fishing cards whether the percentage of farmer's card is 35%. All the cards belong to men and women do not have any access to these cards if their household head is male. Women are working in agricultural field, fishing ponds, shrimp ghers like men. But they cannot get any sorts of benefits although the male members of the family spend 3-5 months outside village for other occupation. At that time women need to bear all the expenses of their household as well as get engaged in all sorts of economic activities like farming, fishing, shrimp cultivation etc. From the KII with the Assistant Agriculture Officer it was mentioned that, following methods are used to offer the cards to the community people and they are:

1. Landless family (0-0.2 hector)
2. Marginal farmer (0.02-0.2 hector)
3. Small farmer (0.2-1 hector)
4. Medium Farmer (1.5-above)

The card is always offered to one member in one family. So, it is always men who own the card and receive different trainings from the government. Like the subsidy and safety-net system there are so many issues where women are getting behind from men in order to benefits and opportunities from the society. There was another Access and Control Profile conducted during

the FGDs with the participants which is not only related to water but also related to other materialistic resources and services to get to know about women's position into the system. And the table followed by Harvard Analytical Framework regarding the access and control over benefits and resources is given below:

Access and Control Profile (A= Access and C= Control)								
Resources			Benefits			Power		
	Female	Male		Female	Male		Female	Male
Land	A	A/C	Mobility	A	A/C	Political	A	A/C
Money	A	A/C	Participation	A	A/C	Educational	A	A/C
Home	A	A/C	Income (Home)	A/C	A/C	Institutional	A	A/C
Platform	A	A/C	Income (Outside)	A	A/C	Fundamentalism	A	A/C
Vehicle	A	A/C	Labor and Work	A	A/C	Social	A	A/C
Equipment		A/C	Basic need	A	A/C	Cultural	A	A/C
Domestic Animal	A/C	A/C	Asset ownership	A (-)	A/C	Ethnic leadership	A	A/C
Skill	A	A/C	Safety net support	A	A/C	Family	A	A/C
Training	A	A/C	Law and security	A	A/C	Individual power (Asset, Knowledge, Education, Experience, Skill)	A	A/C
Labor	A	A/C	Market access	A	A/C	Health and Nutrition	A	A/C
Technology (Mobile, TV, Radio)	A (-)	A/C	Respect and honor	A	A/C	Body	A	A/C
Credit	A	A/C	Decision making	A	A/C	Economic	A	A/C
River/Pond	A (-)	A/C	Credit Program	A	A/C			
Knowledge (Formal/Non-Formal)	A (-)	A/C	Government Program	A	A/C			
Information	A (-)	A/C						
Paid Work	A	A/C						

Table 11: Access and Control profile over Benefits

From the above table it is clearly showed that, almost all the economic, community and social work men have access to get involved whether in case of control privileged group of men have most of the access where the marginalized group of men also suffer from no control. But for women most of the cases it is only access as they have huge limitation to control over these resources irrespective any classes including privileged or marginalized. Some of the cases like access and control over river/pond or any type of water-bodies knowledge, information, asset ownership women belongs to (-) negative or less as a result. Throughout the discussion the following details were revealed:

- Women and men both owned and inherited land, although women only owned 32% of all productive land
- Wealthier farmers can obtain credit and most of them have access to machinery for weeding and threshing
- Women's earnings traditionally come from making home products and laboring in the other crop field
- There are few opportunities of women to be skilled and to get employed
- Women traditionally do not benefit as much as men from credit and extension programs for farmers

5.2.3.4 Roles and Responsibilities between Men and Women

From this disaggregation of the social relations to water, it is clear that material inequalities influence water security and deprivation through a range of processes operating at different social levels. These processes include property relations, inequalities of income, state provision, rules of access to common social property, and social status. Conditions of access to water for many poor households constrain both health and livelihood. Poor households generally get access to unsafe water, and their access may also be insufficient to sustain potential livelihoods, for example irrigated agriculture. A recent review of participatory poverty assessments has concluded that better water supplies were consistently perceived by the poor as a high priority. There is thus increasing discourse on ensuring water security for poorer households as an integral part of poverty eradication measures (Barker and van Koppen 1999).

Gender relations influence the social relations of access to water in at least three ways. Firstly, there are, in all societies, gender-based divisions of work. As in many societies, women have primary responsibility for organizing and undertaking domestic work. This work includes a range

of activities: maintaining daily life (cooking, cleaning, washing clothes), managing the health of the household, caring for and raising the children. So, where household access to water requires significant input of work-time, this work is frequently done by the women and children of a household. Women tend to work longer hours than men do in many societies. The work involved in gaining access to water may then lead to difficult choices. Access to higher quality water might have to be forgone, for example, in order that children in the household can be kept safe or other household chores completed on time. Secondly, the overwhelming majority of productive assets, that is, land, factories, and finance, are owned or controlled by men. This means that those forms of access to water which involve ownership of property, tend to be dominated by men. Women also generally experience disadvantaged access to markets, including markets for water. In addition, decision making in state bureaus, and in communal institutions, tends to be dominated by men. There are thus reasons to believe that decision-making is male dominated in all the spheres of social access to water. Thirdly, policy discourse and local norms may situate economic uses of water in a male domain and domestic uses in a female domain. Then, the subordination of women, giving men as a group more social and economic power, may influence priorities for public investment and collective decision-making in water. Uses of water identified with men, such as irrigation, may then be better represented and more knowledgeably discussed in societal forums at all levels, than uses of water identified with women, such as drinking, cooking and washing.

During the FGD there was an analysis conducted to have an overview about the roles and responsibilities carried out by women and men emphasizing on three roles (reproductive, productive, and community role) of women in the society following the Harvard Analytical Framework.

Activity Profile					
Productive Activities		Male Child	Male Adult	Female Child	Female Adult
Agriculture	Land Cultivation		✓		
	Irrigation		✓		
	Seed Sowing		✓		✓
	Seed Plantation		✓		✓
	Using Fertilizer		✓		✓
	Nursing			✓	✓
	Buying seed, fertilizer and medicine		✓		

	Harvesting		✓	✓
	Threshing		✓	✓
	Boiling			✓
	Drying			✓
	Storage			✓
	Packaging		✓	✓
	Marketing		✓	
	Market price valuation		✓	
	Communication with seller		✓	
	Selling		✓	
	Seed storing			✓
Income Generating	Sewing (Home)			✓
	Livestock Rearing (In)	✓		✓
	Crab cultivation		✓ (+)	✓ (-)
	Pisciculture		✓	
	Fisheries		✓	✓ (-)
	Carp		✓	✓
	Carp cultivation		✓	
	Making bag		✓ (-)	✓
	Small Business (Grocery)		✓	✓
	Hotel business		✓	
	Cook of a hotel			✓
	Tea stall	✓	✓	✓ (-)
	Business of milk		✓	✓
	Confectionery		✓	✓
	Handicrafts			✓
	Service (Office)		✓	✓ (-)
	Wage labor		✓	✓
	Contract work		✓	✓
	Garments		✓ (-)	✓
	Business/shop in the local market		✓	✓ (-)

Broker		✓		
Marketing of product		✓		✓ (-)
Reproductive Activities	Male Child	Male Adult	Female Child	Female Adult
Collecting water and supply			✓	✓
Cooking			✓	✓
Collecting firewood		✓ (-)	✓	✓
Child rearing				✓
Nursing of older			✓	✓
Health care		✓ (-)		✓
Shopping		✓		✓
Giving birth of child				✓
Brest feeding				✓
Buying necessary products for home		✓		✓ (-)
Cleaning (Home)				✓
Washing cloths				✓
Cleaning furniture			✓	✓
Room/home washed with mud				✓
Nursing of livestock	✓		✓	✓
Food serving and storing				✓
Hospitality		✓ (-)	✓	✓
Community Activities	Male Child	Male Adult	Female Child	Female Adult
Participation in Social Program (Marriage, Death)		✓		✓ (-)
Participation in Religious program		✓		✓ (-)
Participation in local justice activities		✓		✓ (-)
Participation in election		✓		✓ (-)
Participation in social development		✓		✓ (-)
Giving vote during election		✓		✓
Participation in different associations/ meetings/groups		✓		✓ (-)

Table 12: Analysis of Roles and Responsibilities of Men and Women

In the above table (+) shows about *MORE* contribution and (-) indicates *LESS* contribution of men and women in roles and responsibilities. Here it is evident that, both in agricultural and income generating activities women have contribution like men but due to lack of linkage with the market their income is less in compare to men though they are working hard in these sectors and their contribution is equally important and visible. In reproductive roles men's contribution is hardly found whereas it is considered as the prime job for a woman that has no link with the economy. And also, for the community role men are more visible in any type of decision-making process whereas women are less visible. However, it is evident that, the work burden is two/three times more for a woman in compare to man though they do not have any access and control over resources.

In Bangladesh, women are the main managers of water for domestic purposes (drinking, washing, cleaning, bathing, and cooking) as well as for some subsistence production in homestead gardening or raising of poultry and goats. In coastal areas, where there is no municipal network for water provision, water is procured from diverse sources, including tube-wells, ponds, canals, ditches, and rivers. Women use water from different sources depending on availability, proximity and purpose of use. Thus, the water supply system in rural Bangladesh is not a fixed system, but a set of water sources about which choices are made, and negotiated, often on a daily basis. Drinking water is mainly obtained from nearby PSF, supply water and bottle water, whether one-dram water costs (20 litter) 25-30 BDT daily which is used by 27% of the community who are well off. Access to tube-wells depends on whether it is privately owned or publicly owned. Thus, access to and control over water is differentiated by class in rural Bangladesh; wealthier women have better access to cleaner water than poorer women. Access to water is also differentiated by location, since those households nearer a functioning water infrastructure are likely to use groundwater more often. However, any sort of water source has to be shared among different users. Tube-wells available in public places such as schools, mosques, and bazaars often provide the only source of clean and safe water for rural households that do not have private tube-wells. But these are often broken or inadequately maintained, forcing many to depend on good relations with wealthier households to access private tube-wells for water.

Overwhelmingly, proximity dictates the source and use of the water, particularly for poorer and female-headed households. Several trips must be made each day to the nearest water source or surface water body to meet water needs. The distance to be covered can range from a few yards to several hundred yards. Women and girls may walk two to five hours each day to fetch water,

making several trips each day. The need to maintain a long queue to collect water which also takes away 2-5 hours at a regular basis. Because drinking water is constructed as a domestic responsibility in the female domain, the education of young women may be adversely affected. Often, daughters-in-law or younger women are sweater to fetch water, because this is seen as a more menial task by more powerful women in a household. The burden of carrying traditional water pitchers (Kolshi) on the hip can cause difficulty during pregnancy and deformity in posture. In instances where a long walk is required to reach the nearest functioning water source, many families are forced to use closer saline surface water. Homestead ponds and canals are often the nearest source of water. But these sources are for used for aquaculture, washing clothes and utensils, bathing, washing domestic animals, and even a place to throw domestic waste. These multiple uses can all contribute to pollution of the surface water source, making it unfit for consumption. Water purification of polluted water is generally undertaken through filtering, boiling, and using water purifying tablets, or through a range of indigenous purification strategies. The ability to purify surface water requires money and time and is often practiced by more affluent households. This has consequences for health that thus vary by class.

5.2.3.5 Households washing and bathing water source which is mainly carried out by women

Washing mainly indicates both cloth and kitchen utensil washing. From the study it was found that at present most of the households (80%) were used general pond water for washing while 10% used tube-well water and 3% river water. It was clear from the (figure 10) that all the households were used same water source for washing purpose for many years. The coastal peoples bathing water source were same before & after Aila/Sidr.

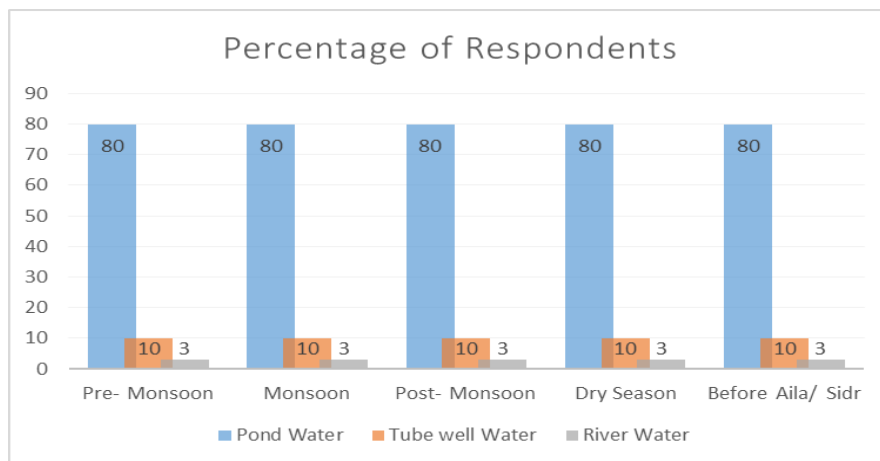


Figure 10: Performance of different water supply options for domestic purpose in different times

5.2.3.6 Women involved in drinking water collection and its purification technique

In Bangladesh perspective majority women (80%) involved in drinking water collection while daughter involved 10%. This result represents that in most of the cases women were related with water hygiene. Only 7% of male involved with drinking water collection from distance sources (figure 11). As women involved in water handling, so proper training for women can reduce water bone disease. Water purification reduces the possibility of water bone disease transmission. Water purification system was very much poor in the study area. Most of the people directly consume water from sources (65%), filter 5%, Boiling 8%, Fetkeri 18% others 4% (figure 12).

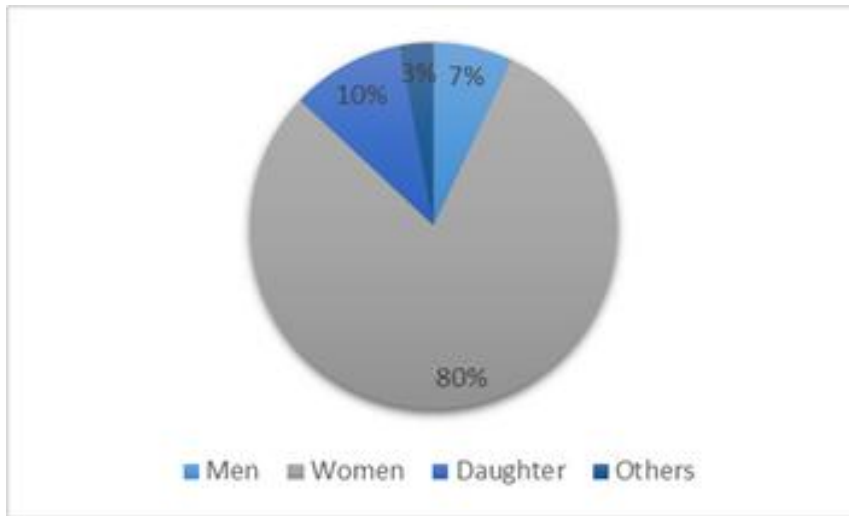


Figure 11: Person involved in drinking water collection in coastal region

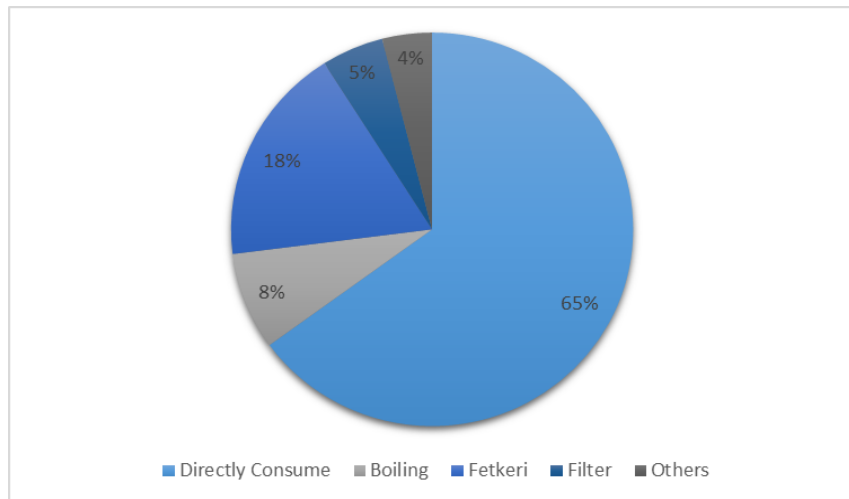


Figure 12: Drinking water purification materials used by coastal people

Rights of access to surface water sources and decision-making about those sources, may be unclear and may vary from one village to another. Conflict over ownership and use of ponds are sometimes reported. Over time, the use of ponds and tanks for aquaculture, and the assertion of private property rights, may further constrain the access of poor households, and increase the work of the women in those households. Increasingly, shrinking surface water sources in general have started to pose problems, as more and more water-bodies are landfilled or dry up, as well as get converted for other economic activities, with increasing population growth, all of which have gendered implications that are often overlooked. In sum, there are material and gender inequalities in access to water for drinking and cooking water. Access to drinking water is primarily through ownership and common property modes. Market access, in the form of bottled water, has started in Bangladesh in the last few years, but is not widely available in rural areas and is expensive. State backed provision in rural areas has been limited to the provision of village fresh water sources which, as noted, are often inoperable.

5.2.4 Women in Saline Prone Agricultural System in Coastal Area of Bangladesh

The coastal zone is extremely vulnerable to a number of rapid and slow-onset events that affect rice production and related livelihoods. Currently, cyclones accompanied by storm surge and increased salinity intrusion into fresh water and soils are the most catastrophic phenomena for coastal communities, especially in Satkhira, a vulnerable coastal district. At least nine major cyclones have hit the coast in the last 50 years. But in the last decade, the number of cyclonic events from the Bay of Bengal has increased. Cyclone Sidr in 2007, cyclones Nargis and Reshmi in 2008 and cyclone Aila in 2009 caused huge damage in Bangladesh and Myanmar. The government of Bangladesh estimates that the total cost of damage from cyclone Sidr was US\$1.6 billion (DMB, 2010). Cyclone Sidr killed more than 3,000 people; it also directly affected about five million families and crops of about 0.7 million hectares (Rabbani et al, 2010; DMB, 2010). According to the Bangladesh Bureau of Statistics (BBS), cyclone Sidr caused damage to more than 0.1 million tons of rice crop in Khulna (one of the most affected 12 coastal districts) (BBS, 2009). Cyclone and storm surges induced by climate change force saline water into agricultural lands along the coast, which damages crops not only in the year the cyclone hits, but for several years afterwards. This has also happened in the area that was studied for the present research, Shyamnagar upazilla in Satkhira zilla. Saline water intrusion caused by cyclone Aila in 2009 led to loss and damage to rice crops in many villages in the area. Some recent studies indicate that salinity intrusion in both soil and water might increase further because of escalating intensity of

cyclone and storm surge (Ministry of Environment and Forests, 2005; Rabbani et al., 2010; SRDI, 2010)

5.2.4.1 History and trend of rice production and salinity

(Islam, 2004) states that many coastal districts, including Satkhira, are facing increased levels of salinity in agricultural fields. A recent report shows that more than 1 million hectares of arable land in Bangladesh are affected by salinity intrusion caused by slow and rapid-onset events (SRDI, 2010). It also points out that 71% of cultivated areas in Shyamnagar upazilla are affected by high-level salinity (above 12 ds/m). According to the BBS, the net cultivated area in Satkhira decreased by about 7% from 1996 to 2008 (BBS, 2008). It was found that immediately after cyclone Aila, total rice production in Satkhira decreased from 0.53 million tons in 2008 to 0.46 million tons in 2009 (BBS, 2009, 2010). The report also indicates that production of the principal rice crop (Aman rice) in Satkhira decreased substantially, from about 0.3 million tons in 2008 to 0.2 million tons in 2010.

The Ministry of Environment and Forests (2005) predicts that a sea level rise (SLR) of 14 cm, 32 cm and 88 cm will affect Bangladesh by 2030, 2050 and 2100 respectively. The predicted SLR is expected to push saline water further inland and affect not only rice production but also all other agricultural practices in the future. A recent estimate is that the country may lose 0.2 million tons of crops to saline intrusion in a moderate climate scenario, but that this might be more than double in a severe climate scenario (Huq and Ayers, 2008).

5.2.4.2 Community perception of salinity levels in rice fields

Focus group participants and questionnaire survey respondents claim that salinity intrusion has increased sharply over the last decade and particularly over the past six years (figure 13). Current high salinity in rice fields is caused to a large extent by cyclone Aila, which hit the area in 2009. In 2018, when the fieldwork took place, more than 80% of farming households experienced high salinity in rice fields, compared to 2% and 17% sixteen and six years ago respectively (figure 13). The proportion of salinity-free farmland has gone down over the past 26 years, from more than 60% to nil. Almost all saline-free and low-salinity farmland has turned into medium- or high-salinity farmland, which has a severe impact on agricultural productivity.

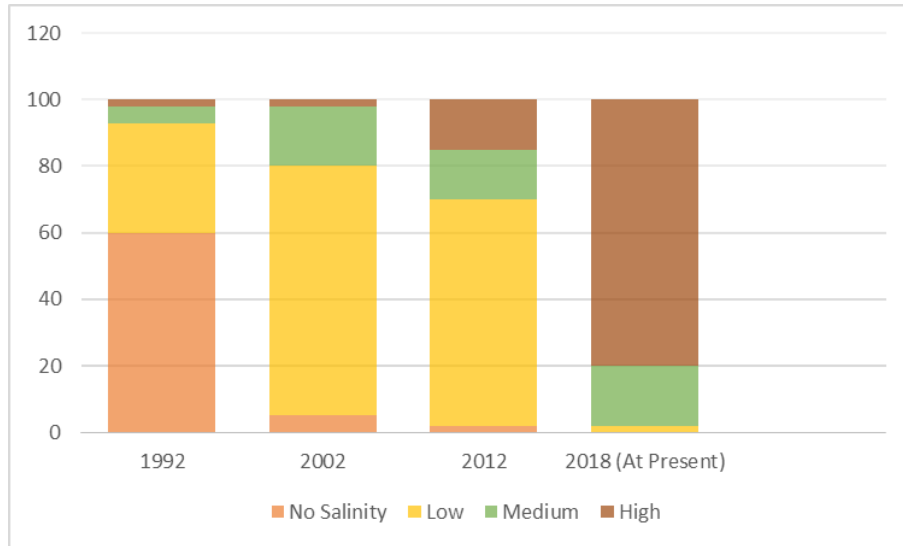


Figure 13: Respondents' perceptions of trend of salinity during last 26 years in the study area, by percentage

Currently village Borokupat is the most adversely affected village, as noted by more than 90% of respondents; salinity level has increased from 35% to over 90% in this village in the last five years. Farmers in the study village mainly cultivate Aman rice varieties, which grow between April and August. In the past 26 years, the pattern of Aman production in Atulia union has been quite irregular. The total Aman production was more than 8,500 tons between 1993 and 1997 but was less than 8,000 tons from 1998 to 2006, except in 2002 when it was 8,460 tons. In 2016, the production of Aman was about 5,200 tons. Since then, it has decreased substantially by 55% in 2018 in the study area.

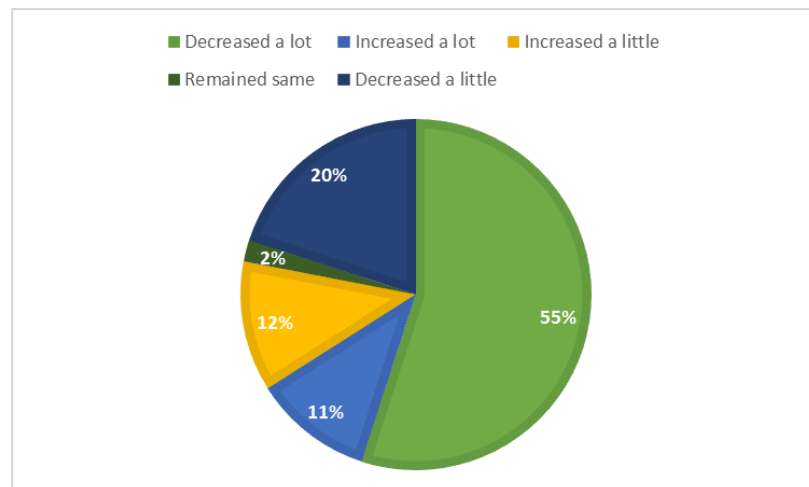


Figure 14: Change in rice production in the study area over the last 20 years

Figure 14 shows that, during the Focused Group Discussion with the rice farmers, they mentioned the changes of rice production gradually due to high salinity after Aila. About 20% of farmers in the study village believed rice production has decreased over the years. More than half of the respondents (55%) mentioned that rice production had ‘decreased a lot’ over the last 26 years.

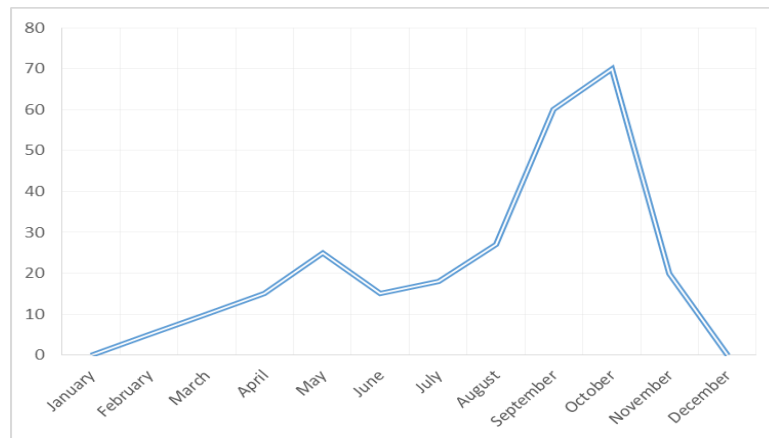


Figure 15: Percentage of respondents facing food crisis during different months of the year

Changes in rice production cause food crises in the study village. A majority (70%) of the study households were found to be facing a food crisis at some time of the year. Figure 15 shows that the study population faces a food crisis that varies from month to month, with peaks in September and October. These are the later months of the monsoon, just before the harvesting of Aman rice. During the winter months (December to February) study households experience less food shortages. The study finds that households in Borokupat village experience slightly more food shortages compared to the other villages in Atulia Union due to constant threat of natural disaster and salinity intrusion.

In group discussions and interviews, participants explained that the impacts of salinity intrusion affect men and women differently, mainly because of the level of exposure and different roles men and women play in the household. For example, one male respondent said, *“I am losing rice and vegetable production due to salinity intrusion in the agricultural fields, which is directly affecting my income”*, while a woman respondent reported, *“I have to walk at least 1.5 km every day, especially during pre-monsoon (March-April-May) and winter (December-January-February) season, to collect water for drinking from the nearest pond/PSF (pond sand filter) in which the salinity tastes low.”*

5.2.4.3 Salinity intrusion is the main cause of declining rice production in the study area

Figure 14 showed that 75% of respondents reported declining rice production. Figure 16 indicates the main reasons given for declining rice production. Most respondents (98%) identified salinity intrusion as the main cause of declining rice production, followed by lack of rainfall (73%). Other factors mentioned included excessive rainfall in short periods of time (41%), pest attack (18%), not having fertilizer at the right time (8%), water logging (4%), high cost of cultivation, and lack of irrigation water. The group of 23% who reported increasing rice production consisted mainly of relatively rich farmers who were able to invest in improved technology, fertilizers, improved seeds and others external inputs. Other farmers who were able to increase rice production had land with low salinity, sufficient fresh water for irrigation, and access to saline-tolerant rice varieties. All the farmers strongly believed that salinity intrusion in soil and water is the main challenge to rice farming in the study area.

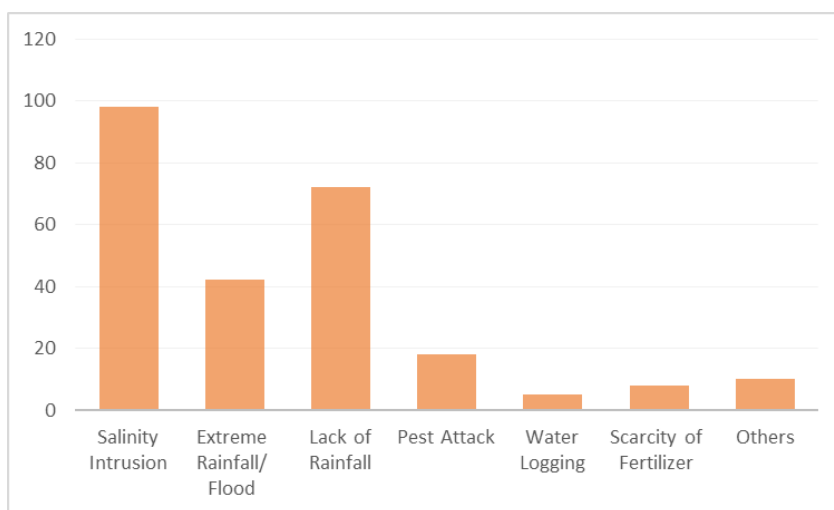


Figure 16: Percentage of respondents on causes of reduction in rice production

5.2.4.4 Using of Non-Agricultural Adaptation Technology

To get rid of the vulnerability in rice production, villagers are getting more involved in non-agricultural economic opportunity. The study indicates that more than 78% households take out loans, reduce household expenses and change eating habits to cope with the impact of salinity on rice production. Figure 17 shows that 72% of households try to earn more to overcome the crisis situation, while about 40% migrate to find work elsewhere. Many male members of the households studied migrate temporarily to work, either to the nearest district or to Dhaka, the

capital city. Some households have migrated permanently, as confirmed during focus group discussions and interviews. In Borokupat village, non-field adaptation measures are very prominent compared to practices in other villages. 33% are switching to non-farm activities whereas 43% are cutting their household expenditure. About 92% people are trying to change their eating habits to cope with the salinity (figure 17).

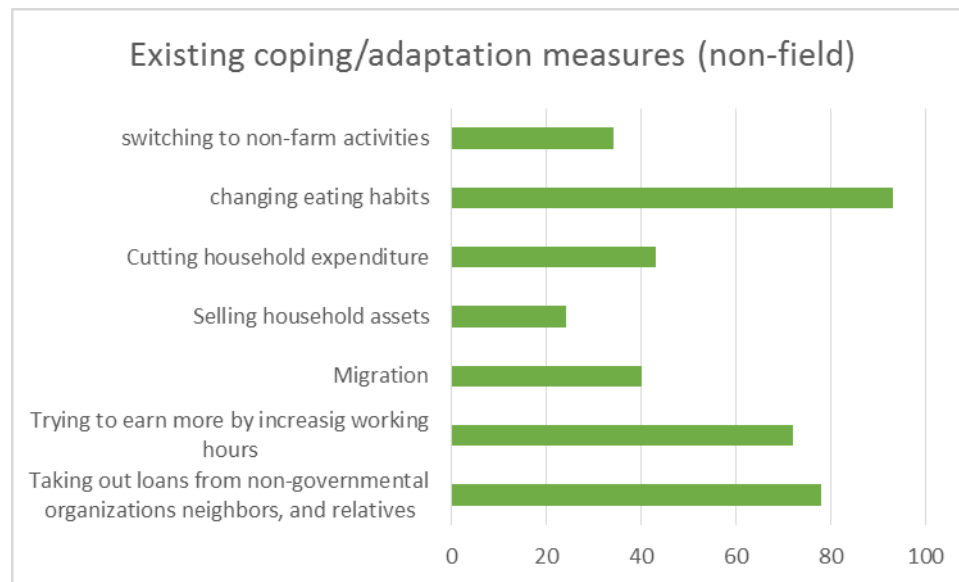


Figure 17: Existing coping/adaptation measures (non-field) to deal with overall impact of salinity intrusion on rice production in the study area in Borokupat village, Shyamnagar, Satkhira

5.2.4.5 Contribution of women in agricultural work in Borokupat village

Keeping the above analysis as backdrop, this section highlights the contribution of women in agricultural work in Borokupat village, emphasizing on the salinity intrusion as a hinder of their contribution in overall agricultural work. In recent times more women in coastal area are engaged in agricultural work. Especially when men are migrant to earn through non-field work at that time women are involved in field-based rice production work as well. Women, who so long remained within the four walls of their houses, can successfully be given incentives to grow non-rice foods also including pulses, oils, beans, and wheat. The demand for these has been growing fast with economic prosperity. On the other hand, the country must reduce the growing import dependence of non-rice foods to insulate the domestic market from the volatility of the world market.

Happily, women are already heavily engaged in homestead-based vegetable and fruit production, and subsistence-based poultry and animal farming. But then women farmers lack easy access to

knowledge of improved technology and disease management, supply of quality seeds, and access to finance on easy terms. The saddest part of the story is that women preserve seeds, sow them, water the fields and take care of plants. Yet they have no right to proceeds of the crop sales. The crop field is owned by their husbands or fathers-in-law and the money to buy the seeds is sent by their husbands who get all the sale proceeds. These are the daily challenges being faced by women farmers in pursuing their livelihoods.

In coastal area as the water scarcity is high therefore, women face some extra challenges in getting irrigation water and sufficient water to produce vegetables in the homestead. The rise of tube-wells, PSF, protected ponds, and water markets to distribute the entire water sources have been associated with increasing male control over water. New technologies involve new property rights, usually defined as the rights of men. Agarwal (1994) has made a powerful argument that male control of property, particularly land, is one way in which women are subordinated. Several NGOs have promoted the formation of poor women's groups for agriculture in coastal area of Bangladesh. The general trend is male domination in agricultural schemes and water selling markets "leading to less control over the incomes from such water assets" by women (Jordans and Zwarteveen, 1997). At the same time, households with no land rights have no direct water rights either. Land rights, in a country like Bangladesh, with a significant percentage of the rural population landless, establish water rights. The development of irrigation has consolidated men's power over production and has given a new productive asset, irrigation water, to those with land and pumps.

Field observation suggests that, almost all rural households have household gardening that are worked and managed by women. In coastal Bangladesh, household gardening is watered and maintained by women and provide significant contributions to nutrition and household food security. These water uses and needs have not been included in current water resource schemes.

Irrigation pump water is generally used for field crop production. Those aspects of production which are managed by women, fruit and vegetable production and the rearing of livestock, do not have government-backed irrigation support. In sum, the expansion of irrigation has been through ownership and market of access, tending to favor richer households and to enhance men's control of water. There have been some counter initiatives to give control of pumps to the landless and to women, but they remain small in scale and of uncertain efficacy. The importance of women's productive activities, livestock and homestead gardens, has generally been overlooked in state schemes, and the provision of water from private irrigation sources is not known.

With no access to agricultural loan or government-issued farmer's card, which helps access agricultural inputs, most women farmers in Bangladesh are forced to depend on their husbands' money for their agricultural ventures. On the other hand, there is still no agency to give training on crops, cultivation and farming as the most essential requirement for women farmers.

Market access is the other major challenge that women farmers face. Other pressing needs also include recognizing women's contribution to agriculture and food security, ensuring subsidy for women farmers and introduction of family agricultural cards and ensuring women's right to property. Although Bangladesh's agriculture sector is becoming increasingly dependent on women's participation, women do not get institutional recognition as farmers, let alone own farmlands. Due to patriarchal and discriminatory social structure, women have little or no control over harvest.

Women's participation in income-generating activities like dairy farming in coastal areas is growing, ensuring countrywide supply of milk, a primary source of nutrition. However, their roles apparently remain behind the scene as men usually deal with clients in most cases. Though men are doing the financial transactions, female members of those farm families play the key role in dairy farming. The Bangladesh Bureau of Statistics has brought to the fore the state of women in farming. They own only 18 per cent land in the country while 81 per cent is owned by men. According to BBS, village women spend 53 per cent time of the day in farming earning 61 per cent of the GDP from agriculture. But then one in three women in Bangladesh suffers from malnutrition. A landless woman farmer during the group discussion mentioned disappointedly, *"We work in the fields more than men do, but we do not get any incentive from the government or banks as farmers."* Women farmers are deprived of all government initiatives for farmers' welfare.

Apart from water crisis, lack of High Yielding Variety (HYV), salty water and lack of occupation another topmost problem for women in agriculture is to bring water from a distant place. As they are not facilitated by men in doing this. Fetching water is considered as one of women's work. Therefore, they need to walk at least 2-3 km a day to bring the water for household chores, homestead gardening, livestock rearing, and poultry that makes women overburdened in their regular life. As men are engaged in non-agriculture work or migrated from the village in 2-3 months in a year, and women need to get engaged directly in the agriculture work therefore, it is also an important factor to earn money from the agricultural work. In a patriarchal society like Bangladesh, due to lack of linkage with the market though women are engaged in productive

work like agriculture, but they do not earn from this type of work. Always it is men who goes to the market, sell the product and keep the money into their pockets. All the respondents shared in the FGD that vegetables are highly damaged as well as domestic animals do not live for a long time due to high salinity in water. As a result, rearing domestic animals are drastically decreased that is also decreasing women's income. Apart from that, there is no government policy or plan for the marginalized group of people especially vulnerable to saline water in the coastal area to get rid of this situation.

Wage discrimination between men and women is another important factor that was mentioned by all the respondents. In agricultural land men get 250-300 BDT and women get 170 BDT per day as a day labor. However, women can earn at least 200-1000 BDT for selling the own growing vegetables. But the group unanimously shared that, women get at least 100 BDT less than a male labor in a day as wage. 45% women shared that they sometimes get criticized by the male labor. And about 10% women labor reported, they have been sexually harassed by the male labor in doing agricultural work in the field. During the group discussion, around 70% participants shared they don't have personal land for agricultural production. 90% male added that, they work outside the village for at least two-three months and they can earn more money to work outside village which is around 10000 to 12000 BDT in a month.

In reply to the question of the reasons to go outside from village for a particular time most of the respondents replied the problems of salinity, lack of resilience HYV, lack of fertilizer, high price of fertilizer, and various diseases in the agricultural land are the main reasons for not having any work in a particular time in the agricultural field in village.

During the KII with the Assistant Agriculture Officer it was discussed that, farmers can get "*Farmer's Card*" from the government and they offer training on fertilizer, newly introduced technologies, pest management, and crop preservation technique to the card users. But most of the time the card users are men. As per the policy one member from one household will get the farmer's card and most of the time it is men who are getting cards. Therefore, all the trainings are also received by men that deprive women to get information, knowledge, skill, and awareness though they are also engaged in the same work. And lack of information, knowledge, and awareness also play a vital role of women not being able to talk in the big meeting related to agriculture. Because they do not feel confident which is directly linked with their agency level. Though in recent day's government take initiatives to incorporate women farmers in training through implementing a few projects like Integrated Pests Management (IPM), Integrated Crop

Management (ICM) etc. but to reduce the discrimination between men and women there are many more projects or initiatives should come forward to work women’s challenges and vulnerabilities and to reduce the challenges in an equity approach. Providing agriculture related materials and incentives can play an important role for women to get engaged in agriculture activities as well as to increase their income.



Picture 7: Nilima Rani Mondol, 38, working as a day laborer in agricultural field in Borokupat village, Shyamnagar, Satkhira

5.2.5 Women in fisheries in coastal area of Bangladesh

According to the household survey, there were 88% people used river water in those firms’ crawfish was cultivated and 12% of people used pond water. At present 96% people used river water for crawfish cultivation and 4% pond water after Aila, and Sidr. From the study it was found 80% farmers used pond water for Shrimp and Lobster cultivation. At present 98% of people used pond water & 2% rain water for fish cultivation. Most of the respondents (97%) use general pond water in fish depots for fish and shrimp processing while only 3% use tube-well water. The percentage was same before Aila, and Sidr.

Sources of water	Present (%)	Past (%)
River water for crawfish	96	88
Pond water for crawfish	4	12
Pond water for shrimp and lobster	98	80

Table 13: Water sources of coastal people for fish cultivation

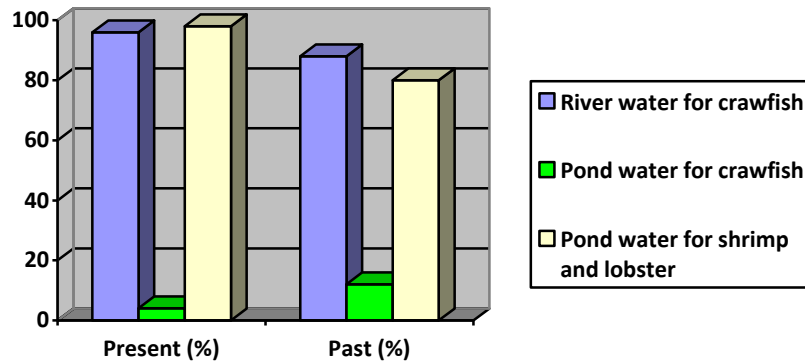


Figure 18: Water source used for fish cultivation in different times (Household Survey, 2018)

5.2.5.1 Gender dimension in shrimp cultivation

Shrimp culture is also an example of changes in water use with implications for gender and class relations arises from the shrimp export industry. The shrimp export industry has begun to flourish in the coastal areas of Bangladesh in the 1980s. Shrimp exports, mainly of the marine shrimp (*Penaeus monodon*, or black tiger shrimp), found a niche market in Japan, Western Europe, and the United States (Sultana 1998). Shrimp exports contributed 8-10% of total export earnings in recent years. Considerable tracts of land, particularly in the southwest, have been turned into saline ponds where shrimp are cultured, and increasing numbers of people are involved in the industry (Sultana 1998). In coastal areas, richer farmers forcibly take land from poorer people for shrimp farms, and often these shrimp farm owners are from outside the area (Khatoun, 1995). The rural poor then become laborers who collect wild shrimp larvae (or fry) from coastal rivers and marshes. In the southwest of Bangladesh, the Sundarban Mangrove Forest, the largest tract of mangroves in the world, is being threatened by the expansion of shrimp farming. Social tensions and ecological disruptions in such areas have been widely reported (Rahman 1994). However, gendered impacts of the rise of shrimp farming have not been adequately documented or addressed (Datta 1995; Khatoun 1995). As more and more families become laborers for the shrimp farms, increasing numbers of women and children are becoming shrimp collectors and shrimp processors.

Although this is being heralded as employment generation by the industry, the overall impacts of the industry on the lives and livelihoods of rural women are not considered. Shrimp ponds, which require saline water, are made by constructing canals that bring sea water to existing or newly dug ponds. Land previously used for rice cultivation and ponds used for washing and bathing are

taken over by shrimp farming. The extent of salinity in groundwater may also be increased by these changes. Women have farther to walk to collect drinking water when both ground and surface waters are made saline and polluted with chemicals by shrimp ponds. During the group discussion many women shrimp cultivators mentioned that, many of them face harassment on their way to collect water from shrimp-farm guards, who think women may steal the shrimp.

A decline in the diversity of women's income sources has been noted from the group discussion. Agriculture is shrinking in the coastal areas, reducing the diverse and varied tasks that women were engaged in before (e.g., weeding, harvesting, rice husking). They now spend most of the day in rivers and creeks to collect shrimp fry, often standing in waist-deep water, which has increased health problems (e.g., skin diseases) and also exposes them to the dangers of attacks from small sharks in the coastal rivers. Homestead production, both kitchen gardens and domestic livestock, is reduced as a result of the increased salinity of domestic water. Gathering of various livelihood resources from mangrove forests is reduced as the area of shrimp cultivation expands. Loss of mangrove areas and other public lands and water bodies as common pool resources appears to have had a greater impact on women than on men in coastal areas (Lopez-Rodriguez 1996; Dalta 1995). A decline in nutritional diversity is suspected as consumption of fish, poultry, fruits, and vegetables declines from falling survival rates of different species of plants and animals due to increased salinity in the area and conversion of large tracts of lands for shrimp ponds. Such realities adversely impact women's health, nutrition, workload, and livelihood strategies. It has also been reported from the discussion that there is migration of men out of shrimp farming areas due to a reduction in adequate employment to sustain their families; female-headed households are thus on the rise. The case of shrimp aquaculture illustrates the breadth of gender concerns when a new form of production changes access to land, water, and employment. Specifically, in relation to water, shrimp production has encroached upon common property access both to surface water and groundwater. As a result, access to water for drinking and bathing is constrained. Women's work in gaining access to water is thus increased, and the ability to sustain a range of livelihoods is reduced.



Picture 8: Saline water enters into Shrimp Gher and make salinity intrusion

5.2.5.2 Women employment in shrimp cultivation

Shrimp culture has created employment opportunity for rural women in coastal areas of Bangladesh. The emergence of commercial shrimp farming and the related backward and forward linkage activities has opened up new dimension for women's involvement in many of the activities. Apart from household works rural women got opportunity to be employed as wage laborer for collecting aquatic weeds and cleaning the shrimp farms. Shrimp processing factories and depots are the largest source of employment for women. The research respondents reported that women represented 73 percent of depot workers. They estimated that 65 percent of workers in the shrimp processing plants were women. Shrimp fry collection is also an important source of employment and income for rural women. Collection of shrimp fry by women in knee to shoulder deep water in the coastal belt is a familiar scene. About 55,000 coastal women are engaged in fry collection, constituting 36 percent of the fry collectors (Talukder, 1999).

Besides, a large number of women are engaged in collection of shrimp feed (e.g. snail) and artisanal production of fish trapping and packing materials. Shrimp farmers and other people in coastal areas are also benefited from the overall development of shrimp industry. Different stakeholders involved in shrimp industry reported that among all other development factors, expansions of shrimp farming played significant role in developing roads and communication, marketing system, social and economic institutions and in improving overall economic condition in the study areas. Again, life style and housing condition of related stakeholders have also been improved after expansion of shrimp farming. Thirty eight percent sample respondents reported that their investment capacity to other business increased and 59% viewed that the educational facilities for their children increased due to extra earning from shrimp farms. Moreover, benefits gained from coastal aquaculture operation are higher than any other agricultural activities

compared to land productivity. Thus, there is a growing interest of local people in coastal aquaculture.

5.2.5.3 Exploitation of women's labor in shrimp cultivation

Women in the shrimp production mainly get work as wage laborers, building the embankments around shrimp ponds, maintaining service roads and weeding in the shrimp fields. Women from Borokupat village reported during the group discussion that they have been working in the shrimp sector for the last 20 years. Women do various types of work related to shrimp production. Most women of the study area maintain their livelihood by collecting shrimp fry, preparing gher as day laborers, clearing the shaowla and working in the processing plant. It is mostly the poor women who are working in the shrimp sector.

During peak fry collection periods (locally known as Ghone), women spend the entire night collecting fries. Shrimp fry collection starts from the month of Boishakh (mid-April) and peaks from the month of Jaishtho (mid-May). This fry collection continues through the month of Bhadro (mid-September) when the numbers of fry collected start falling. The women spend early dawn hours or the late evening catching the shrimp fry from the rivers, canals, etc. During the full moon the fry availability increases, and collectors work any hours when they are available. The gher owners prefer women workers to male workers. It is because women could be paid less than the male workers and usually women never resist such exploitation. The labor requirements in the gher are to repair and reconstruct gher embankments, which require earth excavation and movement, clearing the weed and other aquatic plants from the water bodies, liming the gher water bodies, fish sorting, etc. The preparatory work begins from Choitro (mid-March) and Boishakh (mid-April) when the gher are prepared for stocking. Generally, women are engaged in the gher for five hours beginning at 7 am and extending till 1 pm. During the lean period, some of the women continue providing services to the gher, while others seek employment in homesteads, repairing homes, processing crops, or for domestic services. Some also seek work in the crop fields, road repair and development, canal excavation, etc.

5.2.5.4 Exploitation of Wages

The women in the study area reported that the wage rate for the gher preparation is too low to maintain their family expenses. The average wage rate for women per day is between 45–50 BDT. In all the activities related to shrimp production women receive lower wage compared to

their male counterparts. The participants drew attention to the fact that men get preferential treatment in terms of wages, although both men and women are engaged in similar type of activities. During the group discussion women reported that they receive 30-40 BDT per day for earth excavation in the gher, while their male counterparts receive 50-60 BDT per day. For cleaning and de-heading, they receive 25-30 BDT per day while their male counterparts receive 30-40 BDT per day.

Women continue to accept the low wage only to maintain their subsistence. There are several reasons for women receiving lower wages. These are as follows:

- The supply is more than the demand for women laborers; therefore, the employer takes the advantage of the situation and exploits women's labor.
- Absence of any other better alternative is compelling women to do such works with low wage.
- Paymaster claims that men work more than women.

The other form of exploitation women have to encounter is being subjected to bonded labor as evidenced by FGD reports. Poor men and women take loans in advance from local wealthy people. This system of taking loan is known as dadon. Majority of the poor families take dadon from the faria (local small-scale buyers of fries who later sell the fries to the market) during their crisis period. The pre-condition of such dadan giving is to sell the collected shrimp fry to the faria from whom dadon was taken. The farias exploit the poor families because they (farias) buy the shrimp fry for less than the market price. If the member of any family, who has taken dadon from faria, does not collect fry, the faria creates pressure on them to do so.

As women fry collectors sell their catch at shore or at home, they have to agree to whatever rate is offered. Men fry collectors on the other hand can travel to trading points/centers where they can compare rates of several purchasers and decide whom to sell to and at what rate. Women are forced to sell to the faria alone, who is the sole buyer, controlling the price to his advantage. The above finding is similar to the findings of many other developing countries (FAO, 1990) where marketing, supervision and management of fish production remain a male domain. Shrimp fries collection has attracted the women across classes. In the study area women from the affluent section is also catching fries. It has given them an additional source of income, which they enjoy for petty luxuries.

However, employment in shrimp production is seasonal, menial and poorly paid. The income of women workers from working in shrimp production has to be set against a reduced contribution of women's traditional unpaid work in agricultural activities and household production. With such a low-income women respondents mentioned that they cannot manage their family properly. In FGD with the women shrimp cultivators expressed that they did not consider their engagement in shrimp fry collection and ancillary services to be of significance in terms of improving their overall living conditions. The daily rearing barely covers for two meals. All other essential expenditure for their family's upkeep, for example clothes, medical treatment, etc. are left unattended because of poverty.

5.2.5.5 Burden on Women

Despite women's involvement in the shrimp sector women still do their routine household tasks and involvement in shrimp production has increased their total workload. Women reported that their workload at home has also been increased particularly due to the increasing shortage of drinking water and also to collect fuel wood and biomass. In FGD women participants mentioned that previously they used to spend an hour for the collection of fuel wood. These days fuel collection takes about two hours. Women mentioned that because of the heavy workload in shrimp farms women cannot do family work. If women fail to prepare meal on time their husbands usually beat them up.

5.2.5.6 Insecurity in shrimp related activities

The work environment is not free of problems. Women have to encounter some problems while working in the shrimp production. During shrimp fry collection from the river, especially young girls and women are harassed either physically or verbally. Women do not feel secured while collecting fry from the river especially in early hours of the morning. FGDs on the insecurity of women and children progressed with stimulated responses from participants. Some of the major points to which all participants agreed are summarized below:

- Insecurity of women has been on the increase.
- Although the apparent monetary benefit attracts the women and children to work in shrimp related activities, they work against the context of occupational risks, hazards as well as absence of social laws.

The women have no means to challenge these obstacles. According to the participants in FGD the rule of business is to accept this situation or majority of the respondents stated that harassment and violence against women is quite visible in the society, as elsewhere in the country. The main problems the women respondents identified are as follows:

- They were not allowed leave even if they fell sick.
- They were jeered at and verbally and physically harassed by male guards, managers and male youth inside the gher.
- They were fired from work if they arrived late for work.

Discussions conducted at various levels reveal that male agents like gher owners and gher guards sexually exploit women. There is instance where male trade agent takes advantage of women and makes sexual advances. A woman shrimp cultivator during the discussion mentioned that when she found that she was pregnant by a male agent in shrimp trade that particular man refused to marry her. When her family contacted him for marriage, he demanded dowry of 10, 000 BDT to be given. The family couldn't meet the demand. A few days later the person responsible was not found anywhere. So, she was compelled to live with her newborn daughter alone, without a father. Soon, society identified her as a "*fallen*" women and she was asked to live separately. Women in various FGD pointed out that it is because of women's helplessness and vulnerable position in shrimp trade that women are left at the whims and wishes of those engaging them in work.

5.2.5.7 Women in Crab Collection

Trading of crab is also considered as another occupation for women. Studies on the value chain analysis revealed that the market chain of the crab begins from the most disadvantaged section of coastal population, the fisherwomen, who collect crab from the wild and sell to the local traders, Aratdar. Aratdars usually pay advance money to the collectors in the lean season in a condition that the later will sell their entire catch to the former at a certain price fixed earlier. The study revealed that the local Aratder purchased small crabs from the collectors or farmers, while the distributor bought the medium crabs from the local Aratder. Interestingly, different crab pricing and marketing channels were observed in Satkhira regions. Whole sellers in Satkhira used to pay nominal price, hiding the fact that the crabs were being sent to Dhaka for export. On the other hand, considerable differences in pricing were observed within the collectors from different areas. Women collectors were found to be more vulnerable to exploitation by the farias or middlemen

than their male counterpart although they were the majority. From the Focused Group Discussion, it has been mentioned that, women are directly involved in crab fattening, sometime, they are more likely to be referred to as helpers assisting their husband or other family members in feeding, stocking, and other pre and post-stocking management in village Borokupat. From the FGD it has been found that huge numbers of women workers are engaged in different types of activities in crab industry which are described in figure 19. Women from crab fattening households were found to be carrying out several farming activities. All of the women in the crab farming are involved in providing feed to crabs while only 6% of them are involved in pond preparation before stocking. During harvesting about 23% of women get involved in this activity and in feeding 36% women are engaged. In marketing only 13% women are engaged whereas in stocking there are 22% women who are working in this sector.

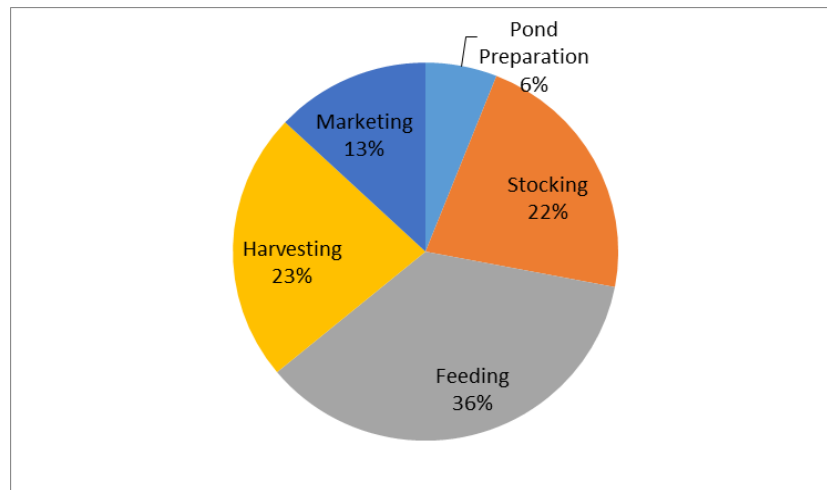


Figure 19: Number of women farmers in the crab farming activities

5.2.5.8 Challenges of women in crab collection

The crab collectors are extremely marginalized groups of people in Borokupot Village. During the FGD it was discussed, the women crab farmers do not have any land ownership nor access to water bodies or other resources. Since the southern part of Bangladesh is a disaster-prone area, they need to cope with natural disasters and ecological vulnerabilities. During cyclone ‘Aila,’ they encounter damages and losses of household assets, fishing equipment, fish ponds. Moreover, because of the saline water intrusion, they cannot have other employment opportunities as this part of the country is not good for field crop production. This limited opportunity forced them to depend on shrimp and crab cultivation more for livelihoods. The exclusion from markets and income inequality causes exclusions from local institutions to access these basic services.

Local power structure is a major challenge for women crab farmers. This power structure describes traditional socio-culture, economic, environmental, and political status in local community which creates the burdens of women's engaging and learning in economic tasks and control over social, economic, and natural resources. The FGD data found that Aila was a major turning point of their livelihoods. This vulnerability adds new challenges with irregular flooding and extreme water scarcity. This flooding inundates local water bodies like ponds, canals, and ditches. These ecological vulnerabilities cause major challenges for agricultural production and crab cultivation due to land degradations. This degradation is further causing by shrimp cultivation by gher system. Locally influential farmers use this system by irrigating saline into a pond in freshwater zone. They use government property like khasland, ponds, and canals illegally for this purpose. In this context, marginalized women crab collectors experience survival challenges. The influential people are again crab traders and aratdars who control crab production by proving loan or buying crabs.

Local women encounter lack of capacity on crab fattening culture. This capacity can be described with technical skills and capital. Lack of technical capacity causes major challenges for accessing advanced knowledge in crab cultivation. This lacking is further increased by lack of minimum economic capacity to buy production materials and hire laborers. These limited scopes cause major problems in producing good quality crab. In terms of expanding of crab fattening culture business, marginalized women crab farmers face the challenges also due to lack of access to market and fair prize. This market linkage is only possible when they will have network to each other, and this network is institutionalized with professional association. Again, women crab fishers want gender sensitive association so that their voices are addressed properly. In this context, they want to get capital and training with this gender focusing context. This access is essential to ensure their livelihoods.

During the FGD, participants shared that, to get a fisher folk card from the government one needs to have at least 2-3 bigha agricultural land which is very rare for this marginalized group of people especially for women. Though women are engaged in same activities as well as doing extra hour work in compare to men but in this patriarchal society usually women do not belong to land. It is always male members of the family who is the owner of the land. So, all the times cards belong to men and women are out of all sorts of benefits and services from the government.

In a KII with the Sub-Assistant Fisheries Officer it was discussed that, in Bangladesh there is no specific policy, rules or regulation for shrimp or crab cultivation. Even it is not in gazette form. So, no specific clause or regulation is applicable for this community especially women though most of the people in coastal area of Bangladesh are fully dependent on shrimp and crab cultivation. The Sub-Assistant Fisheries Officer also emphasized that, as men are out from the village for at least 3-5 months in a year and engage in different types of non-agriculture activities in big cities like Dhaka therefore women need to be fully engaged in shrimp and crab cultivation in these periods. And they face various types of harassment from the co-worker during working in public places as well as they are also vulnerable to wage discrimination in both sectors like shrimp and crab. It is very much essential for women to have benefits and regulations in place from the government.

Crab collection or shrimp farming are the ecological factor that has an adversely affect in women's social, economic, and political life. The existing gender and environmental vulnerability stresses that women in some instances might be able to take advantage of changing livelihood opportunities that are brought about by transformations of socio-ecological systems (Ahmed and Fajber 2009). Examples abound of women's crab- collector groups or women's shrimp producer groups helping communities deal with vulnerabilities like salinity and help the to be more resilient through finding an alternative livelihood opportunity. But women (compared to men) generally lack access to credit, markets, technology, and skills to sustain such changes that might not readily be available to them, or they are constrained by a host of social, political, and cultural factors. For instance, in coastal areas with growing salinity, the collapse of ecosystems that supported diversified livelihoods is being transformed into market-based shrimp farming in coastal areas across Bangladesh; similarly, dying vegetation due to rising salinity results in crises of fuel and fodder, the collection of which are particularly gendered tasks for women and girls.

5.2.6 Health impact of people for salinity intrusion in coastal area of Bangladesh

In Bangladesh, women are the main managers of water for domestic purposes (drinking, washing, cleaning, bathing, and cooking) as well as for some subsistence production in homestead gardening or raising of poultry and livestock. Women use water from different sources, including tube-wells, ponds, canals, ditches, and rivers, depending on availability, proximity, and purpose of use. The water supply system in rural Bangladesh is not a fixed system but a set of water sources about which choices are made, and negotiated, often on a daily basis.

Class and location in rural Bangladesh differentiate access to domestic water. More prosperous households generally own deep tube-wells, providing cleaner water. Wealthier women thus have better access to cleaner water than poorer women. Access to water is differentiated by location in that those households nearer a functioning tube-well are likely to use groundwater more often. Overwhelmingly, proximity dictates the source and use of the water, particularly for poorer and female-headed households. Several trips must be made each day to the nearest tube-well or surface water body to meet water needs, with women and girls devoting several hours each day to ensure household water security. The distance to be covered can range from a few yards to several hundred yards. Women and girls may walk 2 to 5 hours each day to fetch water. Polluted water sources are used when time constraints are too high. Often, daughters-in-law, young girls, or younger women are sent to fetch water, because this is seen as a more menial task by more powerful women in a household. Because drinking water is constructed as a domestic responsibility in the female domain. The burden of carrying traditional water pitchers (Kolshi) on the hip can cause difficulty during pregnancy and deformity in posture. In instances where a long walk is required to reach the nearest functioning tube-well, many families use closer polluted surface water (fieldwork observations 2018).

Human life, livelihood, health and wellbeing are closely linked with local ecosystems. Water is fundamental to all forms of ecosystem services including, provisioning, cultural, regulatory, and maintenance; however contaminated water is also one of the major mediums of mortality and morbidity worldwide (UNICEF and WHO, 2015). Climate change and environmental pollution drive health in complex direct and indirect ways and ‘water caused diseases’ are on the rise-which are linked with degraded water qualities. Salinity intrusion into drinking water and its associated health impact is one such critical issue (McMichael, 2003) with increased blood pressure (BP) or hypertension leading way to cardiovascular diseases (CVD). This is of particular concern for a country like Bangladesh where large coastal population drinks water from sources with elevated salinity level (Vineis et al., 2011). Coupled with human pressure, local water crises are gradually increasing, with serious implications for public health, environmental sustainability, food and energy security and economic development (UNESCO, 2015). Climate change is very likely to expose large-scale coastal populations to multiple risks with increased intensity and frequency and being a low-lying deltaic country, Bangladesh is prone to the multidimensional health hazards. Salinity intrusion in fresh water and soil is one of many complexities in coastal Bangladesh (Khanom and Salehin, 2012, MoEF, 2009b).

In Bangladesh, 97% of the population depends on underground sources for drinking water (Shamsudduha, 2013) and it has been estimated that about 20 million people living along the coast are affected by varying degrees of salinity in drinking water (Khan et al., 2011). Elevated water salinity is linked with direct health outcomes such as hypertension and pre-eclampsia, skin diseases, acute respiratory infection and diarrheal diseases and transmission of mosquito-borne diseases (Talukder et al., 2015). In 2002 the World Health Organization (WHO) recognized health impacts of consumption of highly saline waters as a priority for investigation under its public health initiatives (McMichael, 2003). Higher rates of (pre)-eclampsia and gestational hypertension in pregnant women were observed in the southwestern coast of Bangladesh compared with non-coastal areas, which was hypothesized to be caused by saline contamination of drinking water, with some seasonality effect higher particularly in dry season (Khan et al., 2011). A consecutive population-based study conducted in Satkhira district, Bangladesh with 202 pregnant women also reported significant association between sodium intake from the drinking water and both (pre) eclampsia and gestational hypertension (Khan et al., 2014). Higher risk of hypertension due to saline water exposure has been found among young adults in coastal Bangladesh as well (Talukder et al., 2016).

Hypertension or high blood pressure is an increased risk factor for overall mortality, cardiovascular diseases, myocardial infarction, heart failure, stroke, renal disease, etc (Dennison-Himmelfarb et al., 2013) and is influenced by genetic, medical disorder, lifestyle and environmental factors, primarily by the latter two, which differ between developing and low-income developing countries (Ibrahim and Damasceno, 2012).

Three small scale studies done in coastal Bangladesh with pregnant women and young adults suggested an association between drinking water salinity and hypertension (Khan et al., 2008, Khan et al., 2014, Talukder et al., 2016). Interestingly, Rasheed et al. (2014) observed that the coastal population with high salt intake practices showed a low level of awareness of hypertension. A recent systematic review also made inconclusive positive remarks on the association between saline drinking water and increased blood pressure (Talukder et al., 2017). Consumption of saline water and practice of high salt intake from food, made coastal people already prone to increased blood pressure. The present trend of salinity intrusion and future CCSR impacts will further exacerbate the situation making coastal population highly vulnerable to drinking water associated hypertension.

From the field observation it was found that, the research participants drink water from a number of different sources; however, these can be brought under 05 major categories: protected pond, Pond Sand Filter, rainwater harvesting, tube-well and supply water. Informal discussion with respondents revealed that, consuming saline water might have already made some impact on their taste bud and taste threshold. People consider quite high level of saline water as sweet/fresh-which people from outside can't consume. The research participant was found to be associated with high raw salt intake practice, which might have some impact for raising the blood pressure anomaly, however, further investigation is required to fully understand the situation. Educational status and landownership have a positive association with risk of hypertension as findings show in the study which might be related to types of livelihood and physical activity. According to Talukder (2016), 2% higher chance of hypertension among those who consume more than 2-litre saline water per day compared to those who took less than or equal to 2-litre saline water per day. Apart from that, about 60% respondents were found carrying different sorts of skin disease due to salinity. Not only skin problem but also it affects to their nutritional balance as lack of agricultural food production and diversity of food leads to the malnutrition problem. Due to malnutrition the coastal community people are suffering from different type of diseases as well as the rate of maternal mortality and morbidity is comparatively high in this region.

Chapter 6: Case Studies

6 Case Studies

6.1 Water women in Borokupat village, Bangladesh

Borokupat village is at the border of the Sundarbans, and part of the people's livelihood is supported by the forest. Men traditionally harvest forest resources such as mud crabs, honey, shrimp collection, or fish. Men are rarely involved in 'reproductive' responsibilities such as cooking, water collection, or childcare because these tasks are not 'real work' and fall under the women's domain. Women, in an effort to contribute income to the household, find time to collect shrimp larvae and crabs from nearby canals of the Sundarbans after completing their traditional tasks. Additionally, women are enlisted to clean private shrimp ponds of aquatic weeds; or are enlisted for work in seasonal labor around the area.

The hardship is extreme due to fresh water scarcity as well as health problems from waterborne diseases. Through IUCN funding, one of the local organizations named, Nakshikantha re-excavated five ponds and provided 33 plastic tanks for storing rain water to increase access to safe water for consumption. In April 2014, four ponds have been successfully re-excavated, and one pond was made into a reservoir that can store up to seven million liters of fresh water.

A year later in May 2015, at least 250 Borokupat village families get clean fresh water from the re-excavated ponds, situated only 250 meters from their houses. Now, it only takes half an hour to collect water for the household.

The spill-over effects of the project's result have profound implications on the 'invisible' work carried out by women and children, which often goes unaccounted for as contributing to the productive sphere. In the case of Borokupat village, the amount of time it takes to go to the nearest clean water source has decreased. Villagers have more time for meaningful social activities that were being compromised on before, such as education, income generation, and caring for family members.

Women are happy about the change. One respondent reported, "*Having fresh water nearby gave me an extra two hours every day. With this time, I am now able to raise chickens, tend the*

garden, cook good meals for my family, and teach my children lessons for school. I also have less quarrels with my husband," she said with a smile.

However, having new freshwater sources nearby did not dramatically change the behavior of villagers towards water. The fresh water ponds are overseen by a village committee, led by the women living nearest the ponds. The committee has installed public announcement boards with messages about good practice related to clean water, such as boiling water before drinking; do's and don'ts when collecting water from the ponds; and precautions to keep poultry and livestock away. Today, the village is creating a collective fund from the contribution of water users, so the ponds can be maintained and kept in good state.



Picture 9: Water women in Borokupat village

6.2 Provati Rani, the Radiance of Hope

Provati Rani, 26 years old, grows vegetables and spices in her back yard, harvests vermi compost and sells vermi compost to the neighbors as well as in the market. She lives with an extended family at Borokupot in Shyamnagar, Satkhira. Her husband, Bijoy Baidya is a fisherman and she is a mother of a baby girl. After Aila she lost her everything and due to huge salinity, she could not grow crops and vegetables for a long time. As a result, her father-in-law was caught by a bad debt. In 2015, she has been a member of Shushilan, a local NGO working for the marginalized group of people in coastal area. In support with Shushilan she has been a member of Water Management Group as well. After joining in the Water Management Group, she attended several meetings and took part in the decision-making process as well. She has worked to make an embankment in Polder 02 which is under Satkhira district and with the support of Bangladesh water Development Board (BWDB) she earned a good amount of money from the embankment

work. Apart from that, she is also a member in sluice gate operation committee in her village and she received a good number of training from BWDB and Shushilan on the maintenance of the sluice gate to make the villagers protected from salinity intrusion. Now the salinity has been reduced in her land. Additionally, she has also learned various techniques to produce vegetables and crops in the saline-infused land which has helped her to be more adaptive and resilient. Now a day she harvests onions inside pet bottles, as saline-infused land is non-arable for onion harvesting. Therefore, she has learnt the pet bottle technique of onion harvesting from agriculture department and applied this innovative approach in her yard this year and earned a good amount of money by selling those onions in to the market.

She has also received training on compost cultivation that is leading to increase her production. She is selling the compost at a large scale in the market staying at home through mobile communication and earning more money from it.

In a close conversation with Provati, she mentions, *“I feel very happy when I can return lending money back which was borrowed by my father in law earlier. My family is very proud of me. My husband gives me more value and recognition during taking any important family decision. They consider me as a decision maker. Which makes me happier.”*

She also mentions that, *“after joining the Water Management Group my life has been changed. I have received many trainings on water management and adaptive technology on agriculture. I have started to earn after joining the group. It helped me a lot to increase my leadership skill as well as confidence. Now I do not get nervous in talking in a public forum”*. This year, she produced seasonal vegetable in her garden through coping with the salinity as well as environmental degradation. By doing this her production increased two times more in this year. She sold vegetable of 25 Kg and earned a good amount of money after meeting family needs properly. She also sells 15-20 kg of worth tk. 20 compost fertilizers per month to the market regularly. By selling vegetables and vermi compost, Provati is paying back all the loans which was taken by her father in law. And now she is the ‘Role Model’ in her community.



Picture 10: Provati Rani in her garden, using saline tolerant seeds and technology

6.3 Exclusion of women in water management process

Coastal water infrastructure projects in the coastal zone of Bangladesh have aimed at flood control and at supporting the most visible productive uses of water, e.g.; irrigation for paddy cultivation and water supply for shrimp farming. This latter focus has often ignored other uses of water, where women use a variety of water sources, such as ponds, wells, rivers, canals for productive (kitchen garden, livestock) and domestic purposes. WMOs are solely in charge of the productive uses of water and rarely consider other water uses that are particularly important for women: drinking water, bathing, sanitation, livestock and homestead garden irrigation. In one WUG in Borokupat village, there was no women in the group, and it was only operated by men which was not funded by any other donor and was considered as a private group as well. The ownership of that WUG was belong to the local lite and their close persons. Therefore, the neglect towards the multiple uses and users of water had adversely affected the entire group who were dependent on that water source. For women, this had increased time to fetch water and to find suitable places for bathing, poorer nutrition due to decreased vegetable cultivation and increased reliance on the cash economy for food items such as rice and fish. The expanding use of groundwater for irrigation had caused many hand pumps used for drinking and domestic water to run dry. And not only the women but also the men from marginalized group who were very poor and excluded, suffered from water scarcity in the agricultural land due to use extensive groundwater for irrigation in the land of community elite people. Thus, created a clear discrimination in the society in terms of sex, gender, class, caste, religion, ethnicity, and disability. A major rationale for women's participation in WUGs is therefore that can improve the integration of their needs within water management and improve their livelihoods.

During the data collection for the qualitative survey, it was difficult to locate women WMO members for KIIs. FGDs in this village revealed that though women are formally included in the WMOs, they are not notified of, or involved in, water management meetings. This appears to be connected to an inherent bias against women's involvement in water management expressed both explicitly, *"women should not be involved in water management"*, mentioned by one of the male participants during FGD. Implicitly through the formation of WMOs consisting of only male elites who used their spouses to complement the quota requirement of the guideline. A majority of women respondents emphasized the importance of drinking water and water for food yet would still state that formal water management and WMOs belonged to the male domain. *"No, I am not involved in any water management organization. I am a woman, why will I be involved there"?* mentioned by one of the respondents while talking regarding the importance of women's participation in WUGs during Focus Group Discussion.

Chapter 7: Role of different stakeholders in water governance

7 Role of different stakeholders in water governance

This chapter describes the roles of different stakeholders in water governance system to deal with salinity focusing on gender. The coastal people in Bangladesh are very much vulnerable due to water scarcity, cyclone, and salinity intrusion. The women in this region are more vulnerable because of their social position and condition. However, there are many NGOs, INGOs, government projects, local government structure, donors, and private sectors are working in this area to reduce the salinity as well as to improve the livelihood of the community people to make them more resilient. The life of the vulnerable community people is being supported through different initiatives by the government including application of High Yielding Variety (HYV) rice like: BINA 08 that saline tolerant and production is high in salty soil, establish Pond Sand Filter (PSF) through INGOs in partnership with local NGOs to reduce the workload of women to collect fresh water, or creating Water Users Group (WUG) to make sense of community ownership in the water governance system through the projects of government funded by different donors etc. This chapter will highlight the roles of different stakeholders in reducing salinity through establishing a resilient community to adapt the vulnerabilities emphasizing on gender.

7.1 Role of Local Government

Local government institutions (LGIs) are not formally acknowledged the water governance system but play an important role in overall water governance process. For example, the Union Parishad (UP) arranges for evacuation when alerted to cyclones, while it also organizes immediate repair in the face of embankments breaking during disasters. Similarly, when the Water Management Organizations (WMO) system fails to address acute maintenance needs, the UP responds to the requests of its constituents by using rural employment schemes such as KABHIKA (Food for Work), KABITA (Cash for Work) and 40-day Work Order allocated from the UP to maintain roads, embankments, and canals. It does so through either sub-contracting NGOs or LGED, or by directly forming Labor Contracting Societies (LCS) consisting of the rural and disadvantaged poor. Such rural employment schemes are popular, and a majority of respondents suggested that permanent funding should be made available to these schemes to address siltation and salinity intrusion.

Since the Union Parishad (UP) representatives are democratically and locally elected, different sorts of water management process is seen as generally favorable in managing disputes of operation, though incidences of elite capture have also been mentioned.

From the group discussion it was identified that, the community people perceived the UP as locally accessible, accountable and working for the local community. The second most frequently mentioned suggestion in the qualitative survey, after completion of any sort of water management activities in the village the role of UP in monitoring the overall work should be increased. The FGDs and KIIs generally depict the UPs as having a unique position as grassroots representatives situated within the local government system. This allows them to further coordinate between various sectors, from drinking water to agriculture, fisheries, infrastructure and health, and thus help avoid the replication and duplication. Figure 20 below illustrates the gap between participation as seen by the Water Management Organizations versus participation as seen by the local people themselves. In total, 72% believed that the Government (BWDB 28%, UP 35%, and LGED 9%) should be responsible for water governance, with a majority favoring the UP. Figure 20 illustrates that respondents preferred the UP to act in water management questions (35%) over entities such as WMOs (2%). About 24% also thinks that, community has also responsibility to secure water for them.

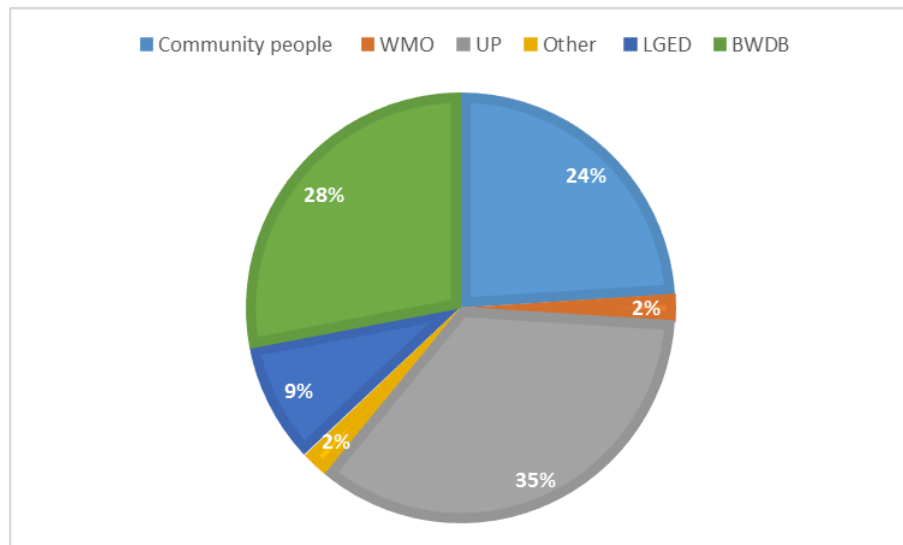


Figure 20: Community perception of the responsibility for water governance.

Increasing the role of local government institutions in water governance is not a panacea. They have their own share of problems ranging from several factors that impede their responsiveness

and accountability to the people. This encompasses role confusion and a lack of authority and accountability between local politicians (the UP) and local bureaucrats (at upazilla/district level) to being weak and constrained by the central government through regulations and inadequate local resources (Toufique and Turton, 2002; As-Saber and Rabbi, 2009). UP plays stronger roles as chairs of formal and unofficial committees and bodies like those of WMOs (Toufique and Turton, 2002).

Despite the mentioned shortcomings of local government institutions, there are several points that favor inclusion of UP in water governance. First, chairperson and members of UPs are already involved in water governance as mentioned during the KII. They are involved because, as elected representative of the people, the local residents demand these services from them and given the nature of electoral politics, UP members feel obliged to meet these demands. Thus, the polls might exert a positive pressure on the UP members in favor of their electorate's needs and in favor of accountability. The deficient electoral process of the WMOs and the lack of long-term vision prevent this pressure to work in the case of the community organizations. Second, unlike WMOs, whose funding is restricted through specific donor projects, UPs can access wider arrays of developmental funds from the Upazilla level that they can deploy more effectively for water governance related work. Finally, while there is considerable change required to strengthen LGIs to become more accountable and effective, each successful local election means that local governments, their power and authority are validated by the electorate. Strengthening of grassroot democracy through regular elections and inherent competition for votes in a multi-party democracy is likely to lessen chances of elite capture and exclusion (Lewis and Hossain, 2008). In the case of Borokupat village, a formal recognition of the UPs' role in water governance has great potential to allow them to act as the democratic link between communities and implementing government agencies, though it must be noted that this is not a 'silver bullet'. It could, however, contribute towards a democratic decentralization of water management that is (a) more efficient as they can coordinate between various departments at the local level while using existing channels for maintenance; (b) more equitable as they face re-election and are therefore held accountable to their voters to a greater extent than the WMO executive committees where elections are exclusive to those with economic or social power; (c) more sustainable as it would strengthen existing government channels and make them more responsive and accountable to their citizens rather than having to rely on temporary projects. This requires formal funding and recognition of initiatives furthering transparency and accountability to citizens in the local government system.

In a KII with the UP Chairperson of Borokupat village it was identified, after 1980s people of this locality started to push salt water into the agriculture land for shrimp cultivation. And later this salty water spread all over the surface water and ponds, which then make the soil salt. Additionally, after Aila and Sidr most of the Ponds in this area mixed with salt water. These are the reasons of high salinity intrusion in this area. He also mentioned that, with the help of the government fund they have set-up different pockets to supply fresh water to the local people, but those are very inadequate in compare to the demand. And sometimes the pockets also give salty water when the flow and tide is high. There are 03 protected ponds (PP) in this village for supplying pure drinking water which are maintained by the Union Parishad. The cost of maintaining the PP is provided by Union Parishad. They have no separate fund for maintaining this PP. They have to spend at least 80000 BDT each year for maintaining these ponds, but they do not get any specific budget from the government in doing this. They spend the entire money from Kajer Binimoye Khadyo (KBIKHA) and other projects. They have separate worker for looking after these PP to excavate, make fence around the ponds, and embankments. For this maintenance work they need more money, but they have limitation of budget and maximum 10000 BDT Union Parishad can effort to execute this type of maintenance work.

In discussion with the Sub Assistant Fisheries, Assistant Agriculture officer it was identified that, all the relevant stakeholders of the local government bodies provide trainings to the farmers, fisher folks where most of the participants are men. Whereas women are also engaged with the same type of work in the community level. But when it is about increasing the capacity, information, knowledge, and skill it is always men who receive the training. The farmer's card, fisher folk's card is also availed by men though there is no discrimination towards women in getting it. But to avail the card by women, it needs to be a female headed household. If they have a male member in their family, they are not entitled to get the card. Most of the male members in the family migrant for 3-5 months to the cities to earn more. At that time women face difficulties in accessing to the benefits if the cards are by the name of their male members. In Bangladesh there is no specific policy for shrimp cultivation, even it is not in the gazette form. Some regulations have locally formed but they are not in gazette form. So, there is nothing to mention about water management issues specifically in these regulations. However, the card holders also mentioned that, they do not receive any sort of benefits or facilities from the government against the cards. According to Assistant Agricultural Officer, as per the farmer's card they provide training on pest management, crop preservation technique, and newly introduced technologies

which are given mostly to men as they have the cards. But women in these sectors are lacking behind due to not accessing any cards.

7.1.1 Existing adaptation measures taken by the Government

To deal with salinity intrusion and associated impacts, farmers in the study area have adopted a number of non-field and field-based adaptation measures. Field-based measures are mainly aimed at reducing the impact of salinity intrusion on agricultural production. Non-field-based measures aim to make livelihoods less dependent on farming. Field-based measures mainly include using saline-resistant cultivars, reducing salinity by washing rice fields, adjusting irrigation practices, and repairing or reconstructing irrigation channels. Non-field measures include temporary migration for work (either within the home district or to another nearby district), changing eating habits and lifestyles, switching to non-agricultural income-generation activities, etc. The study found that 61% of households adopted some field-based (rice fields) adaptation measures; of these, 38% planted saline-resistant cultivars (BRR1 23, BRR1 47, BINA-8) (figure 21). One would expect these measures to be most widespread in Borokupat, where salinity was highest. It was clear from discussions with study households that awareness of the impact of salinity, access to saline-resistant cultivars, poverty and local knowledge about measures to combat salinity all play a vital role in whether adaptation measures are implemented. Although many households (27%) washed rice fields at different stages of cultivation to reduce soil salinity, planting saline-resistant cultivars remains the most common adaptation measure to increasing salinity in the study area and about 8% make some adjustment in the irrigation system.

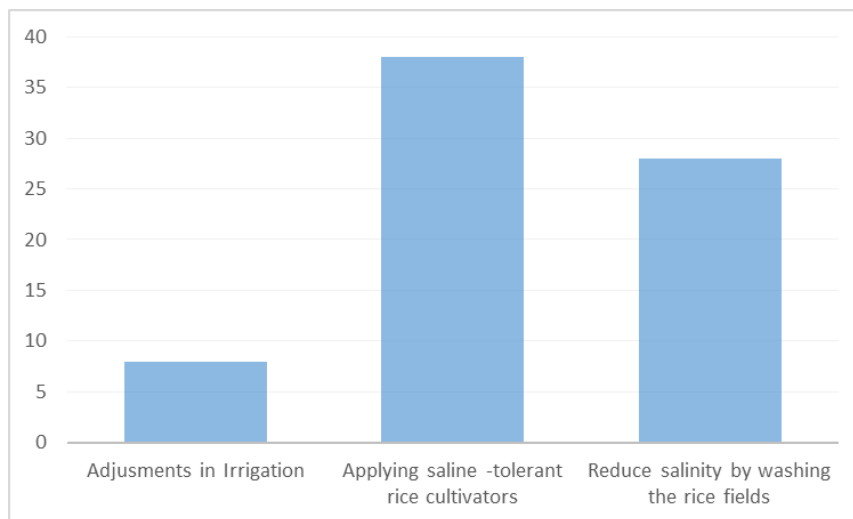


Figure 21: Existing adaptation measures to deal salinity intrusion in rice fields

7.2 Role of NGOs in Water Governance System

Furthermore, in the villages where NGOs engage in social activities to empower and mobilize community people, this has led to a movement to hold their democratically elected representatives accountable and responsive to their needs. For example, Nijera Kori and Bangladesh Environmental Lawyers Association (BELA) provided support to landless groups and an anti-salinity movement in order to regain land from aquaculture through the help of their local government officials. This illustrates Larson's argument that poor and excluded people "need organizations and collective action, allies, interlocutors and sympathetic, or at least open-minded, government officials" if they are to be heard (Larson, 2008: 46).

Not only the government but also the NGOs and projects are working in the coastal area of Bangladesh to reduce the salinity intrusion. There are many projects are working not only with the infrastructure but also with the people to create a social cohesion to cope with salinity. Various local and international NGOs such as Shushilan, Uttaran, Action Aid, Caritas, Concern Worldwide, Oxfam, UNICEF (United Nations Children's Fund), USAID (United States Agency for International Development), and government organizations such as DPHE (Department of Public Health) and CDMP (Comprehensive Disaster Management Program) are involved in supplying drinking water in coastal Bangladesh. Among them, UNICEF and DPHE carried out the introduction of pond sand filters (PSF) along the coastal belt. The respondents in the study area were asked about the types of adaptation and coping measures supported and implemented by different institutions. Considering the salinity problem, the study revealed that, 30% of the respondents in moderate and severe drinking water scarcity areas adopted PSFs to get safe drinking water, with the assistance of government organizations (for example DPHE) and nongovernment organizations (like Shushilan) in cooperation with donor agencies as well as international NGOs (for example Caritas and UNICEF). In addition, 35% of the respondents from severe drinking water scarcity areas practice rainwater harvesting technology by conserving rainwater during the rainy season and using it for drinking purposes with the help of various NGOs. Besides the pond sand filter and rainwater harvesting technology, 18% of respondents from severe and moderate scarcity areas respectively use deep tube-wells with overhead tanks installed by the local NGO Iswaripur Development Foundation (IDF), with GIZ (German Development Cooperation) assistance.

In a KII with the project officer of Shushilan it was mentioned that, the Atulia union is the combination of 8 wards, among eight wards (2 and 3) ward has some pure drinking water pockets. Shushilan collects water from the pockets and supply to the local people, but that is very inadequate. And sometimes the pocket gives salty water but that is reasonable for drinking. According to the Union Parishad Chairperson, UP has set up (8-10) protected ponds (PP) in the other 6 wards for pure drinking water in Atulia Union which is maintained by Union Parishad.

The UP Chairperson also illustrated that UP collaborated with Shushilan to establish some PSF which is now maintaining to provide drinking water for the locality. Additionally, in the protected pond they have tried to stop bathing, washing utensils, or cleaning dress but it is not followed regularly due to poor maintenance. As they did not assign anybody particularly to look after the protected pond and he also mentioned that, the WUG in the village is not looking after the maintenance of protected pond.

In a KII with the project officer Shushilan it was discussed, Shushilan has set up PSF, funded by Oxfam that costs 500000-600000 BDT. But now the villagers have taken over the responsibility for the maintenance of the PSF. They have formed a committee (WUG) with 05 members where 02 of them are female. They have also made an account to the bank with the subscription fee of the villagers which is around 5000-6000 BDT (10-20 BDT/ per household), so that they can use this bank account for further maintenance of the PSF. Shushilan provided training to the WUG committee on the process of maintenance of PSF and they also encouraged the villagers to open the bank account so that everybody has the ownership of the PSF. Like Shushilan, there are many NGOs and projects are working in this village to protect the villagers from salinity intrusion. They provide different training on agriculture, bee collection, shrimp, crab production, and techniques to adopt with the salinity. To increase WUG skills various training programs are arranged regularly by NGOs at the community level where women participation is higher than men.

In a KII with the Project Officer of Shushilan it was identified that, supply fresh water center should be established at a convenient place where more women can be reachable, and they do not need to face any sort of violence in fetching water. He also mentioned that, new water treatment plant can be set up and supply water system should be provided like the cities. Government should take measures to solve the water scarcity problem of this coastal area people. He also mentioned that supply water should be drinkable. Sometimes the supply water is also polluted

with dust and stings and not available for all the time. Water treatment plant can be set up with the help of NGOs, private sectors, and government.

In a discussion with the NGO staff it was very evident that, most of the people including UP chairperson, local government officials, WMO representatives, NGO staff and the community people have lack of knowledge about National Water Policy. Though the problem of salinity in coastal area is not highlighted in the national water policy. But most of the NGOs are working in coastal area targeting to achieve SDG-6 goal which is “Clean Water and Sanitation”. He also emphasized that, government can organize training, seminar, develop poster and leaflets, conduct TV and radio program, and initiate local drama in participation with the community to make us aware on national water policy as well as the overall water management system, where the contribution of women and the importance of involving them in decision-making process will be highlighted.

7.3 Role of Water Management Organizations

According to Dewan, Buisson, and Mukherji, 2014, figure 22 illustrates the key participatory stages of the Participatory Water Management (PWM) that all the relevant stakeholder pertaining to water management should follow. The PWM aims to ensure community ownership and involvement in water management, both in planning, decision-making, and financial and physical participation.

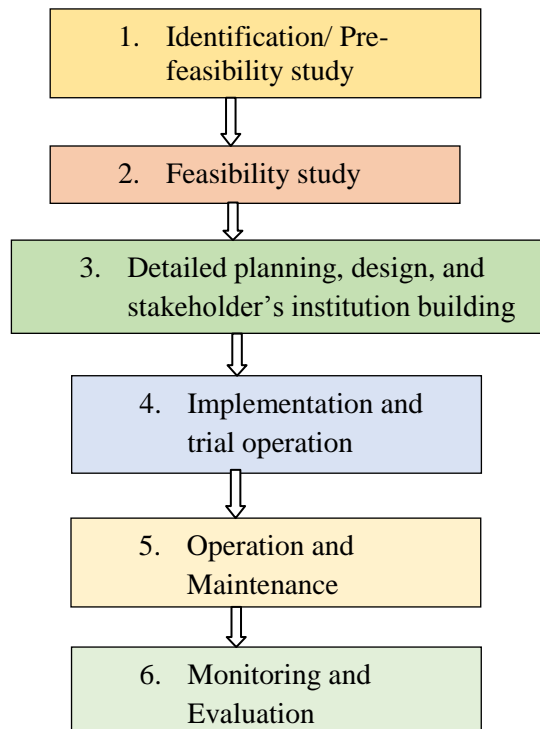


Figure 22: Process of participatory water management (Source: Ministry of Water Resources, 2001)

The first three stages in the PWM (figure 22) aim to ensure that local stakeholders have ample opportunities to provide feedback and shape water management projects. The PWM requirement of feasibility studies sought to address the perceived top-down planning associated with BWDB. It also aimed to place the decision-making power in the hands of local stakeholders through the WMO, rather than through the implementing agency. This component was integrated into the methodologies of LGED's Small-Scale Water Resources Development Sector Project (SSWRDSP) for sub-projects under 1000 hectares and BWDB's Integrated Planning for Sustainable Water Management (IPSWAM) for larger projects (Dewan and Buisson, 2014).

Equity is a key aim of community-based water governance system as communities are perceived as able to manage resources for the common interest. In order to ensure women's participation, the process of PWM stipulate that one-third of the executive committee members must be women. However, household surveys in the study site reveal that 80% of executive committee members are male and less than 20% are women. During the data collection for the qualitative survey, it was difficult to locate women WMO members for KII. FGDs in these communities revealed that though women are formally included in the WMOs, they are not notified of, or involved in, water management meetings. This appears to be connected to an inherent bias against women's involvement in water management expressed both explicitly, "*women should not be involved in this work [water management]*", and implicitly through the formation of WMOs consisting of only male elites who used their spouses to complement the quota requirement of the criteria.

A majority of women respondents emphasized the importance of drinking water and water for food yet would still state that formal water management and WMOs belonged to the male domain. "*No, I am not involved in any water management organization. I am a woman, why will I be involved there*"

The above findings of women being marginalized in the participation process are corroborated with other studies on gender and Community Based Natural Resource Management (CBNRM). Agarwal (2001) argues that participatory institutions can exclude people through 'participatory exclusions' that can individually or interactively constrain a women's participation in natural resources management. She identifies these exclusionary mechanisms as rules of entry (e.g. only

one member for each household in WMOs), social norms of women's behavior and actions (meetings held in public spaces deemed inappropriate for women), social perceptions of women's abilities (unknowledgeable, 'illiterate'), all of which are exclusions expressed by our respondents. Similarly, in her case study on community-based forest management in Nepal, Agarwal found that women's participation was often characterized by tokenism, where women were nominal members often not made aware of meetings, and when they did attend they would rarely speak up and if they did speak, their opinions carried little weight. Frequently, male executive committee members choose women members in their absence and without consulting them (Agarwal, 2001).

From the field observation it was identified that, inclusion of women does not necessarily address power issues between men and women and does not capture that many poor and marginalized men are excluded. The water management recognizes the particular vulnerability of those without landholding by requiring at least one landless representative in the WMO executive committees. This recognition is important because, though they do not own the land on which they work, they are also local stakeholders who are affected in various ways by issues of water management. For example, it may inhibit their right to fish for themselves in public canals or reduce or increase their chance of employment depending on whether aquaculture or agriculture is pursued. However, a majority of the WMOs lacked landless representatives in both the general and executive committees and when landless members have been found in these committees, they have always been male, thus ignoring the particular social exclusion of women of the poorest class.

By having quotas for women, the differences between women in a locality may become obscured and institutionalize exclusions and privilege where rich or elite women hold the nominal memberships. A key weakness of the water governance is to focus on 'community' that ignores the various levels of conflict of interest among rural populations, by viewing the WMO as capable of representing the interests of a homogenous 'community'. The mechanism of quotas as they have been implemented thus far generally fails to empower these target groups in the decision-making processes of WMOs.

In a KII with the WMG President he referred the various problems in water management process including economic, political and social. Lack of fund is always a problem to them and lack of cooperation from local government is also a big factor in meeting the community needs.

7.3.1 Model illustration to create a collaboration between government and non-government sector in water governance to deal with salinity

In the study area, salinity is the most prominent cause of accelerated safe drinking water scarcity. The problem of salinity that poses a threat to drinking water sources has not been dealt with as effectively. Currently about 40 million people are directly affected by water and soil salinity and another 20 million are at risk in coastal Bangladesh (Abedin, Habiba and Shaw, 2014). The increasing concentration of salinity will put more pressure on people's health and threaten livelihood, income generation, and food security of coastal populations. Although measures, including rainwater harvesting, conservation of pond water, local technology for water treatment (such as pond sand filters), and groundwater use management, have been implemented at the local and community levels and supported by various institutions to improve water supply.

Based on the findings, according to (Abedin, Habiba and Shaw, 2014) figure 23 mentions a model for an integrated community-based approach to reducing drinking water scarcity. To mobilize these processes not only requires active participation of communities, but also needs feedback and support from various stakeholders such as governmental agencies, NGOs, and other organizations. It is imperative that communities' adaptation methods be supported and guided by local governments and NGOs to make them both more effective and environmentally friendly. At the same time, it is imperative to have efficient partnerships, collaboration, and coordination between government organizations and NGOs.

A number of socioeconomic factors along with geographical location enhance the vulnerability of individuals and communities in the study area and relentlessly undermine the struggle of people to minimize or cope with their vulnerabilities by undertaking adaptive measures. This study highlights how communities need to improve their critical situation in both the severe and moderate drinking water scarcity areas. The results reveal that rainwater harvesting is the prime demand in the severe drinking water scarcity area, whereas piped water supply is the preferred expectation for moderate drinking water scarcity areas. Undertaking actions at the community level requires government as well as other organizational initiatives and activities to implement these actions. Rather than disaggregated efforts, integration is needed to resolve the potable water supply problem and to facilitate a community's adaptation. Although a number of government and nongovernment organizations are working at both the local and the national levels, the main problem is a lack of coordination among them. Because there is no integrated approach between

adaptation measures of the community, government, and other development organizations, it is difficult to overcome drinking water scarcity.

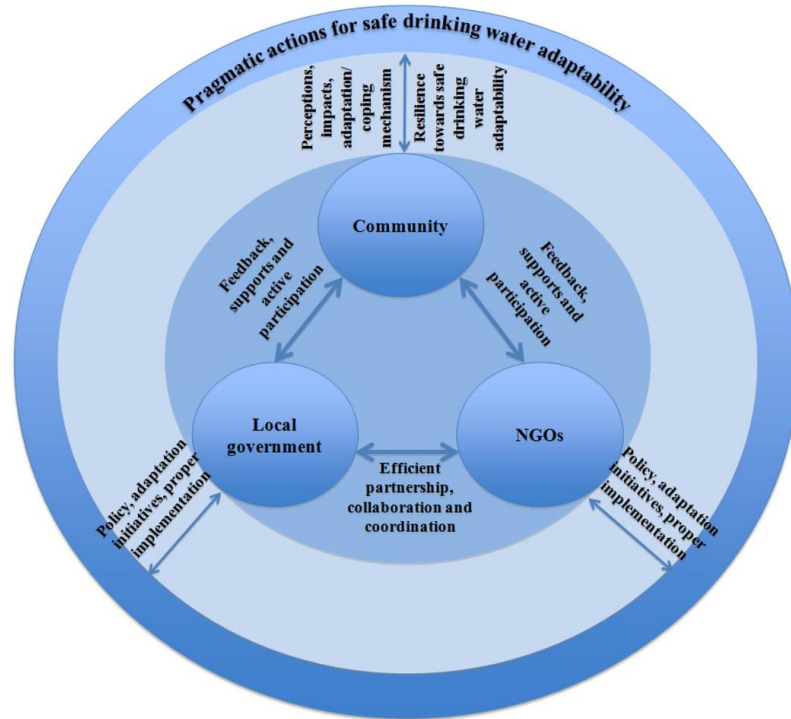


Figure 23: Model for an integrated community-based approach to reducing safe drinking water scarcity in southwestern Bangladesh. Source: Abedin, Habiba and Shaw, 2014.

7.4 Role of Community People in Water Management

The community people of this village were engaged in social forestation within 6-Kilometer-long embankment of Khalpatua river, which has reduced the intensity of storm surge, cyclone, dam damaged, and protection of flooding in the village Borokupat. These villagers often influence Bangladesh Water Development Board (BWDB) and Government Administration for dam repairing in a planned way where they play an important role in decision making to control the salinity as well as to reduce the risk of erosion and disasters. They also created a contingency fund of BDT. 482,710 for their community development through influencing the local government officials.

In a conversation with the UP Chairperson he mentioned, the areas where community has more ownership and they are engaged actively in water management process. At the individual level, depending on socioeconomic conditions, a respondent employs measures that are manageable for

a single household, whereas at the community level, members of a community share responsibilities and draw benefits from the measures they adopt collectively. For example, small units of ponds with sand filters and rainwater harvesting systems are considered as the most suitable safe drinking water options used by individual households. Large ponds with sand filters and large rainwater harvesting systems are used in communities and are now the only major sources of safe drinking water maintained at the community level. Very few people have the ability to buy purified water from water treatment plants or shops; the majority of residents cannot afford such expenses.

At the community level, use of pond sand filtration is the most common practice in moderate water deficit areas. Pond sand filters are promoted by the government, international NGOs, and local NGOs to provide a safe drinking water supply with the cooperation of a community's people. During the Focused Group Discussion (FGD) it was mentioned by the participants that, most of them from severe drinking water scarcity areas use pond sand filters to get safe drinking water with minimal salinity contamination.

From the field observation it was seen that, several technologies have been adapted to reduce the salinity of water. And community people are trying hard to adapt different technology and the livelihood system to survive as well as to get rid of the situation. As they are being adversely challenged by the water scarcity for many reasons which lead them towards poverty and marginalization. They are trying hard to adapt the situation as, civilizations have developed in water scarce environments and have cultural skills that make it possible to live under such conditions.

7.5 Women's vulnerability in the Community due to saline intrusion

The Water User Groups (WUGs) where more women are engaged and actively participated are more functioned in compare to those groups where women are not actively engaged. In the conversation with the project officer Shushilan, it was very clear the project WUGs and adaptation technologies funded by the donors are well functioning because they form a gender balanced group where women are included to operate and maintain the water governance system. They provide trainings to both women to enhance their knowledge, skills, awareness, and information pertaining to overall water governance structure and management process. Thus, enhance the confidence and leadership skills to women to maintain the insufficient water resources efficiently.

Inclusion of women in any sorts of committee or structure do not help only women rather than it also helps the overall society. As village men go to the cities for 3-5 months in a year for income therefore, it is the women who stay at the village and engage all sort of productive, reproductive, and community work including water governance. The knowledge and skills regarding water governance as well as engaging in water users' groups help the women to have a clear understand about the situation to take the instant and effective situation to get rid of any sort of challenges. It has a positive and timely impact to the overall community as well.

From the case study of Provati Rani it was found that, after joining the Water Management Group her life has been changed. She has received many trainings on water management and adaptive technology on agriculture. She has started to earn after joining the group. It helped her a lot to increase her leadership skill and confidence. By selling vegetables and vermi compost, she paid back all the loans which was taken by her father in law and became the decision-maker in her family.

On the other hand, in another case study it was found that, the water users' group where there is no women involvement are not well functioned and not able to meet the requirement and expectation of community people regarding water resource management. Therefore, it is obvious that, gender equity should be the key aim as communities are perceived as able to manage resources for the common interest. At least 30% women's participation in Water User Groups is mentioned in the policy and guideline, but the reality is different. In reality women are in the water user group only for tokenism or reserving criteria and they have lack access to take part in the decision-making process. All the water users' groups are male dominated therefore, it is hard for women to attend the meeting at any time off the day and to take part in the decision-making process. In order to ensure 'women's participation', the guidelines stipulate that one-third of the executive committee members must be women. However, household surveys in the study sites reveal that 80% of executive committee members are male and less than 20% are women.

Chapter 8: Recommendations

8 Recommendations

While there is general recognition that water plays an important role in improving the livelihoods of poor rural people, there is a need to distribute the benefits of water projects funded by the government and donors equitably to both men and women in rural societies. Agricultural water management continues to be seen as a man's job even when women provide most of the labor in irrigated fields. This study showed that the problems in involving women in decision-making in water management are well known and have been documented time and again. However, efforts to involve women in decision-making in water management and improve their access to productive resources have only had modest success.

Apart from the questionnaire survey, this study also conducted focus group discussions (FGDs) and Key Informant Interviews (KII) to get an understanding of probable solutions the communities especially women consider viable to solve the drinking water problem and their communities' needs. To support the objective of the study as well as considering the situation and women's condition in village Borokupat, Syamnagar, Satkhira, a few recommendations are summarized below focusing on the information based on FGD, KII, and questionnaire survey, that provides practical and realistic recommendations for various actors in the water management sector, including community people, policymakers, researchers, non-governmental organization, and civil society:

8.1 Securing women's access to land and water

The first step in improving livelihoods and reducing poverty among the rural and saline vulnerable poor people is to ensure that both women and men have equal access to land and water, as well as other resources such as financial services and products. More needs to be done to include women in decision-making for water management and to secure WUA membership for women who do not have land or power. Access to water often depends on land rights or access to land use; therefore, women's access to land is crucial to their access to water. Allocating the land based on the labor inputs provided by the potential beneficiaries should ensure the equitable distribution of agricultural land to poor women.

8.2 Multiple-use water systems

Water systems that provide services for multiple uses of water are now being promoted as a potential approach for achieving the Sustainable Development Goals (SDGs). While a livelihood approach is central to developing multiple-use water systems, there are technical (water sources, quality) and cost issues that need to be addressed if this approach is to work in poor rural communities. Water may not be sufficient for all users and uses within the command area of water systems, but different sources may be used for different purposes, depending on the location of the delivery point, as well as the quality of water.

Water systems designed for delivering services for multiple uses tend to be more expensive than single-purpose water delivery systems. However, multiple-use water systems also have a greater potential for more user commitments in operation and maintenance because they are able to provide a wide range of services to different users. The cost for designing, constructing, operating and maintaining such systems must be covered by water charges (which may be different depending on the use) and subsidies. If the actual cost of these systems is not met, the systems risk breaking down under the vicious cycle of low maintenance, bad service, low cost recovery, low budget and low maintenance. Despite the critical issues in multiple-services water systems, the systems have a great potential to improve livelihoods among poor people in rural areas, particularly rural women, if the systems are planned, designed, constructed, operated and maintained properly. The cost of these systems may even be less than anticipated if the benefits in terms of improved health and livelihoods are considered.

8.3 Mainstreaming gender for empowerment

Addressing women's concerns and mainstreaming gender in water initiatives and projects through a livelihoods approach are critical because this generates an understanding of people's livelihood strategies and their decision-making mechanisms and processes. A number of approaches have been developed over the years to facilitate gender mainstreaming in integrated water resources management. But it needs a regular supervision and a proper monitoring process to ensure the system is in place and it is supporting to reduce the vulnerability of poor and marginalized group of people especially women.

8.4 Gender-sensitive approach design and targeting

Gender-sensitive approach design and targeting are needed to enable rural women to benefit fully from both government and non-government initiatives. The designs should be based on the actual situation at the particular site and not on common place assumptions regarding women's control over and access to resources. In targeting, a distinction must be made among poor rural people, rich rural elites and poor rural women in order to reach the poor women. While setting quotas for women's membership in WUAs, the relevant stakeholders should take care to ensure that women who are affected by salinity intrusion and most vulnerable due to different reasons of socio-economic issues are being addressed. It should also be monitored that the decisions made through the WUAs members, are well- addressed for the women who are most affected due to salinity rather than women from rich and influential families who join only because men in the families want them to do so.

8.5 Sex-disaggregated data collection and analysis

Sex-disaggregated data analysis is important throughout the implementation, operation, and maintenance cycle in order to design solid gender-responsive interventions, to monitor the effectiveness and to evaluate the impact of the initiatives. These data are key in assessing the positive or negative impacts of interventions.

During talking with the local government and NGO officials in KII it was revealed that, in the projects, if the data on interventions are not always disaggregated by sex and socio-economic population segment, making it difficult to understand the effects of the interventions on different groups, particularly women.

8.6 Gender-sensitive indicators

Gender-sensitive indicators are essential in monitoring and assessing the impact of the initiatives on communities of poor women and men. The indicators should be district specific and must be used in the context of the location. For example, indicators for a water management project in Khulna will be different from a water management project in Rangpur or Sylhet. Because the severity of water crisis and vulnerability of people due to water would be different in these districts. However, for monitoring and impact evaluation, project-specific indicators need to be developed in close collaboration with and based on input from the participating communities.

8.7 Gender-responsive budgets

Gender-responsive budgets and gender audits are being promoted as new gender mainstreaming initiatives (Sever 2005). These help in establishing who is benefiting from the services and interventions. If it is used in combination with gender-sensitive indicators, they are useful in the monitoring and evaluation of policies and adaptation methodologies. Gender-sensitive indicators may be crucial in establishing criteria for budget allocations at the planning and formulation stages of interventions (Sever 2005). Sex-disaggregated data is needed to perform this analysis.

8.8 Capacity-development among stakeholders

Significant support and capacity-development efforts are required to enhance the participation of rural women in decision-making processes for water management. Training and capacity-development among women to enable them to take up leadership roles, to voice their concerns without any hesitation and to enhance their technical skills are essential if the benefits of water interventions in reducing poverty and improving livelihoods are to be equitably distributed. Also, rural men need to be engaged in empowering rural women, particularly in societies where the support of men for such initiatives is required.

The capacity-development of relevant stakeholder including government and non-government, civil society, service providers, policy makers, and project designers is as important as the capacity-development of rural women and men pertaining to water governance, national water policy, and women. The stakeholders must be aware of the benefit of a good gender approach in achieving progress in agriculture, particularly in water management. A number of sector guides and manuals for gender mainstreaming exist. However, they use social scientists' language and terminology that may not be easily understood by water professionals in the field and are therefore not applicable in many circumstances (Zwarteveen 2006).

8.9 Documenting and sharing existing knowledge

Documenting and sharing experiences in incorporating gender issues are essential for drawing lessons on what works and what does not work in certain situations. Although there are several water programs and projects that focus on gender issues and women's involvement in Satkhira district, the experiences have not been documented sufficiently. This is particularly true regarding the process of involving women in project cycles and the related achievements and constraints. In

some cases, reference to women's participation in a project is limited to the number of women beneficiaries and number of women trained. More needs to be done to document clearly the lessons learned: the successes, challenges and catalysts in successful gender mainstreaming.

8.10 Collaboration, Cooperation and Coordination

Multiple stakeholders are working on the vulnerable community of Satkhira district especially in Borokupat village. Therefore, lack of coordination is clearly visible in the projects of government, INGOs, and local NGOs along with the WMGs. Strong cooperation among different stakeholders, government, NGOs, and donor agencies, can facilitate the achievement of safe drinking water adaptation initiatives and promote an effective safe drinking water adaptation policy. More attention by government as well as by national and international NGOs is needed to overcome the salinity problem in the future considering the present context. Private sector can also play a vital role in reducing the salinity intrusion in this locality in association with the other stakeholders.

Local government institutions and local community organizations could establish a collaborative partnership in undertaking the responsibility for developing a local "vision" and strategy; designing/planning, allocating resources, implementing and monitoring/evaluating of water related development activities that would better cater to local needs. They would "jointly" become the driving force towards development, develop a "sense of shared ownership," and become "managers" of their development initiatives.

8.11 Inclusion of gender in water policy and guideline

Since the 1980s, salinity problems have received very little attention in Bangladesh; even the Coastal Zone Policy 2005 (Ministry of Water Resources 2005) developed by the government did not take salinity issues into account. The National Adaptation Program of Action (Ministry of Environment and Forest 2005) briefly explains the causes and impacts of water salinity on the coastal economy, whereas much more emphasis was placed on climate change and sea-level rise.

The National Water Policy of the Bangladesh government should incorporate methods of coordination and partnership among the development efforts of government, NGOs, and communities in order to ensure proper implementation at the grassroots level emphasizing on women and salinity factor in coastal belt. This would promote pragmatic actions that facilitate

integration by knowing and applying community perception through addressing the different needs and vulnerability of women, adaptation measures, and expectations to cope with and solve the safe drinking water scarcity problem.

8.12 Proper monitoring strategy

Though at least 30% women representative needs to be in Water User Group along with one third women member to be in the executive committee. But most of the time, the representation of women is only for quota basis and mostly rich and elite rural women take part in these water groups. However, they usually do not participate in the decision-making process, and most of the time the vulnerabilities of women are not considered in taking any water related decision in the community. In the first stage of “Water User Group (WUG)” which is “Water Management Group (WMG)” based in village level, women participation is comparatively better. But it gets less in the upper stages which are “Water Management Association (WMA)” at upazilla level and “Water Management Federation (WMF)” at district level. Although according to Water User Group guideline, the representation of women will remain same in each of the stages of water governance. Therefore, proper and strong monitoring is needed to incorporate women’s effective participation in all the stages.

8.13 Advocacy and networking

Advocacy and networking based on evidence-based research is needed to collaborate and coordinate with the other relevant line ministries of Bangladesh for example: ministry of agriculture, fisheries, rural development, and disaster management focusing on women and water issues to address the different needs and vulnerabilities of women due to salinity. It would help others to consider gender issues in planning, developing, and implementing of any sort of program, policies, guideline and approaches to ensure the needs and vulnerabilities of women are being addressed through an equity approach.

8.14 Use of different tools for context analysis

Addressing unequal power relations between women and men will contribute to enhancing women’s rights, participation and leadership in prevention and reduction of water governance at all levels. To recognize the leadership capacity of women as active agents and contributors and

for further strengthening women's capacities and supporting their leadership role in water governance is vital for community resilience as a whole.

Conducting gender analysis and Participatory Capacity and Vulnerability Assessment (PCVA) of women in specific area and geographical location are essential to address the different impact of water scarcity due to salinity. Using these types of tools in the community level explicitly promote gender responsive and harmonized information management, statistical methodologies and processes as well as using existing data to its full potential in research informing water governance to close existing knowledge gaps. Without data, problem identification and accountability is superficial and perpetuate responses that are insensitive to gender differentials.

8.15 Cost analysis in designing the adaptive technology

During designing of any kind of adaptive technology as water sources like protected pond, Pond Sand Filter, rainwater harvesting, tube-well and supply water etc. cost analysis should be done. And it should be measured that, whether the cost is bearable for the poorest rural women or not. If it is comparatively expensive for them then a contingency plan should be in place to reach various water sources to the marginalized group of people especially women at the most convenient and cheapest way.

8.16 Community Participation

Active participation of communities is specially needed in association with various stakeholders such as governmental agencies, NGOs, and other organizations. It is imperative that communities' adaptation methods be supported and guided by local governments and NGOs to make them both more effective and environmentally friendly. At the same time, it is imperative to have efficient partnerships between government organizations, community people, and NGOs for gender mainstreaming in overall water governance sector. To involve community especially women from the designing to evaluation process of an intervention would help the stakeholder addressing the special needs and vulnerabilities due to salinity intrusion in the affected area.

Chapter 9: Conclusion

9 Conclusion

Women's role in the management of water resources has been increasingly acknowledged by development agencies, policymakers, national governments and non-governmental organizations over the past decade. Despite this recognition of the importance of involving women, evidence shows a wide gap between the stated intentions to improve their access to water and practical results in the field. In general, the problems are well known; there is a critical need to identify solutions at different levels— policy, implementation, local – to move the agenda of gender mainstreaming in water governance forward.

To assess women's roles in productive, reproductive, and community level in water governance system a proper gender analysis needs to be conducted that would be based on context, location and need emphasizing on water governance. This would help to identify the reasons of inhibit engagement of women in decision making processes to cope with salinity intrusion and to ensure equal and proper use of fresh water. Moreover, analysis is needed to identify the impact of salinity issues on women's workloads considering it as a constraint of their life and livelihood. Affirmative action is essential to ensure women's participation in decision-making in water governance. However, interventions taken by the government and non-government sectors must include supporting components such as capacity-development, access to capital and awareness-raising to achieve better results in encouraging women's participation and improving their livelihoods.

Considering the socio-ecological theory, one of the major findings of this study is gendered location makes a difference in saline contaminated areas, where gender differentiated impacts are being observed. Women's general lack of resources to deal with the ramifications of the saline problem can compound the effects of poverty and gender to increase further their marginalization and suffering. However, gender has to be understood as intersecting with other axes of differentiation such as social class, age and geographical location, to understand the degrees in suffering from salinity intrusion (i.e. those who have resources or power and whether their water source is saline prone or not). Such intersectionalities produce the similarities and differences between people that enable water politics to have multiple ramifications, affecting both men and women of different social categories and locations in different ways. Both inter and intra-gender

oppression and discrimination operate simultaneously in producing such realities. From the FGD and KII discussion it was evident that, the socio-economic condition of women as well as the trenchant patriarchal power relations affect the implementation of the water governance system at local, institutional and national levels.

While there are numerous saline adaptation programs in operation in Bangladesh currently especially in coastal area, donors and NGOs are involved in different aspects in scattered projects (e.g. pond sand filter, rain water harvesting, raising awareness, developing and providing saline tolerant seeds and technologies, etc). Many of these studies and projects do not involve a gendered analysis or approach (Sultana 2006), and very few women's NGOs are involved in addressing women issues in salinity intrusion. At most there are a few groups of women who are formed to receive various water technologies, but often decision making about salinity and water management is controlled by the men in households. Compounded by trenchant patriarchal power relations, collectivizing among women themselves to resolve safe water access is thus not evident, as not all household members feel the ramifications of the crisis equally, and different households adapt to the situation differently. Lots of factors are causing the process of salinity for people of the coastal area in Bangladesh and gender dimension. However, various approaches have been taken place to reduce the vulnerability created by the salinity with the support from both government and non-government sector. But focusing on women in water issues is hardly observed and recognized. To identify the strategies to enable greater representation of women's voices in the water governance systems to protect community livelihoods and ensure water security, special needs and vulnerabilities of women should be considered as an equity approach throughout the policy formulation, program development, and implementation process focusing on social and ecological context. Salinity intrusion consequently has multiple dimensions and linked effects that go beyond just having access to water, resulting in continued suffering and hardship of many that influences everyday life and village politics, and needs greater attention from scholars and practitioners.

Chapter 10: Reference

10 Reference

- Zurlini, G., Petrosillo, I., and Cataldi, M. 2008. Socioecological Systems. In Sven Erik Jørgensen and Brian D. Fath (Editor-in-Chief), *Systems Ecology*. Volume 5. pp. (3264-3269) Oxford: Elsevier.
- Claudia, P. W. 2015. A Theory on Water Governance Dynamics. In *Water Governance in the face of global change*. pp. (159-180). Springer.
- Agarwal, B. 1994. Gender and command over property: A critical gap in economic analysis and policy in South Asia. *World Dev.* 22(10):1455-1478.
- Agarwal, B. 1997. Environmental action, gender equity and women's participation. *Dev. Change* 28:1-44.
- Agarwal, B. 1997. Bargaining and gender relations: Within and beyond the household. *Feminist Econ.* 3(1):1-51.
- Agarwal, B. 2000. Conceptualizing environmental collective action: Why gender matters. *Cambridge J. Econ.* 24(3):283-285.
- Eckersley, R. 1992. *Environmentalism and Political Theory- towards an Eco-centric Approach*. State University of New York. ISBN 0-203-49871-2.
- Escobar, A. 1995. *Encountering Development- The making and unmaking of the third world*. Princeton University Press. ISBN 0-691-03409-5 (cl).
- Coles, A., and Wallace, T. 2005. *Gender, Water and Development*. Oxford International Publishers Ltd. ISBN 1-84520-125-6.
- Glover, D. and Kaplan, C. 2000. *Genders- The new critical idioms*. Routledge. ISBN 0-203-9923-4.
- Enarson, E. 1998. *Through Women's Eyes: A Gendered Research*. Disaster Preparedness Resources Centre. University of British Columbia. 22(2):157-173.
- Shirin, M. Rai. 2008. *The gender politics of development- essays in hope and despair*. ISBN 978-1-84277-837-1.
- Eric, C. Jones, and Arthur, D. Murphy. 2009. *The Political Economy of Hazards and Disasters*. Alta Mira Press.
- Peet, R., and Watts, M. 1996. *Liberation Ecologies- environment, development, social movements*. Routledge. ISBN 0-203-03292-6.

- Pelling, M. 2003. *Natural Disasters and Development in a Globalizing World*. Routledge. ISBN 0-203-40237-5.
- Maarten, A. Hajer. 1995. *The Politics of Environmental Discourse- Ecological Modernization and the Policy Process*. Oxford University Press.
- Mishra, S. Panda. 2008. *Engendering Governance Institutions- State, Market and Civil Society*. SAGE Publications India Pvt Ltd. ISBN: 978-0-7619-3608-4.
- Bordia, M. Das. 2017. *The Rising Tide-A new look at water and gender*. The World Bank.
- *Passport to Mainstreaming Gender in Water Programming*. 2012. Food and Agriculture Organization of the United Nations (FAO).
- *Ecological Impacts of Climate Change*. 2008. The National Academies Press. The United States of America.
- Wahaj, R. 2007. *Gender and Water- Securing water for improved rural livelihoods: The multiple-uses system approach*. International Fund for Agricultural Development (IFAD).
- Cleaver, F., ed. 1998. *Choice, Complexity and change: Gendered livelihoods and the management of water*. *Agriculture and Human Values* (special issue) 15(4).
- Datta, A., 1995. *Who benefits and at what cost? Expanded shrimp culture in Bangladesh*. Paper presented at the Rural Development Studies Seminar, Institute of Social Studies, The Hague.
- Elson, D. 1995. *Male bias in the development process*, 2nd ed. Manchester: Manchester University Press.
- Jackson, C. 1998. *Gender, irrigation and environment: Arguing for agency*. *Agric. Hum. Values* 15(4):313-324.
- Jordans, E., and M. Zwarteveen, 1997. *A well of one's own: Gender analysis of an irrigation program in Bangladesh*. Colombo, Sri Lanka: International Irrigation Management Institute.
- Khatoon, K. 1995. *Impact of shrimp cultivation: Pattern of changes in the lives of people in Paikgachha and Shyamnagar*. Dhaka, Bangladesh: Ain-O-Shalish Kendra.
- Dewan, C., Buisson, M.Charlotte, and Mukherji, A. 2014. *The imposition of participation? The case of participatory water management in coastal Bangladesh*. *Water Alternatives* 7(2): 342-366.
- Tusar, K. and Moumita, C. 2013. *Climate change influence water use pattern in south-west coastal belt of Bangladesh*. *J. Environ. Sci. & Natural Resources*. 6(2): 217 -225.
- Benneyworth, L., Gilligan, J., John, C. Ayers, Goodbred, S., George, G., Carrico, A., Rezaul, M. Karim, Akter, F., and Piya, B. 2016. *Drinking water insecurity: water quality and access*

- in coastal south-western Bangladesh. *International Journal of Environmental Health Research*.
- Hanchett, S., Hossain, T., Monju, K. R. Akhter, Akhter, S., and Islam, A. 2014. *Water Culture in South Asia: Bangladesh Perspectives*. Development Resources Press. ISBN-978-0-9906337-0-9.
 - Anwarul, M. Abedin, Habiba, U., and Shaw, R. 2014. Community Perception and Adaptation to Safe Drinking Water Scarcity: Salinity, Arsenic, and Drought Risks in Coastal Bangladesh. *International J Disaster Risk Sci* (2014) 5:110–124.
 - Cleaver, F. 2000. Analyzing Gender Roles in Community Natural Resource Management: Negotiation, Lifecourses and Social inclusion. *IDS Bulletin* 31 (2): 60–7.
 - Szabo, S., Sarwar, M. Hossain, Neil, W. Adger, Matthews, Z. 2015. Soil salinity, household wealth and food insecurity in tropical deltas: evidence from south-west coast of Bangladesh.
 - Crow, B. and Sultana, F. 2002. Gender, Class and Access to Water: Three Cases in a Poor and Crowded Delta. *Society and Natural Resources* 15 (8): 709–24.
 - Jackson, C. 1993. *Doing What Comes Naturally? Women and Environment in Development*. *World Development* 21 (12): 1947–63.
 - Jordans, E. and Zwartveen, M. 1997. *A Well of One's Own: Gender Analysis of an Irrigation Program in Bangladesh*. Colombo: Grameen Krishi Foundation and International Irrigation Management Institute.
 - Kabeer, N. 1994. *Reversed Realities: Gender Hierarchies in Development Thought*. London: Verso.
 - Marchand, M. and Parpart, J. 1995. *Feminism/ Postmodernism/ Development*. New York: Routledge.
 - Meinzen-Dick, R. and Zwartveen, M. 1998. Gendered Participation in Water Management: Issues and Illustrations from Water Users Associations in South Asia. *Agriculture and Human Values* 15 (2): 337–45.
 - Mohanty, C. T., Russo, A. and Torres, L. 1991. *Third World Women and the Politics of Feminism*. pp. 1–47. Indiana University Press.
 - Rocheleau, D., Thomas-Slayer, B. and Wangari, E. 1996. *Feminist Political Ecology: Global Issues and Local Experiences*. New York: Routledge.
 - Palmer-Jones, R. W. 1992. Sustaining serendipity? Groundwater irrigation, growth of agricultural production, poverty in Bangladesh. *Econ. and Polit. Weekly* XXVIII (39):A-128-140.

- Allen, T. and Thomas, A. 1992. Poverty and development. Oxford University Press. pp.: 291-312.
- Rahman, A. 1994. The impact of shrimp culture on the coastal environment. Vol. 1. pp.: 449-524. Bangladesh University Press Ltd.
- Rogaly, B., Harriss-White, B. and Bose, S. 1999. Sonar Bangla? Agricultural growth and agrarian change in West Bengal and Bangladesh. Thousand Oaks, CA: Sage.
- Sadeque, S. Z. 1996. Nature's bounty or scarce commodity: Competition and consensus over ground water use in Bangladesh. Paper presented at the Annual Conference of the International Association for the Study of Common Property, Berkeley, CA, June.
- Sultana, F. 2007. Water, Water Everywhere, But Not a Drop to Drink: Pani Politics (Water Politics) in Rural Bangladesh. International Feminist Journal of Politics.
- Rabbani, G. 2013. Salinity-induced loss and damage to farming households in coastal Bangladesh. Int. J. Global Warming, Vol. 5, No. 4.
- Basar, A. 2012. Water Security in Coastal Region of Bangladesh: Would Desalination be a Solution to the Vulnerable Communities of the Sundarbans? Bangladesh e-Journal of Sociology. Volume 9. Number 2.
- Nuruzzaman, AKM. 2014. Causes of Salinity Intrusion in Coastal Belt of Bangladesh. International journal of plant research.
- Nahian, M. A., and Ahmed, A, et al. 2018. Drinking water salinity associated health crisis in coastal Bangladesh. Elem Sci Anth, 6: 2.
- Sen, A. 1981. Poverty and famines: An essay on entitlement and deprivation. Oxford: Clarendon Press.
- Sen, G. 1996. Gender, markets and states: A selective review and research agenda. World Dev. 24(5):821-829.
- Shamim, I., and K. Salahuddin. 1994. Energy and water crisis in rural Bangladesh- Linkages with women's work and time. Dhaka: Women for Women.
- Sultana, F. 1998. Shrimp and sustainability: Social and ecological impacts of the shrimp aquaculture industry in Bangladesh. University of Minnesota, Minneapolis.
- Van Koppen, B. 2000. Poverty/ Gender. From bucket to basin: Managing river basins to alleviate water deprivation. The contribution of the International Water Management Institute to the world water vision for food and rural development. Colombo, Sri Lanka: International Water Management Institute.

- Van Koppen, B., and Mahmud, S. 1996. Women and water pumps in Bangladesh: The impact of participation in irrigation groups on women's status. UK: Intermediate Technology.
- Van Wijk, C., De Lange, E., and Saunders, D. 1996. Gender aspects in the management of water. *National Resources Forum* 20(2):91-104.
- Wood, G. 1984. Provision of irrigation services by the landless: An approach to agrarian reform in Bangladesh. *Agric. Admin.* 17:55-80.
- Wood, G., and Palmer-Jones, R. 1991. The water sellers: A cooperative venture by the rural poor. West Hartford, CT: Kumarian Press.
- Wynne, B. 1994. Scientific knowledge and the global environment. pp.: 169-189. London: Routledge.
- Crow, B., Sultana, F. 2002. Gender, Class, and Access to Water: Three Cases in a Poor and Crowded Delta. *Society and Natural Resources*, 15:709-724.
- Ali, A.M.S. 2006. Rice to shrimp: Land use/ land cover changes and soil degradation in southwestern Bangladesh. *Land Use Policy* 23(4): 421–435.
- Curry, E. 2010. Water scarcity and the recognition of the human right to safe freshwater. *Northwestern Journal of International Human Rights* 9(1): Article 5.
- Daily Star. 2013. Salinity in southwestern region: Drinking water to death. 26 July 2013.
- Habiba, U., M.A. Abedin, and R. Shaw. 2013. Salinity induced livelihood stress in southwestern part of Bangladesh. In *Water insecurity: A social dilemma*, ed. M.A. Abedin, U. Habiba, and R. Shaw, 139–165. Bingley, UK: Emerald Publishers.
- Islam, R.M. (ed.). 2004. Where land meets the sea: A profile of the coastal zone of Bangladesh. Dhaka: University Press Limited.
- Parvin, G.A., Takahashi, F., and Shaw. R. 2008. Coastal hazards and community-coping methods in Bangladesh. *Journal of Coastal Conservation* 12(4): 181–193.
- Pereira, L.S., Cordery, L., and Lacovides, L. 2009. Coping with water scarcity: Addressing the challenges. New York: Springer.
- Quazi, A.R. 2006. In search of safe drinking water: In the context of climate change and salinity. Satkhira, Bangladesh: Uttaran and Water Committee.
- Haider, M.Z., Hossain, M.Z. 2013. Impact of salinity on livelihood strategies of farmers. *J Soil Sci Plant Nutr* 13(2):417–431.
- Rahman, M., Giedraitis, V.R., Lieberman, L.S., Akhtar, T., Taminskien. 2013. Shrimp Cultivation with Water Salinity in Bangladesh: the Implications of an Ecological Model. *Univers J Public Health* 1(3):131–142.

- Huq, S. and Ayers, J. 2008. Climate Change Impacts and Responses in Bangladesh. Policy Department: Economy and Science. European Parliament. Brussels, Belgium.
- Primavera, J.H. 1997. Socio-economic Impacts of Shrimp Culture. *Aquaculture Research*. pp.: 815-827.
- Dasgupta, S., Kamal, F.A., Khan, Z.H., Choudhury, S., and Nishat, A. 2014. River salinity and climate change: evidence from coastal Bangladesh.
- Huq, S., and Rabbani, G. 2011. Adaptation Technologies in Agriculture- the Economics of rice farming technology in climate vulnerable areas of Bangladesh.
- Ranjan, P. 2007. Effect of Climate Change and Land use change on Saltwater Intrusion.
- Rounak, A., and Aatur, M. Rahman. 2013. Transboundary River Water for Ganges and Teesta Rivers in Bangladesh: An Assessment. *Global Science and Technology Journal*. Vol: 1. No: 1.
- Khan, A. H. 1993. Farakka Barrage: Its impact on Bangladesh- an overview. Dhaka. P.13.
- Mirza, M.M.Q. 1998. Diversion of the Ganges Water at Farakka and Its Effects on Salinity in Bangladesh. *Environmental Management*. Vol: 22. No: 5. Pp.: 711-722. Hamilton, Newzealand.
- Huq S, Karim Z, Asaduzzaman M, Mahtab F. 2005. Vulnerability and adaptation to climate change for Bangladesh. Kluwer Academic, Dordrecht.
- IPCC (Intergovernmental Panel on Climate Change) 2007: synthesis report. UN Intergovernmental Panel on Climate Change, New York.
- Arnstein, S.R. 1969. A ladder of citizen participation. *Journal of the American Institute of Planners* 35(4): 216-24.
- Arntzen, J.W., Molokomme, D.L.; Terry, E.M.; Moleele, N.; Tshosa, O. and Mazambani, D. 2003. Main findings of the review of CBNRM in Botswana. Occasional Paper No. 14. Gaborone: IUCN/Netherlands Development Organization (SNV) CBNRM Support Program.
- Buisson, M.C., Mitra, A. and Kenia, N. 2013. Report from Households and Water Management Organizations Quantitative Surveys. Dhaka, Bangladesh: Challenge Program on Water and Food.

Appendix 1: Survey questionnaire

Gender Based Water Governance to Cope with Salinity Intrusion: A Study on Coastal Area in Bangladesh

Survey Location	Village	Borokupat		
	Union	Atulia		
	Sub-District	Shyamnagar		
	District	Satkhira		
Number of Household				
Name of Respondent				
Gender	Male	1	Female	2
Father/Husband's/Wife Name				
Mobile No.	Profession	Interview Time		
Date	Start	End		

সালাম/আদাব, আমি একটি গবেষণার কাজ করছি এবং বর্তমানে আপনাদের এলাকার মানুষের জীবন-জীবিকার উপর একটি জরিপ কাজ পরিচালনা করছি। এ ব্যাপারে আপনার কিছু মূল্যবান সময় আমাকে দিলে খুশি হবো। আপনার দেয়া তথ্যাদি শুধুমাত্র গবেষণার কাজে ব্যবহৃত হবে এবং সকল প্রকার গোপনীয়তা রক্ষা করা হবে।

Section 1: Demographic and Basic Household Information

Q.1. Household information: পরিবারের তথ্য:

পরিবারের সদস্যদের নাম লিখুন (পরিবারের প্রধানের নাম দিয়ে শুরু করুন) Name of the Household Head	প্রধানের সাথে সম্পর্ক Relation with HH head (start with HH head)	বয়স Age	লিঙ্গ Sex	বৈবাহিক অবস্থা Marital status	শিক্ষা Education	প্রধান পেশা Main Occupation	বছরে কত মাস প্রধান পেশায় নিযুক্ত থাকেন (১-১২ মাস) Months employed in main occupation per year (from 1-12 months)	২য় কাজ 2 nd Job	মৌসুমি কাজ Seasonal job (Note the Months and days) (মাস ও দিন উল্লেখ করুন)

লিঙ্গের কোড: Code for Sex:

পুরুষ Male	1
ইরী Female	2

সম্পর্কের কোড: Code for Relationship:

পরিবারের প্রধান (নিজে) Household head (self)	1	পুত্র বধু/মেয়ের জামাই Son/Daughter- in- law	6
স্বামী/স্ত্রী Husband/ wife	2	শ্বশুর/শ্বশুড়ী Father/ mother-in-law	7
পুত্র/কন্যা Son/ Daughter	3	নাতি/নাতনি Grandson/ daughter	8
পিতা/মাতা Father/ Mother	4	অন্যান্য (উল্লেখ করুন) Others (Specify)	

ভাই/বোন Brother/ Sister	5	
-------------------------	---	--

বৈবাহিক অবস্থার কোড: Code for Marital status:

বিবাহিত Married	1
অবিবাহিত Unmarried	2
বিপত্নিক/বিধবা Widow	3
তালাকপ্রাপ্ত/প্রাপ্তা Divorced	4
বিচ্ছিন্ন Separated	5

শিক্ষার কোড: Code for Education:

অশিক্ষিত Illiterate	1	এইচএসসি HSC	7
শুধুমাত্র স্বাক্ষর করতে পারেন Can sign only	2	স্নাতক Graduate	8
পড়তে এবং লিখতে পারেন Can read and write	3	স্নাতকোত্তর Post graduate	9
৫ম শ্রেণী পর্যন্ত Up to class V	4	অন্যান্য (উলে-খ) Others (Specify)	
৬ষ্ঠ-৯ম শ্রেণী পর্যন্ত Class VI-IX	5	শিশু (< ৭ বছরের কম) Child (<7 yrs.)	99
এসএসসি SSC	6		

পেশার কোড: Code for Occupation:

কৃষি-নিজের জমি চাষাবাদ Farmer (own land)	1	কুমার Potter	15
বর্গাচাষী Farmer-cum- sharecropper	2	কাঠমিস্ত্রী Carpenter	16
গৃহিনী/পরিবারের কাজ করেন Housewife/household work	3	রাজমিস্ত্রী Mason	17
অন্যের ঘরে কাজ করেন Works in others' house	4	কামার Blacksmith	18
কৃষি দিন মজুর Agriculture wage labor	5	দর্জি Tailor	19
কৃষি নয় এমন দিন মজুর Non-agricultural wage labor	6	প্রতিবন্ধি Disable	20
চুক্তিভিত্তিক শ্রমিক Contractual labor	7	মধু সংগ্রহকারী Honey Collector	21
অভিবাসী শ্রমিক Migrant labor	8	কাকড়া উতপাদনকারী Crab Producer	22
ঘরের পাশে বাগান করা Gardener	9	মাঝি Boatman	23
হাঁস-মুরগী পালন Poultry	10	মাছ ধরা Fisher	24
রিক্সা/ভ্যান চালক Rickshaw/van puller	11	পশু-পালন Live Stock rearing	25
চাকরীজীবী Salaried employee	12	বেকার Unemployed	26
ক্ষুদ্র ব্যবসা Small enterprise	13	চিংড়ী চাষী Shrimp Farmer	
হস্তশিল্প Handicrafts	14	অন্যান্য (উলে-খকর) Others (Specify)	

Section 2: Land/water body ownership pattern, livelihood assets and security

2.1 পারিবারিক আয় ও ব্যয় সংক্রান্ত তথ্য income and expenditure

Q.2 গত বছর আপনার পরিবারে কোন খাতে কত টাকা খরচ হয়েছিল? How much did your household spend on the following items in the last year?

খরচের তালিকা List of Expenses	কোড Code	টাকা Amount (inBDT)
খাদ্য Food	01	
স্বাস্থ্য (চিকিৎসা, ঔষধ ইত্যাদি) Health (treatment, medicines etc)	02	
শিক্ষা (বই, কাগজ, কলম, ফি ইত্যাদি) Education	03	
পরিবহন/ভাড়া Transportation / Conveyance	04	
পোশাক Clothing	05	

ঘর তৈরি এবং মেরামত House construction and repairing	06	
লিজ মূল্য/ খাজনা Lease value / Tax	07	
বিনোদন Entertainment	08	
সামাজিক কর্মকাণ্ড Social activities	09	
পণ্য পরিবহন Product transport	10	
তেল এবং জ্বালানী Fuel & fire wood	11	
দেনা/ঋণ পরিশোধ Credit / Loan repayment	12	
বিবাহ Marriage	13	
যৌতুক Dowry	14	
মোবাইল খরচ Expenditure on mobile	15	
অন্যান্য (উলে- খ করণ) Others (specify)		

Q.3 কৃষি এবং কৃষি বহির্ভূত উৎপাদনের আয় থেকে পরিবারের বাৎসরিক আয়ের বিবরণ (গত বছর) Annual household income from agricultural and off-farm production (last year)

উৎস Source	কোড Code	উৎপাদন/বিক্রয় মূল্য টাকায় Source/Value of sales	উৎপাদন খরচ/খরচ (টাকা) Production expenditure/ex penditure (in BDT)	উৎপাদন খরচ বাদ দিয়ে লাভ/ক্ষতি (টাকায়) Profit/Loss after deducting production cost
কৃষিজাত Agricultural		a	b	a-b
ধান Rice	01			
পাট Jute	02			
আলু Potato	03			
গম/ভুট্টা Wheat/ Maize	04			
তালপাতা (কাশ/ছন) Thatch (kash/ chon)	05			
আখ Sugarcane	06			
মরিচ Chilli	07			
বাদাম Nuts	08			
পেঁয়াজ Onion	09			
রসুন Garlic	10			
কচু Taro	11			
শাক সবজি Vegetable	12			
কলাই/ডাল Gram/Pulse	13			
ফল Fruits	14			
মাছ Fish	15			
হাঁস-মুরগী বিক্রি Selling of poultry	16			
পশু বিক্রি Selling of Livestock	17			
দুধ বিক্রি Selling of milk	18			
ডিম বিক্রি Selling of eggs	19			
চিংড়ি ও কাঁকড়া shrimp and crab	20			
চিংড়ি পোনা সংগ্রহ collect shrimp hatchery	21			
অন্যান্য (উলে- খ করণ) Others(specify)				
মোট Total				
কৃষি বহির্ভূত আয় Off-farm				
কাঠ বিক্রি Wood selling	22			
হস্তশিল্প বিক্রি Handicrafts selling	23			
ক্ষুদ্র ব্যবসা/ ব্যবসা Small enterprise/ Business	24			
ঋণ/ টাকা ধার করা Loan/ borrowed Money	25			

মজুরী Wage	26			
অন্যান্য (উলে-খ করুন) Others(specify)				
মোট Total				

Q.4আপনারা উৎপাদিত ফসল/পণ্য, মাছ, হাঁস-মুরগী, গরু-ছাগল ইত্যাদি সাধারণতঃ কোথায় বিক্রি করেন? (প্রতিটির জন্য ১ টি উত্তর)
Where do you sell the crops/products, fish, poultry, livestock, etc. that you produce? (Single choice for each)

	ফসল/পণ্য Crop/Product	মাছ Fish	হাঁস-মুরগী Poultry	পশু Livestock
ফড়িয়া (জমি/বাড়ি থেকে নিয়ে যায়) Foria (take from home/land and sell)	1	1	1	1
কাছের হাট/বাজার (সপ্তাহের নির্দিষ্ট দিন বা প্রতিদিন) Nearby market (on a particular day during the week or daily)	2	2	2	2
বড় পাইকারী বাজারLarge wholesale market	3	3	3	3
অন্য কোনো স্থানে (উলে-খ করুন) Some otherplace (specify)				
বিক্রি করি না/প্রযোজ্য নয় Do not sell/not applicable	99	99	99	99

Q.5 Percentage of HHs experiencing at least one month of food shortage? গত এক মাসে খানাগুলো যে পরিমানে খাদ্য স্বল্পতার শিকার হয়েছিল?

No Shortage (কোন স্বল্পতা ছিল না)	
One Month (এক মাস)	
Two Months (দুই মাস)	
Three or more months (তিন থেকে চার মাস)	

Q.6 Reasons for food shortage কি কারণে খাদ্য স্বল্পতা হয়েছিল?

Flooding and Cyclones (বন্যা এবং ঘূর্ণিঝড়)	
Water Management Problems (পানি ব্যবস্থাপনা সমস্যা)	
Financial Issues (অর্থনৈতিক কারণ)	
Others (অন্যান্য)	

Q.7 প্রতি মাসে কত টাকা সঞ্চয় করেন? কোথায় সঞ্চয় করেন? কত মাস ধরে সঞ্চয় করেন এবং কি কারণে সঞ্চয় করেন?How much money do you save every month? Where do you save it? For how many months have you saved and for what reason?

সদস্যের কোড Member's Code	প্রতি মাসে সঞ্চয় (টাকা) Savings per month (Tk.)	* সঞ্চয়ের উৎস (কোথায় সঞ্চয় করেন) *Source of Savings	কত মাস ধরে সঞ্চয় করেন Duration of Savings (months)	**সঞ্চয়ের কারণ **Reason behind Savings

Section:3 Water Governance

Q. 8 Are you a member of Water User Group? আপনি কি কোন পানি দলের সদস্য?

হ্যা Yes:

না No:

হয়ে থাকলে কোন দল Which Group:

পানি ব্যবস্থাপনা দল Water Management Group:

পানি ব্যবস্থাপনা এ্যাসোসিয়েশন Water Management Association:

পানি ব্যবস্থাপনা ফেডারেশন Water Management Federation:

পদবী Post:

পদবী Post:

পদবী Post:

Q.9 সাধারণতঃ আপনারা কোথা থেকে খাবার পানি পান? **Where do you usually get water for drinking?**

Q.10 সাধারণতঃ আপনারা কোথা থেকে রান্নার পানি পান? **Where do you usually get water for cooking?**

উৎস Source	Q.14 খাবার পানি Drinking Water	Q.15 রান্নার পানি Cooking Water
নিজ টিউবয়েল Tube well	01	01
Pond Sand Filter	02	02
Protected Pond	03	03
কুয়া/হিন্দা Well/ Indara	04	04
Supply Water	05	05
নদী/খাল River/ Canal	06	06
বৃষ্টির পানি Rain Water Harvesting	07	07
অন্যান্য (উলে-খ করুন) Others (specify)		

Q.11 (যদি পানির উৎস টিউবয়েল হয় তাহলে জিজ্ঞাসা করুন) পানির উৎসটি কি আর্সেনিক যুক্ত? (Ask if source is Tube well) **Is the source contaminated by arsenic?**

হ্যাঁ Yes	1
না No	2
পরীক্ষা করা হয়নি Not tested	3
জানি না I don't know	9

Q.12 আপনার টিউবয়েল/ খাবার পানির উৎস কি গত ৫ বছরে প্রাকৃতিক দুর্যোগে ক্ষতিগ্রস্ত হয়েছিল? **Did your Tube well/ drinking water source get affected by any natural disaster in the last 5 years?**

হ্যাঁ Yes	1	সাক্ষাৎকার চালিয়ে যান Continue
না No	2	Q.19 তে যান Go to Q.19

Q.13 প্রাকৃতিক দুর্যোগের সময় আপনার খাবার পানির উৎস কি? **What is your source of drinking water in times of natural disaster?**

নিজ টিউবয়েল Tube well	01
Pond Sand Filter	02
Protected Pond	03
কুয়া/হিন্দা Well/ Indara	04
পুকুর Supply Water	05
নদী/খাল River/ Canal	06
বৃষ্টির পানি Rain Water Harvesting	07
বাইরে থেকে from outside	08

Q.14 আপনারা কি খাবার পানি বিশুদ্ধ করেন? **Do you purify drinking water?**

হ্যাঁ Yes	1	সাক্ষাৎকার চালিয়ে যান
না No	2	Q.21 তে যান

Q.15 পানি বিশুদ্ধ করার জন্য আপনারা কি করেন? **What do you do to purify water?**

ফুটানো Boiling	1
----------------	---

ফিল্টার Filtering	2
রাসায়নিক প্রক্রিয়া Chemical Process	3
অন্যান্য (উল্লেখ করুন) Others (specify)	

Section: 5 Women rights, women security and domestic violence

Q. 29 কোন কোন পারিবারিক বিষয়গুলিতে আপনি এখন সিদ্ধান্ত নিতে পারেন? **What are issues now you can take decisions in the household?**

বিষয়	কোড Code	কে সিদ্ধান্ত নেয়? Who is the decision maker?
সন্তান নেয়া Having children	1	
নতুন নতুন অর্থনৈতিক কার্যক্রম গ্রহণ করা Undertaking new financial ventures	2	
উৎপাদনশীল কর্মকাণ্ডে সম্পৃক্ততা Involvement in productive activities	3	
প্রাপ্ত সেবার ব্যবহার Use of aid received	4	
নারীদের ভোট দেয়া Voting of women	5	
জমি বেচা-কেনা Purchase/Sale of land	6	
গাছ বেচা-কেনা Purchase/Sale of trees	7	
উৎপাদন/পণ্য বেচা-কেনা Purchase/Sale of production/product	8	
ছেলে মেয়েদের পড়াশোনা Children's education	9	
ছেলে মেয়েদের বিয়ে Children's wedding	10	
গৃহস্থালি পণ্য ক্রয় To buy household products	11	
পরিবারের দৈনন্দিন কাজ (রাগা, ঝাড়া-মোছা, কৃষি কাজ, পানি আনা, হাঁস-মুরগী এবং গবাদি-পশু দেখাশোনা করা) Everyday matters in your household (cooking, cleaning, farming, bringing water, looking after poultry and livestock)	12	
গৃহস্থালি কাজের বাইরে অন্য কাজ (কৃষি, সামাজিক কাজ ইত্যাদি) Work done outside household (farming, social work, etc)	13	

সিদ্ধান্ত গ্রহণের প্রক্রিয়ার কোড: (1=শুধুমাত্র পুরুষ, 2=শুধুমাত্র নারী, 3=উভয়ই, 4=পুরুষের বেশি ভূমিকা, নারীদের অল্প ভূমিকা, 5=নারীদের বেশি ভূমিকা, পুরুষের অল্প ভূমিকা, 6=জানি না।

Code for decision-making process: 1=only male, 2=only female, 3=both, 4=little role of women, 5=other household members, 6=don't know)

Q. 30 আপনি এ প্রকল্পে যুক্ত হওয়ায় কি বাড়ির বাইরে চলাফেরা করার স্বাধীনতা বৃদ্ধি পেয়েছে কি? **Do you feel more freedom of movement outside the home after getting involved with PROTIC?**

পুরোপুরি স্বাধীনতা Complete Freedom	1
মোটামুটি স্বাধীনতা Moderate Freedom	2
কিছুটা স্বাধীনতা Some freedom	3
কোনো স্বাধীনতা নেই No Freedom	4

Q. 31 আপনি কি মনে করেন যে, এ প্রকল্প শেষ হয়ে গেলেও প্রয়োজনীয় তথ্য সংগ্রহ করে জীবনমান সম্মুন্নত রাখা সম্ভব? কিভাবে? **Do you feel even after the closure of this project you will be able to get necessary information to improve your livelihoods? If so, how?**

Appendix 2: FGD for Rice Farmers (Both Men and Women)

1. What do you know about Water Governance?
আপনি পানি ব্যবস্থাপনা সম্পর্কে কি জানেন?
2. What are the issues/ challenges you face in getting sufficient water in your village? Salinity?
আপনার গ্রামে বিশুদ্ধ এবং পর্যাপ্ত পানি না পাওয়ার প্রধান সমস্যা/কারণগুলো কি? লবনাক্ততা?
3. What do you usually do to get rid of these challenges?
এই সমস্যাগুলো দূর করার জন্য আপনি কি করেন?
4. What are the most challenging problem in this area?
এই গ্রামের সবচেয়ে বড় সমস্যা কোনটি?
5. How do you manage this challenge through effective water governance?
এই সমস্যাটি পর্যাপ্ত পানি ব্যবস্থাপনার মধ্য দিয়ে আপনি কিভাবে মোকাবিলা করেন?
6. What are the strategies you gave taken to get fresh water?
বিশুদ্ধ এবং পর্যাপ্ত পানি পাওয়ার জন্য আপনি কি কি পদক্ষেপ গ্রহণ করেছেন?
 - a) Pond Sand Filter- Cost
 - b) Tube well- Cost
 - c) Rain Water Harvesting- Cost
 - d) Protected Ponds- Cost
 - e) Supply Water- Cost
7. Is it funded by government/NGOs/community itself?
উপরোক্ত পদ্ধতিগুলোর খরচ কিভাবে আসে? কে টাকা দেয়? সরকার/ এনজিও/ কমিউনিটি নিজেই?
8. How much cost does it take to establish this type of infrastructure to secure fresh water? Is it possible for you to establish? Or you need some other support? Do you have any maintenance mechanism in taking care of these infrastructure?
এই ধরনের অবকাঠামো তৈরীর জন্য কিরকম খরচ হয়? আপনারা কি নিজেরাই এগুলো তৈরী করতে পারেন? নাকি অন্যের সাহায্যের প্রয়োজন হয়? আপনারা এগুলো তদারকী কিভাবে করেন? কোন খরচ হয়?
9. Do you have any Water User Group? Like Water Management Group/ Water Management Association?
আপনাদের কি কোন পানি ব্যবহারকারী দল আছে? যেমন: পানি ব্যবস্থাপনা দল/ পানি ব্যবস্থাপনা এ্যাসোসিয়েশন?
10. How does it operate?
এরা কিভাবে কাজ করে?
11. Do you have any women representation in these Water User Group? What do women do in these groups? Do they have any designated post? Is their voice heard?
এই পানি দলগুলোর মধ্যে কি নারীদের অংশগ্রহণও আছে? থাকলে সেটা কিরকম? নারীরা সেখানে কি করে? তাদের কি কোন পদবী আছে কিনা? তাদের কথা কি শোনা হয়?
12. What is the common practice in this village for women in water related work? Do they get proper facilities and opportunities like men in getting water?
পানি সংক্রান্ত কোন কোন কাজগুলো নারীরা সাধারণত করে থাকে? তারা কি পুরুষের মত একইভাবে সুযোগ ও সুবিধা দুটোই পায় পানি সংক্রান্ত কাজের ক্ষেত্রে?
13. What are the challenges women facing in ensuring fresh water for her family?
নারীরা তার পরিবারের জন্য বিশুদ্ধ এবং পর্যাপ্ত পানি নিশ্চিত করতে গিয়ে কি কি বাধা/সমস্যার সম্মুখীন হচ্ছে?
14. What strategies can be taken to get rid of these challenges?
এই বাধা/সমস্যাগুলো দূর করার জন্য কি কি পদক্ষেপ গ্রহণ করা যেতে পারে?

15. For reducing salinity intrusion what are the remedies can be taken for a better livelihood and water security in your village? Is it costly? Need support from other? Or you can do it by yourself?
লবণাক্ততা দূর করে পানি নিরাপত্তা এবং উন্নত জীবন-যাপনের জন্য কি কি পদক্ষেপ গ্রহণ করা যেতে পারে? এসব পছন্দ কি খুব বেশি দামী? অন্যের সাহায্যের প্রয়োজন? নাকি নিজেসই করা যেতে পারে?
16. How women can contribute into this salinity reduction strategies?
নারীরা এই সকল পদক্ষেপগুলোতে কিভাবে অংশগ্রহণ করতে পারে?
17. What are the challenges you are facing for high salinity intrusion in your village?
এই গ্রামে অতিরিক্ত লবণাক্ততার জন্য আপনারা কি কি ধরনের সমস্যার সম্মুখীন হচ্ছেন?
18. What do women usually do in agriculture field? How much it cost for them? How much they earn from it? What type of problems they face in doing these? How do they get rid of these challenges?
নারীরা সাধারণত কৃষিক্ষেত্রে কি কি ধরনের কাজ করে থাকে? আর্থিক মূল্যে কত টাকা? এ থেকে তাদের আয় কেমন হয়? কৃষিকাজে নারীরা কি কি ধরনের সমস্যার সম্মুখীন হয়? এই সমস্যা থেকে পরিত্রাণের উপায় কি?
19. What do men do in agriculture field? How much it cost for them? How much they earn from it? What type of problems they face in doing these? How do they get rid of these challenges?
পুরুষেরা কৃষিক্ষেত্রে কি কি ধরনের কাজ করে থাকে? আর্থিক মূল্যে কত টাকা? এ থেকে তাদের আয় কেমন হয়? কৃষিকাজে পুরুষেরা কি কি ধরনের সমস্যার সম্মুখীন হয়? এই সমস্যা থেকে পরিত্রাণের উপায় কি?
20. Do men help in women's agricultural work? Do women help in men's agricultural work?
পুরুষেরা কি নারীদের কৃষিকাজে সাহায্য করে? নারীরা কি পুরুষদেরকে কৃষিকাজে সাহায্য করে?
21. What are the reasons women doing farming/agricultural work?
কি কি কারণে নারীরা কৃষিকাজে সম্পৃক্ত হয়?

Appendix 3: FGD for Shrimp Farmers (Both Men and Women)

1. What do women usually do in shrimp farming? How much it cost for them? How much they earn from it? What type of problems they face in doing these? How do they get rid of these challenges?
নারীরা সাধারণত চিংড়ী চাষে কি কি ধরনের কাজ করে থাকে? আর্থিক মূল্যে কত টাকা? এ থেকে তাদের আয় কেমন হয়? চিংড়ী চাষে নারীরা কি কি ধরনের সমস্যার সম্মুখীন হয়? এই সমস্যা থেকে পরিত্রাণের উপায় কি?
2. What do men do in shrimp farming? How much it cost for them? How much they earn from it? What type of problems they face in doing these? How do they get rid of these challenges?
পুরুষেরা চিংড়ী চাষে কি কি ধরনের কাজ করে থাকে? আর্থিক মূল্যে কত টাকা? এ থেকে তাদের আয় কেমন হয়? চিংড়ী চাষে পুরুষেরা কি কি ধরনের সমস্যার সম্মুখীন হয়? এই সমস্যা থেকে পরিত্রাণের উপায় কি?
3. Do men help in women's shrimp farming? Do women help in men's shrimp farming?
পুরুষেরা কি নারীদের চিংড়ী চাষে সাহায্য করে? নারীরা কি পুরুষদেরকে চিংড়ী চাষে সাহায্য করে?
4. Gender Equality/ Equal Relations of Men and Women do exist in your society or NOT? If not what are the reasons for not doing it?
এই গ্রামে নারী-পুরুষের সম্পর্ক কেমন? নারী- পুরুষের মধ্যে সম্পর্কের ক্ষেত্রে কি সমতা আছে? নাকি নাই? না থাকলে কেন নাই?
5. What are the differences between men and women for not being equal? Where are the discriminations women are facing from men in the society?
কি কি কারণে নারী-পুরুষ এক না? নারীরা সমাজে কি কি ধরনের বৈষম্যের স্বীকার হয়?
a) Productive উৎপাদনমূলক
b) Reproductive পুনরুৎপাদনমূলক
c) Community সামাজিক
6. Did you take any measure ever to get rid of these discriminations? If yes, why did you take these? If no, why didn't you take these?
এই বৈষম্য দূর করার জন্য কি আপনারা কোন পদক্ষেপ গ্রহণ করেছেন? যদি হ্যাঁ হয়, তাহলে সেটা কি ধরনের? যদি না হয়, তবে কেন এখনো কোন পদক্ষেপ নেননি?
7. What are the main issues/constraints you face in water governance? Salinity?

- পানি ব্যবস্থাপনার ক্ষেত্রে প্রধান কি কি বাধা/সমস্যার সম্মুখীন আপনারা হন? লবণাক্ততা?
8. What are the most challenging problem in this area?
এই গ্রামের সবচেয়ে বড় সমস্যা কি?
 9. How do you manage this challenge through effective water governance?
আপনারা এই সমস্যাগুলো কিভাবে সমাধান করেন কার্যকর পানি ব্যবস্থাপনার মাধ্যমে?
 10. What about the women in Water Governance?
পানি ব্যবস্থাপনার ক্ষেত্রে নারীদের অবস্থা কিরকম?
 11. Are you a part of Water User Group? How?
আপনি কি পানি ব্যবস্থাপনা দলের একজন সদস্য? কিভাবে?
 12. How about women in Water User Group? Do they participate? Or their voice is heard? They go to the meeting and take decision?
পানি ব্যবস্থাপনা দলে নারীদের কি অবস্থা? তারা কি অংশগ্রহণ করে? শতকরা কত ভাগ? তাদের কথা কি শোনা হয়? তারা কি মিটিংয়ে অংশগ্রহণ করে এবং সিদ্ধান্ত নেয়?
 13. What are the entitlement do you have related to Water? Do you have any card for the farmers? Fisheries? If you have what do you get as a benefit from these?
পানি সংক্রান্ত কি কি ধরনের সুবিধা আপনাদের আছে? আপনাদের কি মৎস্যজীবী কার্ড কিংবা কৃষক কার্ড আছে? যদি থাকে তবে তা থেকে কি কি ধরনের সুবিধা আপনারা পেয়ে থাকেন?
 14. What do women get from the government? Do they have card also like men? Do they use their card like men: farmers, fisheries? If yes, how?
সরকার থেকে কি নারীদের জন্য বিশেষ কোন সুবিধা আছে? তারা কি কোন কার্ড পায় পুরুষের মত? তারা কি পুরুষের মত সেই কার্ড গুলো ব্যবহার করতে পারে? নারীদের কার্ড পাওয়ার যোগ্যতা কি? যদি উত্তর হয়, কিভাবে?
 15. If no, why don't they have these cards? What are the reasons? They do not need these cards? They don't work as farmers/ fisherfolk?
যদি উত্তর না হয়, তবে কেন নারীদের কোন কার্ড নেই? এর পেছনে কারণগুলো কি? তাদের কি এই কার্ডগুলো প্রয়োজন হয়না? তারা কি কৃষক কিংবা মৎস্যজীবী হিসেবে কাজ করেনা?
 16. How is the benefits of water resources distributed across men and women both? Is it same for both men and women? Or is there any difference?
পানি সংক্রান্ত সুবিধা এবং সম্পদসমূহ নারী এবং পুরুষের মধ্যে কিভাবে বন্টিত হয়? এটা কি উভয়ের জন্য একইরকম? নাকি এর মধ্যে পার্থক্য আছে?
 17. If there are differences, what are the differences between men and women in receiving water related benefits?
যদি পার্থক্য থেকে থাকে, তবে পানি সংক্রান্ত সুবিধা এবং সম্পদসমূহে নারী এবং পুরুষের মধ্যে কি ধরনের বৈষম্য রয়েছে?
 18. Are men and women both getting sufficient service from water governance?
পানি ব্যবস্থাপনার ক্ষেত্রে নারী এবং পুরুষ কি একই ধরনের এবং পর্যাপ্ত সেবা পেয়ে থাকে?
 19. How women are engaged in water (natural resources) issues? What are the challenges women facing in water governance issues?
নারীরা কিভাবে প্রাকৃতিক সম্পদ কিংবা পানির ক্ষেত্রে সম্পৃক্ত? নারীরা পানি সংক্রান্ত কি কি ধরনের সমস্যার সম্মুখীন হয়ে থাকে সমাজে?
 20. What have the remedies you/government/other NGOs taken to get rid of these challenges? Is there any specific example?
এই সমস্যা সমাধানের জন্য আপনারা কি কি ধরনের পদক্ষেপ গ্রহণ করেছেন? আপনি/ সরকার/ এনজিও? কোন উদাহরণ দিতে পারবেন?
 21. What are the reasons women doing shrimp farming work?
নারীরা কেন চিংড়ী চাষের পেশায় সম্পৃক্ত হয়?

Appendix 4: FGD for Housewife Group (Women Only)

1. What type of work do you do in your regular life?
আপনি দৈনন্দিন জীবনে কি ধরনের কাজ করে থাকেন?
 - a) Productive উৎপাদনমূলক
 - b) Reproductive পুনরুৎপাদনমূলক
 - c) Community সামাজিক
2. Do you earn by doing these types of works? How much?
এই কাজগুলো করে কি আপনার আয় হয়? কত?
3. How many hours do you work usually?
আপনি দিনে কত ঘন্টা কাজ করেন?
4. How many hours you spend in fetching water?
আপনি দিনে কত ঘন্টা সময় পানি আনার কাজে ব্যয় করেন?
5. What type of work do men do in their regular life?
পুরুষেরা দৈনন্দিন জীবনে কি ধরনের কাজ করে থাকেন?
 - a) Productive উৎপাদনমূলক
 - b) Reproductive পুনরুৎপাদনমূলক
 - c) Community সামাজিক
6. Do men earn by doing these types of works? How much?
পুরুষেরা কি এই কাজগুলো করে আয় করে? কত?
7. How many hours do men work usually?
পুরুষেরা সাধারণত দিনে কত ঘন্টা কাজ করেন?
8. How many hours do men spend in fetching water?
দিনে কত ঘন্টা সময় পুরুষেরা পানি আনার কাজে ব্যয় করেন?
9. What type of challenges you face in water? Salinity? How do you tackle these challenges?
পানির ক্ষেত্রে প্রধান কি কি বাধা/সমস্যার সম্মুখীন আপনারা হন? লবণাক্ততা? এই সমস্যা থেকে পরিত্রাণের উপায় কি?
10. Do men help/ support you in your work? Do you help in men's work?
পুরুষেরা কি নারীদের কাজে সাহায্য করে? নারীরা কি পুরুষদের কাজে সাহায্য করে?
11. Is there any Water User Group like WUG/ WMA in your village? What type of work they usually do?
আপনাদের কি কোন পানি ব্যবহারকারী দল আছে? যেমন: পানি ব্যবস্থাপনা দল/ পানি ব্যবস্থাপনা এ্যাসোসিয়েশন? এরা কি ধরনের কাজ করে থাকে?
12. Are you a part of WUG? If yes, how? If not, why?
আপনারা কি কোন পানি ব্যবহারকারী দলের সদস্য? না হলে, কেন?
13. Do you take part in decision making process in WUG? If not, why?
আপনারা কি পানি ব্যবহারকারী দলের সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণ করেন? যদি ন হয়, কেন?
14. What are the challenges you face in taking part in decision making process in WUG?
পানি ব্যবহারকারী দলের সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণ করতে আপনি কি কি সমস্যার সম্মুখীন হন?
15. What type of work women usually do for WUG?
পানি ব্যবহারকারী দলে নারীরা সাধারণত কি ধরনের ভূমিকা পালন করে?
16. Do you usually go in WUG meeting discussion? Do you take part in the discussion? Do you make any decision in WUG?
আপনারা কি পানি ব্যবহারকারী দলের মিটিংয়ে অংশগ্রহণ করেন? সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণ করেন? নারীরা কি কোন সিদ্ধান্ত নিজেরা গ্রহণ করেন? করে থাকলে, সেটা কি মানা হয়?

17. If you don't, what are the reasons of not doing these? What challenges do you face in participating the meetings of WUG?
যদি না করে থাকেন, তবে এর পেছনে কারণগুলো কি? পানি ব্যবহারকারী দলের মিটিংয়ে অংশগ্রহণ করতে আপনি কি কি ধরনের সমস্যার সম্মুখীন হন?
18. Do you feel confident enough in making any decision in WUG? If not, why? What are the reasons of not feeling confident in decision making process?
পানি ব্যবহারকারী দলের মিটিংয়ে অংশগ্রহণ করতে এবং সিদ্ধান্ত গ্রহণ করতে আপনি কি আত্মবিশ্বাসী বোধ করেন? যদি না করেন, তবে কেন? এর পেছনে কারণগুলো কি?
19. Do men support you in participating or making any decision in WUG discussion?
পুরুষেরা কি সমর্থন এবং সাহায্য করে পানি ব্যবহারকারী দলে আপনাদের এই অংশগ্রহণে?
20. What are the challenges you face in water related issues?
পানি সম্পর্কিত কাজে আপনারা কি কি ধরনের সমস্যার সম্মুখীন হন?
21. How do you get rid of these challenges?
এই সমস্যাগুলো কিভাবে সমাধান করেন?
22. What are the infrastructure you use for securing fresh water?
বিশুদ্ধ এবং পর্যাপ্ত পানি পাওয়ার জন্য আপনি কি কি অবকাঠামো ব্যবহার করেন?
 - a) Pond Sand Filter
 - b) Tube well
 - c) Rain Water Harvesting
 - d) Protected Ponds
 - e) Supply Water
23. How much extra time does it take from you?
পানি সংক্রান্ত কাজে আপনাকে কত ভাগ বেশি সময় দিতে হয়?
24. What do you think how men can help you in your work?
পানি সংক্রান্ত কাজে আপনার কি মনে হয়, পুরুষেরা আপনাদেরকে কিভাবে সাহায্য করতে পারে?
25. Do you think if you would also participate in the decision-making process then your problems would be minimized drastically?
আপনি কি মনে করেন, আপনি যদি সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় সফলভাবে অংশগ্রহণ করতে পারতেন তবে আপনার সমস্যা অনেকখানি সমাধান হত?

Appendix 5: FGD for Crab Producer (Both Men and Women- Mixed Group)

1. What do women usually do in crab producing? How much it cost for them? How much they earn from it? What type of problems they face in doing these? How do they get rid of these challenges?
নারীরা সাধারণত কাকড়া চাষে কি কি ধরনের কাজ করে থাকে? আর্থিক মূল্যে কত টাকা? এ থেকে তাদের আয় কেমন হয়? কাকড়া চাষে নারীরা কি কি ধরনের সমস্যার সম্মুখীন হয়? এই সমস্যা থেকে পরিত্রাণের উপায় কি?
2. What do men do in crab producing? How much it cost for them? How much they earn from it? What type of problems they face in doing these? How do they get rid of these challenges?
পুরুষেরা কাকড়া চাষে কি কি ধরনের কাজ করে থাকে? আর্থিক মূল্যে কত টাকা? এ থেকে তাদের আয় কেমন হয়? কাকড়া চাষে পুরুষেরা কি কি ধরনের সমস্যার সম্মুখীন হয়? এই সমস্যা থেকে পরিত্রাণের উপায় কি?
3. Do men help in women's crab producing? Do women help in men's crab producing?
পুরুষেরা কি নারীদের কাকড়া চাষে সাহায্য করে? নারীরা কি পুরুষদেরকে কাকড়া চাষে সাহায্য করে?
4. Gender Equality/ Equal Relations of Men and Women do exist in your society or NOT? If not what are the reasons for not doing it?

এই গ্রামে নারী-পুরুষের সম্পর্ক কেমন? নারী- পুরুষের মধ্যে সম্পর্কের ক্ষেত্রে কি সমতা আছে? নাকি নাই? না থাকলে কেন নাই?

5. What are the differences between men and women for not being equal? Where are the discriminations women are facing from men in the society?

কি কি কারণে নারী-পুরুষ এক না? নারীরা সমাজে কি কি ধরণের বৈষম্যের স্বীকার হয়?

- a) Productive উৎপাদনমূলক
- b) Reproductive পুনরুৎপাদনমূলক
- c) Community সামাজিক

6. Did you take any measure ever to get rid of these discriminations? If yes, why did you take these? If no, why didn't you take these?

এই বৈষম্য দূর করার জন্য কি আপনারা কোন পদক্ষেপ গ্রহণ করেছেন? যদি হ্যাঁ হয়, তাহলে সেটা কি ধরণের? যদি না হয়, তবে কেন এখনো কোন পদক্ষেপ নেননি?

7. What are the main issues/constraints you face in water governance? Salinity?
পানি ব্যবস্থাপনার ক্ষেত্রে প্রধান কি কি বাধা/সমস্যার সম্মুখীন আপনারা হন? লবণাক্ততা?

8. What are the most challenging problem in this area?

এই গ্রামের সবচেয়ে বড় সমস্যা কি?

9. How do you manage this challenge through effective water governance?

আপনারা এই সমস্যাগুলো কিভাবে সমাধান করেন কার্যকর পানি ব্যবস্থাপনার মাধ্যমে?

10. What type of work do you do in your regular life?

আপনি দৈনন্দিন জীবনে কি ধরণের কাজ করে থাকেন?

- a) Productive উৎপাদনমূলক
- b) Reproductive পুনরুৎপাদনমূলক
- c) Community সামাজিক

10. Do you earn by doing these types of works? How much?

এই কাজগুলো করে কি আপনার আয় হয়? কত?

11. How many hours do you work usually?

আপনি দিনে কত ঘন্টা কাজ করেন?

12. How many hours you spend in fetching water?

আপনি দিনে কত ঘন্টা সময় পানি আনার কাজে ব্যয় করেন?

13. What type of work do men do in their regular life?

পুরুষেরা দৈনন্দিন জীবনে কি ধরণের কাজ করে থাকেন?

- a) Productive উৎপাদনমূলক
- b) Reproductive পুনরুৎপাদনমূলক
- c) Community সামাজিক

14. Do men earn by doing these types of works? How much?

পুরুষেরা কি এই কাজগুলো করে আয় করে? কত?

15. How many hours do men work usually?

পুরুষেরা সাধারণত দিনে কত ঘন্টা কাজ করেন?

16. How many hours do men spend in fetching water?

দিনে কত ঘন্টা সময় পুরুষেরা পানি আনার কাজে ব্যয় করেন?

17. Do men help/ support you in your work? Do you help in men's work?

পুরুষেরা কি নারীদের কাজে সাহায্য করে? নারীরা কি পুরুষদের কাজে সাহায্য করে?

18. Are men and women both getting sufficient service from water governance? If not, why? What is the reason behind it?
পানি ব্যবস্থাপনার ক্ষেত্রে নারী এবং পুরুষ কি একই ধরনের এবং পর্যাপ্ত সেবা পেয়ে থাকে? যদি না হয়, কেন?
এর পেছনে কারণসমূহ কি?
19. How women are engaged in water (natural resources) issues? What are the challenges women are facing in doing so?
নারীরা কিভাবে প্রাকৃতিক সম্পদ কিংবা পানির ক্ষেত্রে সম্পৃক্ত? নারীরা পানি সংক্রান্ত কি কি ধরনের সমস্যার সম্মুখীন হয়ে থাকে সমাজে?
20. What are the possible remedies can be taken to get rid of these challenges?
এই সমস্যা সমাধানের জন্য আপনারা কি কি ধরনের পদক্ষেপ গ্রহণ করতে পারেন?
21. What are the reasons women are engaged in crab producing?
নারীরা কেন কাকড়া চাষের পেশায় সম্পৃক্ত হয়?

Appendix 6: KII with BWDB Representative

1. What are the issues/ challenges you face in getting sufficient water in your village? Salinity?
আপনার গ্রামে বিশুদ্ধ এবং পর্যাপ্ত পানি না পাওয়ার প্রধান সমস্যা/কারণগুলো কি? লবনাক্ততা?
2. What do you usually do to get rid of these challenges?
এই সমস্যাগুলো দূর করার জন্য আপনি কি করেন?
3. What are the most challenging problem in this area?
এই গ্রামের সবচেয়ে বড় সমস্যা কোনটি?
4. How do you manage this challenge through effective water governance?
এই সমস্যাটি পর্যাপ্ত পানি ব্যবস্থাপনার মধ্য দিয়ে আপনি কিভাবে মোকাবিলা করেন?
5. What are the strategies you gave taken to get fresh water?
বিশুদ্ধ এবং পর্যাপ্ত পানি পাওয়ার জন্য আপনি কি কি পদক্ষেপ গ্রহণ করেছেন?
 - a. Pond Sand Filter- Cost
 - b. Tube well- Cost
 - c. Rain Water Harvesting- Cost
 - d. Protected Ponds- Cost
 - e. Supply Water- Cost
6. Is it funded by government/NGOs/community itself?
উপরোক্ত পদ্ধতিগুলোর খরচ কিভাবে আসে? কে টাকা দেয়? সরকার/ এনজিও/ কমিউনিটি নিজেই?
7. How much cost does it take to establish this type of infrastructure to secure fresh water? Is it possible for you to establish? Or you need some other support? Do you have any maintenance mechanism in taking care of these infrastructure?
এই ধরনের অবকাঠামো তৈরীর জন্য কিরকম খরচ হয়? আপনারা কি নিজেরাই এগুলো তৈরী করতে পারেন? নাকি অন্যের সাহায্যের প্রয়োজন হয়? আপনারা এগুলো তদারকী কিভাবে করেন? কোন খরচ হয়?
8. Do you have any Water User Group? Like Water Management Group/ Water Management Association?
আপনাদের কি কোন পানি ব্যবহারকারী দল আছে? যেমন: পানি ব্যবস্থাপনা দল/ পানি ব্যবস্থাপনা এ্যাসোসিয়েশন?
9. How does it operate usually?
এরা কিভাবে কাজ করে?
10. Do you have any women representation in these Water User Group? What do women do in these groups? Do they have any designated post? Is their voice heard?
এই পানি দলগুলোর মধ্যে কি নারীদের অংশগ্রহণও আছে? থাকলে সেটা কিরকম? নারীরা সেখানে কি করে? তাদের কি কোন পদবী আছে কিনা? তাদের কথা কি শোনা হয়?

11. What are the water policy/ laws for men and women both? Is it equal for both? Or is there any discrimination?
পানি সংক্রান্ত নীতিমালা, পানি ব্যবস্থাপনা দলের নীতিমালা, বাংলাদেশ পানি আইনে নারী-পুরুষের মধ্যে কি কোন বৈষম্য রয়েছে? নাকি সমানাধিকারের কথা বলা হয়েছে? নারীদের জন্য পৃথকভাবে কি কিছু উল্লেখ আছে? নীতিমালাগুলোতে কি বলা হয়েছে?
12. What do you think policy is implementing effectively regularly? Or is there any lacking in implementing the policy?
আপনি কি মনে করেন এই আইন বা নীতিমালাগুলো সঠিকভাবে মেনে চলা হচ্ছে? নাকি হচ্ছেনা? না হলে, কারণগুলো কি?
13. How is the benefits of water resources distributed across men and women both? Is it same for both men and women? Or is there any difference?
পানি সংক্রান্ত সুবিধা এবং সম্পদসমূহ নারী এবং পুরুষের মধ্যে কিভাবে বন্টিত হয়? এটা কি উভয়ের জন্য একইরকম? নাকি এর মধ্যে পার্থক্য আছে?
14. If there are differences, what are the differences between men and women in receiving water related benefits?
যদি পার্থক্য থেকে থাকে, তবে পানি সংক্রান্ত সুবিধা এবং সম্পদসমূহে নারী এবং পুরুষের মধ্যে কি ধরনের বৈষম্য রয়েছে?
15. What are the challenges women are facing in participating in the meeting of WUG? Or in taking part in decision-making process of WUG?
পানি ব্যবহারকারী দলের মিটিং বা সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণ করতে আপনি কি কি সমস্যার সম্মুখীন হন?
16. What are the remedies do you think for women's effective participation in WUG meeting?
পানি ব্যবস্থাপনাকারী দলে নারীদের কার্যকর অংশগ্রহণ নিশ্চিত করতে কি কি পদক্ষেপ গ্রহণ করা যেতে পারে বলে আপনি মনে করেন?
17. What do you think about a gender balanced WUG? Is it really helpful for all? How?
পানি ব্যবস্থাপনাকারী দল যদি পুরুষ-নারীর সমতাভিত্তিতে গঠিত হয় তবে কিরকম পরিবর্তন আসবে? আপনি কি মনে করেন এতে দলটি আরো ভালো কাজ করবে? কিভাবে?
18. What are the things not happening now due to gender discrimination in participation of WUG meeting properly by women?
পানি ব্যবস্থাপনাকারী দল পুরুষ-নারীর সমতাভিত্তিতে না গঠিত হওয়ার ফলে কি কি অসুবিধা তৈরী হচ্ছে?
19. Do women have the capacity and understanding of water governance issues (legal and institutional) and well represented in and effectively contribute to water governance issues?
পানি ব্যবস্থাপনাকারী দলে যথাযথ অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য নারীদের কি যথেষ্ট জ্ঞান, দক্ষতা, এবং অভিজ্ঞতা আছে? তারা কি আইন এবং নীতিমালাগুলো জানে? যদি না জানে, তবে কেন জানেনা? তাদেরকে জানানোর জন্য কি করা উচিত বলে আপনি মনে করেন?
20. Men are supporting in this regard? For women's effective participation in decision making process of WUG?
পুরুষেরা কি সমর্থন এবং সাহায্য করে পানি ব্যবহারকারী দলে নারীদের এই অংশগ্রহণ কিংবা সিদ্ধান্ত গ্রহণ প্রক্রিয়ায়?
21. How women can be engaged in policy level dialogue and representation for water governance issues?
নারীদেরকে পানি আইন এবং পানি নীতিমালা ও নীতিমালা সংক্রান্ত ডায়ালগে কিভাবে অর্ন্তভুক্ত করা যেতে পারে?
22. Is there an accountability mechanism? does it answer to people from all genders equally?
এখানে কি জবাবদিহিতার কোন ব্যাপার থাকে? এটা কি নারী-পুরুষ সবার কাছেই দায়বদ্ধ?
23. Is the investment made in water governance 'worth it' for people from all genders?
সঠিক পানি ব্যবস্থাপনার জন্য সরকারকর্তৃক যেসকল পদক্ষেপগুলো নেওয়া হয়েছে বা খরচ করা হয়েছে সেটা কি নারী-পুরুষ নির্বিশেষে সবার জন্যই মঙ্গলকর?

24. Water governance policy and practice at local and national level includes a gendered-perspectives in their decision-making process?
গ্রাম, কমিউনিটি, এবং জাতীয় পর্যায়ে পানি ব্যবস্থাপনা নীতিমালায় যেসব পদক্ষেপ গ্রহণ করা হয়েছে সেগুলো কি নারী-পুরুষ উভয়ের অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য সমান?
25. Do you think a gendered/gender based policy/practices will really minimize the gap? How?
আপনি কি মনে করেন একটি নারী-পুরুষ সমতাভিত্তিক আইন, কিংবা নীতিমালা এই সমস্যাগুলো সমাধান করতে পারবে? কিভাবে?

Appendix 7: KII with Fisheries Officer

1. What are the govt policies/laws in shrimp farming? Is it equal for all? Or is there any discrimination between men and women?
চিংড়ী চাষের জন্য সরকারের কোন আইন কিংবা নীতিমালা কি আছে? এটা কি সবার জন্য সমান? নাকি এর মধ্যে নারী-পুরুষের বৈষম্য আছে?
2. What do you think policy is implementing effectively regularly? Or is there any lacking in implementing the policy?
আপনি কি মনে করেন এই আইন বা নীতিমালাগুলো সঠিকভাবে মেনে চলা হচ্ছে? নাকি হচ্ছেনা? না হলে, কারণগুলো কি?
3. What are the entitlement do you have related to Fish? Do you have any card for the Fisheries? If you have what do you get as a benefit from these?
মাছ সংক্রান্ত কি কি ধরনের সুবিধা আছে? আপনারা কি মৎস্যজীবী কার্ড দেন? যদি দিয়ে থাকেন তবে তা থেকে কি কি ধরনের সুবিধা মৎস্যজীবীরা পেয়ে থাকেন?
4. What do women get from the government? Do they have card also like men? Do they use their card like men: fisheries? If yes, how? They are also doing the same work?
সরকার থেকে কি নারীদের জন্য বিশেষ কোন সুবিধা আছে? তারা কি কোন কার্ড পায় পুরুষের মত? তারা কি পুরুষের মত সেই কার্ড গুলো ব্যবহার করতে পারে? নারীদের কার্ড পাওয়ার যোগ্যতা কি? যদি উত্তর হ্যাঁ হয়, কিভাবে? তারা কি পুরুষের মত একই ধরনের কাজ করে থাকে?
5. If no, why don't they have these cards? What are the reasons? They do not need these cards? They don't work as fisherfolk? What is the scheme of getting these cards? What are the uses of these cards? Don't women need these?
যদি উত্তর না হয়, তবে কেন নারীদের কোন কার্ড নেই? এর পেছনে কারণগুলো কি? তাদের কি এই কার্ডগুলো প্রয়োজন হয়না? তারা কি মৎস্যজীবী হিসেবে কাজ করেনা? এই কার্ডগুলোর প্রয়োজনীয়তা কি? নারীদের কি তা প্রয়োজন নেই?
6. How is the benefits of water resources distributed across men and women both? Is it same for both men and women? Or is there any difference?
পানি সংক্রান্ত সুবিধা এবং সম্পদসমূহ নারী এবং পুরুষের মধ্যে কিভাবে বন্টিত হয়? এটা কি উভয়ের জন্য একইরকম? নাকি এর মধ্যে পার্থক্য আছে?
7. If there are differences, what are the differences between men and women in receiving water related benefits?
যদি পার্থক্য থেকে থাকে, তবে পানি সংক্রান্ত সুবিধা এবং সম্পদসমূহে নারী এবং পুরুষের মধ্যে কি ধরনের বৈষম্য রয়েছে?
8. Are men and women both getting sufficient and same service from water governance?
পানি ব্যবস্থাপনার ক্ষেত্রে নারী এবং পুরুষ কি একই ধরনের এবং পর্যাপ্ত সেবা পেয়ে থাকে?
9. How women are engaged in water (natural resources) issues? What are the challenges women facing in water governance issues?
নারীরা কিভাবে প্রাকৃতিক সম্পদ কিংবা পানির ক্ষেত্রে সম্পৃক্ত? নারীরা পানি সংক্রান্ত কি কি ধরনের সমস্যার সম্মুখীন হয়ে থাকে সমাজে?
10. What have the remedies you/government/other NGOs taken to get rid of these challenges? Is there any specific example?

এই সমস্যা সমাধানের জন্য আপনারা কি কি ধরনের পদক্ষেপ গ্রহণ করেছেন? আপনি/ সরকার/ এনজিও? কোন উদাহরণ দিতে পারবেন?

11. What are the reasons women doing fisheries work?
নারীরা কেন মৎস্যজীবী হিসেবে সম্পৃক্ত হয়?

Appendix 8: KII with WMG President

1. What are the issues/ challenges you face in getting sufficient water in your village? Salinity?
আপনার গ্রামে বিস্তৃত এবং পর্যাপ্ত পানি না পাওয়ার প্রধান সমস্যা/কারণগুলো কি? লবনাক্ততা?
2. What do you usually do to get rid of these challenges?
এই সমস্যাগুলো দূর করার জন্য আপনি কি করেন?
3. What are the most challenging problem in this area?
এই গ্রামের সবচেয়ে বড় সমস্যা কোনটি?
4. How do you manage this challenge through effective water governance?
এই সমস্যাটি পর্যাপ্ত পানি ব্যবস্থাপনার মধ্য দিয়ে আপনি কিভাবে মোকাবিলা করেন?
5. What are the strategies you gave taken to get fresh water?
বিস্তৃত এবং পর্যাপ্ত পানি পাওয়ার জন্য আপনি কি কি পদক্ষেপ গ্রহণ করেছেন?
 - a. Pond Sand Filter- Cost
 - b. Tube well- Cost
 - c. Rain Water Harvesting- Cost
 - d. Protected Ponds- Cost
 - e. Supply Water- Cost
6. Is it funded by government/NGOs/community itself?
উপরোক্ত পদ্ধতিগুলোর খরচ কিভাবে আসে? কে টাকা দেয়? সরকার/ এনজিও/ কমিউনিটি নিজেই?
7. How much cost does it take to establish this type of infrastructure to secure fresh water? Is it possible for you to establish? Or you need some other support? Do you have any maintenance mechanism in taking care of these infrastructure?
এই ধরনের অবকাঠামো তৈরীর জন্য কিরকম খরচ হয়? আপনারা কি নিজেরাই এগুলো তৈরী করতে পারেন? নাকি অন্যের সাহায্যের প্রয়োজন হয়? আপনারা এগুলো তদারকী কিভাবে করেন? কোন খরচ হয়?
8. Do you have any Water User Group? Like Water Management Group/ Water Management Association?
আপনাদের কি কোন পানি ব্যবহারকারী দল আছে? যেমন: পানি ব্যবস্থাপনা দল/ পানি ব্যবস্থাপনা এ্যাসোসিয়েশন?
9. How does it operate usually?
এরা কিভাবে কাজ করে?
10. Do you have any women representation in these Water User Group? What do women do in these groups? Do they have any designated post? Is their voice heard?
এই পানি দলগুলোর মধ্যে কি নারীদের অংশগ্রহণও আছে? থাকলে সেটা কিরকম? নারীরা সেখানে কি করে? তাদের কি কোন পদবী আছে কিনা? তাদের কথা কি শোনা হয়?
11. What are the water policy/laws for men and women both? Is it equal for both? Or is there any discrimination?
পানি সংক্রান্ত নীতিমালা, পানি ব্যবস্থাপনা দলের নীতিমালা, বাংলাদেশ পানি আইনে নারী-পুরুষের মধ্যে কি কোন বৈষম্য রয়েছে? নাকি সমানাধিকারের কথা বলা হয়েছে? নারীদের জন্য পৃথকভাবে কি কিছু উল্লেখ আছে? নীতিমালাগুলোতে কি বলা হয়েছে?
12. What do you think policy is implementing effectively regularly? Or is there any lacking in implementing the policy?
আপনি কি মনে করেন এই আইন বা নীতিমালাগুলো সঠিকভাবে মেনে চলা হচ্ছে? নাকি হচ্ছেনা? না হলে, কারণগুলো কি?

13. What are the challenges women are facing in participating in the meeting of WUG? Or in taking part in decision-making process of WUG?

পানি ব্যবহারকারী দলের মিটিংএ বা সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণ করতে আপনি কি কি সমস্যার সম্মুখীন হন?

14. What are the remedies do you think for women's effective participation in WUG meeting?

পানি ব্যবস্থাপনাকারী দলে নারীদের কার্যকর অংশগ্রহণ নিশ্চিত করতে কি কি পদক্ষেপ গ্রহণ করা যেতে পারে বলে আপনি মনে করেন?

15. What do you think about a gender balanced WUG? Is it really helpful for all? How?

পানি ব্যবস্থাপনাকারী দল যদি পুরুষ-নারীর সমতাভিত্তিতে গঠিত হয় তবে কিরকম পরিবর্তন আসবে? আপনি কি মনে করেন এতে দলটি আরো ভালো কাজ করবে? কিভাবে?

16. What are the things not happening now due to gender discrimination in participation of WUG meeting properly by women?

পানি ব্যবস্থাপনাকারী দল পুরুষ-নারীর সমতাভিত্তিতে না গঠিত হওয়ার ফলে কি কি অসুবিধা তৈরী হচ্ছে?

17. Do women have the capacity and understanding of water governance issues (legal and institutional) and well represented in and effectively contribute to water governance issues?

পানি ব্যবস্থাপনাকারী দলে যথাযথ অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য নারীদের কি যথেষ্ট জ্ঞান, দক্ষতা, এবং অভিজ্ঞতা আছে? তারা কি আইন এবং নীতিমালাগুলো জানে? যদি না জানে, তবে কেন জানেনা? তাদেরকে জানানোর জন্য কি করা উচিত বলে আপনি মনে করেন?

18. Men are supporting in this regard? For women's effective participation in decision making process of WUG?

পুরুষেরা কি সমর্থন এবং সাহায্য করে পানি ব্যবহারকারী দলে নারীদের এই অংশগ্রহণ কিংবা সিদ্ধান্ত গ্রহণ প্রক্রিয়ায়?

19. Is there enabling conditions for people with different genders to participate, act and lead?

পানি ব্যবস্থাপনামূলক কার্যক্রমে নারী-পুরুষ সকলের সমান অংশগ্রহণ, কথা বলা, বা সিদ্ধান্ত নেওয়ার জন্য সহায়ক পরিবেশ কি রয়েছে?

20. Are people from all genders making informed decisions? Do they have a say?

সকলে মিলে কি যৌথভাবে সিদ্ধান্ত নিতে পারে? নারীদের কথা কি শোনা হয়?

21. How women can be engaged in policy level dialogue and representation for water governance issues?

নারীদেরকে পানি আইন এবং পানি নীতিমালা ও নীতিমালা সংক্রান্ত ডায়ালগে কিভাবে অর্ন্তভুক্ত করা যেতে পারে?

22. Is there an accountability mechanism? does it answer to people from all genders equally?

এখানে কি জবাবদিহিতার কোন ব্যাপার থাকে? এটা কি নারী-পুরুষ সবার কাছেই দায়বদ্ধ?

23. Is the investment made in water governance 'worth it' for people from all genders?

সঠিক পানি ব্যবস্থাপনার জন্য সরকারকর্তৃক যেসকল পদক্ষেপগুলো নেওয়া হয়েছে বা খরচ করা হয়েছে সেটা কি নারী-পুরুষ নির্বিশেষে সবার জন্যই মঙ্গলকর?

24. Water governance policy and practice at local and national level includes a gendered-perspectives in their decision-making process?

গ্রাম, কমিউনিটি, এবং জাতীয় পর্যায়ে পানি ব্যবস্থাপনা নীতিমালায় যেসব পদক্ষেপ গ্রহণ করা হয়েছে সেগুলো কি নারী-পুরুষ উভয়ের অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য সমান?

25 Do you think a gendered/gender based policy/practices will really minimize the gap? How?

আপনি কি মনে করেন একটি নারী-পুরুষ সমতাভিত্তিক আইন, কিংবা নীতিমালা এই সমস্যাগুলো সমাধান করতে পারবে? কিভাবে?

Appendix 9: KII with WMG Women Representative

1. What are the issues/ challenges you face in getting sufficient water in your village? Salinity?
আপনার গ্রামে বিষুদ্ধ এবং পর্যাপ্ত পানি না পাওয়ার প্রধান সমস্যা/কারণগুলো কি? লবনাক্ততা?
2. What do you usually do to get rid of these challenges?
এই সমস্যাগুলো দূর করার জন্য আপনি কি করেন?

3. What are the most challenging problem in this area?
এই গ্রামের সবচেয়ে বড় সমস্যা কোনটি?
4. How do you manage this challenge through effective water governance?
এই সমস্যাটি পর্যাণ্ড পানি ব্যবস্থাপনার মধ্য দিয়ে আপনি কিভাবে মোকাবিলা করেন?
5. What are the strategies you gave taken to get fresh water?
বিশুদ্ধ এবং পর্যাণ্ড পানি পাওয়ার জন্য আপনি কি কি পদক্ষেপ গ্রহণ করেছেন?
 - a. Pond Sand Filter- Cost
 - b. Tube well- Cost
 - c. Rain Water Harvesting- Cost
 - d. Protected Ponds- Cost
 - e. Supply Water- Cost
6. Is it funded by government/NGOs/community itself?
উপরোক্ত পদ্ধতিগুলোর খরচ কিভাবে আসে? কে টাকা দেয়? সরকার/ এনজিও/ কমিউনিটি নিজেই?
7. How much cost does it take to establish this type of infrastructure to secure fresh water? Is it possible for you to establish? Or you need some other support? Do you have any maintenance mechanism in taking care of these infrastructure?
এই ধরনের অবকাঠামো তৈরীর জন্য কিরকম খরচ হয়? আপনারা কি নিজেরাই এগুলো তৈরী করতে পারেন? নাকি অন্যের সাহায্যের প্রয়োজন হয়? আপনারা এগুলো তদারকী কিভাবে করেন? কোন খরচ হয়?
8. Do you have any Water User Group? Like Water Management Group/ Water Management Association?
আপনাদের কি কোন পানি ব্যবহারকারী দল আছে? যেমন: পানি ব্যবস্থাপনা দল/ পানি ব্যবস্থাপনা এ্যাসোসিয়েশন?
9. How does it operate usually?
এরা কিভাবে কাজ করে?
10. Do you have any women representation in these Water User Group? What do women do in these groups? Do they have any designated post? Is their voice heard?
এই পানি দলগুলোর মধ্যে কি নারীদের অংশগ্রহণও আছে? থাকলে সেটা কিরকম? নারীরা সেখানে কি করে? তাদের কি কোন পদবী আছে কিনা? তাদের কথা কি শোনা হয়?
11. What are the water policy/laws for men and women both? Is it equal for both? Or is there any discrimination?
পানি সংক্রান্ত নীতিমালা, পানি ব্যবস্থাপনা দলের নীতিমালা, বাংলাদেশ পানি আইনে নারী-পুরুষের মধ্যে কি কোন বৈষম্য রয়েছে? নাকি সমানাধিকারের কথা বলা হয়েছে? নারীদের জন্য পৃথকভাবে কি কিছু উল্লেখ আছে? নীতিমালাগুলোতে কি বলা হয়েছে?
12. What do you think policy is implementing effectively regularly? Or is there any lacking in implementing the policy?
আপনি কি মনে করেন এই আইন বা নীতিমালাগুলো সঠিকভাবে মেনে চলা হচ্ছে? নাকি হচ্ছেনা? না হলে, কারণগুলো কি?
13. Is there enabling conditions for people with different genders to participate, act and lead?
পানি ব্যবস্থাপনামূলক কার্যক্রমে নারী-পুরুষ সকলের সমান অংশগ্রহণ, কথা বলা, বা সিদ্ধান্ত নেওয়ার জন্য সহায়ক পরিবেশ কি রয়েছে?
14. Are people from all genders making informed decisions? Do they have a say?
সকলে মিলে কি যৌথভাবে সিদ্ধান্ত নিতে পারে? নারীদের কথা কি শোনা হয়?
15. What are the challenges women are facing in participating in the meeting of WUG? Or in taking part in decision-making process of WUG?
পানি ব্যবহারকারী দলের মিটিংএ বা সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণ করতে আপনি কি কি সমস্যার সম্মুখীন হন?
16. What are the remedies do you think for women's effective participation in WUG meeting?

পানি ব্যবস্থাপনাকারী দলে নারীদের কার্যকর অংশগ্রহণ নিশ্চিত করতে কি কি পদক্ষেপ গ্রহণ করা যেতে পারে বলে আপনি মনে করেন?

17. What do you think about a gender balanced WUG? Is it really helpful for all? How?
পানি ব্যবস্থাপনাকারী দল যদি পুরুষ-নারীর সমতাভিত্তিতে গঠিত হয় তবে কিরকম পরিবর্তন আসবে? আপনি কি মনে করেন এতে দলটি আরো ভালো কাজ করবে? কিভাবে?
18. What are the things not happening now due to gender discrimination in participation of WUG meeting properly by women?
পানি ব্যবস্থাপনাকারী দল পুরুষ-নারীর সমতাভিত্তিতে না গঠিত হওয়ার ফলে কি কি অসুবিধা তৈরী হচ্ছে?
19. Do women have the capacity and understanding of water governance issues (legal and institutional) and well represented in and effectively contribute to water governance issues?
পানি ব্যবস্থাপনাকারী দলে যথাযথ অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য নারীদের কি যথেষ্ট জ্ঞান, দক্ষতা, এবং অভিজ্ঞতা আছে? তারা কি আইন এবং নীতিমালাগুলো জানে? যদি না জানে, তবে কেন জানেনা? তাদেরকে জানানোর জন্য কি করা উচিত বলে আপনি মনে করেন?
20. Men are supporting in this regard? For women's effective participation in decision making process of WUG?
পুরুষেরা কি সমর্থন এবং সাহায্য করে পানি ব্যবহারকারী দলে নারীদের এই অংশগ্রহণ কিংবা সিদ্ধান্ত গ্রহণ প্রক্রিয়ায়?
21. How women can be engaged in policy level dialogue and representation for water governance issues?
নারীদেরকে পানি আইন এবং পানি নীতিমালা ও নীতিমালা সংক্রান্ত ডায়ালগে কিভাবে অর্ন্তভুক্ত করা যেতে পারে?
22. Is there an accountability mechanism? does it answer to people from all genders equally?
এখানে কি জবাবদিহিতার কোন ব্যাপার থাকে? এটা কি নারী-পুরুষ সবার কাছেই দায়বদ্ধ?
23. Is the investment made in water governance 'worth it' for people from all genders?
সঠিক পানি ব্যবস্থাপনার জন্য সরকারকর্তৃক যেসকল পদক্ষেপগুলো নেওয়া হয়েছে বা খরচ করা হয়েছে সেটা কি নারী-পুরুষ নির্বিশেষে সবার জন্যই মঙ্গলকর?
24. Water governance policy and practice at local and national level includes a gendered-perspectives in their decision-making process?
গ্রাম, কমিউনিটি, এবং জাতীয় পর্যায়ে পানি ব্যবস্থাপনা নীতিমালায় যেসব পদক্ষেপ গ্রহণ করা হয়েছে সেগুলো কি নারী-পুরুষ উভয়ের অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য সমান?
25. Do you think a gendered/gender based policy/practices will really minimize the gap? How?
আপনি কি মনে করেন একটি নারী-পুরুষ সমতাভিত্তিক আইন, কিংবা নীতিমালা এই সমস্যাগুলো সমাধান করতে পারবে? কিভাবে?

Appendix 10: KII with UP Chairperson

1. What are the issues/ challenges you face in getting sufficient water in your village? Salinity?
আপনার গ্রামে বিসুদ্ধ এবং পর্যাপ্ত পানি না পাওয়ার প্রধান সমস্যা/কারণগুলো কি? লবনাক্ততা?
2. What do you usually do to get rid of these challenges?
এই সমস্যাগুলো দূর করার জন্য আপনি কি করেন?
3. What are the most challenging problem in this area?
এই গ্রামের সবচেয়ে বড় সমস্যা কোনটি?
4. How do you manage this challenge through effective water governance?
এই সমস্যাটি পর্যাপ্ত পানি ব্যবস্থাপনার মধ্য দিয়ে আপনি কিভাবে মোকাবিলা করেন?
5. What are the strategies you gave taken to get fresh water?
বিসুদ্ধ এবং পর্যাপ্ত পানি পাওয়ার জন্য আপনি কি কি পদক্ষেপ গ্রহণ করেছেন?

- a. Pond Sand Filter- Cost
- b. Tube well- Cost

- c. Rain Water Harvesting- Cost
 - d. Protected Ponds- Cost
 - e. Supply Water- Cost
6. Is it funded by government/NGOs/community itself?
উপরোক্ত পদ্ধতিগুলোর খরচ কিভাবে আসে? কে টাকা দেয়? সরকার/ এনজিও/ কমিউনিটি নিজেই?
 7. How much cost does it take to establish this type of infrastructure to secure fresh water? Is it possible for you to establish? Or you need some other support? Do you have any maintenance mechanism in taking care of these infrastructure?
এই ধরনের অবকাঠামো তৈরীর জন্য কিরকম খরচ হয়? আপনারা কি নিজেরাই এগুলো তৈরী করতে পারেন? নাকি অন্যের সাহায্যের প্রয়োজন হয়? আপনারা এগুলো তদারকী কিভাবে করেন? কোন খরচ হয়?
 8. What are the water policy/laws for men and women both? Is it equal for both? Or is there any discrimination?
পানি সংক্রান্ত নীতিমালা, পানি ব্যবস্থাপনা দলের নীতিমালা, বাংলাদেশ পানি আইনে নারী-পুরুষের মধ্যে কি কোন বৈষম্য রয়েছে? নাকি সমানাধিকারের কথা বলা হয়েছে? নারীদের জন্য পৃথকভাবে কি কিছু উল্লেখ আছে? নীতিমালাগুলোতে কি বলা হয়েছে?
 9. What do you think policy is implementing effectively regularly? Or is there any lacking in implementing the policy?
আপনি কি মনে করেন এই আইন বা নীতিমালাগুলো সঠিকভাবে মেনে চলা হচ্ছে? নাকি হচ্ছেনা? না হলে, কারণগুলো কি?
 10. What are the sufferings people having in their life due to this salinity intrusion? How do they get rid of these?
অতিরিক্ত লবণাক্ততার কারণে মানুষের জীবনে কি ধরনের দুর্ভোগ পোহাতে হচ্ছে? তাদের এ থেকে মুক্তির উপায় কি?
 11. What are the things not happening now due to gender discrimination in participation of WUG meeting properly by women?
পানি ব্যবস্থাপনাকারী দল পুরুষ-নারীর সমতাভিত্তিতে না গঠিত হওয়ার ফলে কি কি অসুবিধা তৈরী হচ্ছে?
 12. Do women have the capacity and understanding of water governance issues (legal and institutional) and well represented in and effectively contribute to water governance issues? If not, why?
পানি ব্যবস্থাপনাকারী দলে যথাযথ অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য নারীদের কি যথেষ্ট জ্ঞান, দক্ষতা, এবং অভিজ্ঞতা আছে? তারা কি আইন এবং নীতিমালাগুলো জানে? যদি না জানে, তবে কেন জানেনা? তাদেরকে জানানোর জন্য কি করা উচিত বলে আপনি মনে করেন?
 13. Men are supporting in this regard? For women's effective participation in decision making process of WUG?
পুরুষেরা কি সমর্থন এবং সাহায্য করে পানি ব্যবহারকারী দলে নারীদের এই অংশগ্রহণ কিংবা সিদ্ধান্ত গ্রহণ প্রক্রিয়ায়?
 14. How women can be engaged in policy level dialogue and representation for water governance issues?
নারীদেরকে পানি আইন এবং পানি নীতিমালা ও নীতিমালা সংক্রান্ত ডায়ালগে কিভাবে অন্তর্ভুক্ত করা যেতে পারে?
 15. Is there an accountability mechanism? does it answer to people from all genders equally?
এখানে কি জবাবদিহিতার কোন ব্যাপার থাকে? এটা কি নারী-পুরুষ সবার কাছেই দায়বদ্ধ?
 16. Is the investment made in water governance 'worth it' for people from all genders?
সঠিক পানি ব্যবস্থাপনার জন্য সরকারকর্তৃক যেসকল পদক্ষেপগুলো নেওয়া হয়েছে বা খরচ করা হয়েছে সেটা কি নারী-পুরুষ নির্বিশেষে সবার জন্যই মঙ্গলকর?
 17. Water governance policy and practice at local and national level includes a gendered-perspectives in their decision-making process?
গ্রাম, কমিউনিটি, এবং জাতীয় পর্যায়ে পানি ব্যবস্থাপনা নীতিমালায় যেসব পদক্ষেপ গ্রহণ করা হয়েছে সেগুলো কি নারী-পুরুষ উভয়ের অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য সমান?
 18. Do you think a gendered/gender based policy/practices will really minimize the gap? How?

আপনি কি মনে করেন একটি নারী-পুরুষ সমতাভিত্তিক আইন, কিংবা নীতিমালা এই সমস্যাগুলো সমাধান করতে পারবে? কিভাবে?

19. What are the sufferings women having in their life due to salinity intrusion and also for the water governance issues?

পানি অব্যবস্থাপনা এবং অতিরিক্ত লবণাক্ততার কারণে নারীদের জীবনে কি ধরনের দুর্ভোগ পোহাতে হচ্ছে?

20. Do men support them? If not, why? How men can support women in taking forward in decision making process?

পুরুষেরা কি নারীদের এসকল দুর্ভোগ নিরসনে সহায়তা করে? যদি না করে, কেন করেনা? পুরুষেরা নারীদের সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য কিভাবে সাহায্য এবং সহযোগিতা করতে পারে?

21. What should be the strategies to enhance women's skill, knowledge, and confidence to take part in decision-making process related to water governance?

পানি ব্যবস্থাপনায় সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য নারীদের দক্ষতা, জ্ঞান, এবং আত্মবিশ্বাস বৃদ্ধির জন্য কি কি পদক্ষেপ গ্রহণ করা যেতে পারে?

Appendix 11: KII with Local NGO Representative

1. What are the issues/ challenges you face in getting sufficient water in your village? Salinity?

আপনার গ্রামে বিসুদ্ধ এবং পর্যাপ্ত পানি না পাওয়ার প্রধান সমস্যা/কারণগুলো কি? লবণাক্ততা?

2. What do you usually do to get rid of these challenges?

এই সমস্যাগুলো দূর করার জন্য আপনি কি করেন?

3. What are the most challenging problem in this area?

এই গ্রামের সবচেয়ে বড় সমস্যা কোনটি?

4. How do you manage this challenge through effective water governance?

এই সমস্যাটি পর্যাপ্ত পানি ব্যবস্থাপনার মধ্য দিয়ে আপনি কিভাবে মোকাবিলা করেন?

5. What are the strategies you gave taken to get fresh water?

বিসুদ্ধ এবং পর্যাপ্ত পানি পাওয়ার জন্য আপনি কি কি পদক্ষেপ গ্রহণ করেছেন?

- Pond Sand Filter- Cost
- Tube well- Cost
- Rain Water Harvesting- Cost
- Protected Ponds- Cost
- Supply Water- Cost

6. Is it funded by government/NGOs/community itself?

উপরোক্ত পদ্ধতিগুলোর খরচ কিভাবে আসে? কে টাকা দেয়? সরকার/ এনজিও/ কমিউনিটি নিজেই?

7. How much cost does it take to establish this type of infrastructure to secure fresh water? Is it possible for you to establish? Or you need some other support? Do you have any maintenance mechanism in taking care of these infrastructure?

এই ধরনের অবকাঠামো তৈরীর জন্য কিরকম খরচ হয়? আপনারা কি নিজেরাই এগুলো তৈরী করতে পারেন? নাকি অন্যের সাহায্যের প্রয়োজন হয়? আপনারা এগুলো তদারকী কিভাবে করেন? কোন খরচ হয়?

8. What are the water policy/laws for men and women both? Is it equal for both? Or is there any discrimination?

পানি সংক্রান্ত নীতিমালা, পানি ব্যবস্থাপনা দলের নীতিমালা, বাংলাদেশ পানি আইনে নারী-পুরুষের মধ্যে কি কোন বৈষম্য রয়েছে? নাকি সমানাধিকারের কথা বলা হয়েছে? নারীদের জন্য পৃথকভাবে কি কিছু উল্লেখ আছে? নীতিমালাগুলোতে কি বলা হয়েছে?

9. What do you think policy is implementing effectively regularly? Or is there any lacking in implementing the policy?

আপনি কি মনে করেন এই আইন বা নীতিমালাগুলো সঠিকভাবে মেনে চলা হচ্ছে? নাকি হচ্ছেনা? না হলে, কারণগুলো কি?

10. What are the sufferings people having in their life due to this salinity intrusion? How do they get rid of these?
অতিরিক্ত লবণাক্ততার কারণে মানুষের জীবনে কি ধরণের দুর্ভোগ পোহাতে হচ্ছে? তাদের এ থেকে মুক্তির উপায় কি?
11. What are the things not happening now due to gender discrimination in participation of WUG meeting properly by women?
পানি ব্যবস্থাপনাকারী দল পুরুষ-নারীর সমতাভিত্তিতে না গঠিত হওয়ার ফলে কি কি অসুবিধা তৈরী হচ্ছে?
12. Do women have the capacity and understanding of water governance issues (legal and institutional) and well represented in and effectively contribute to water governance issues? If not, why?
পানি ব্যবস্থাপনাকারী দলে যথাযথ অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য নারীদের কি যথেষ্ট জ্ঞান, দক্ষতা, এবং অভিজ্ঞতা আছে? তারা কি আইন এবং নীতিমালাগুলো জানে? যদি না জানে, তবে কেন জানেনা? তাদেরকে জানানোর জন্য কি করা উচিত বলে আপনি মনে করেন?
13. Men are supporting in this regard? For women's effective participation in decision making process of WUG?
পুরুষেরা কি সমর্থন এবং সাহায্য করে পানি ব্যবহারকারী দলে নারীদের এই অংশগ্রহণ কিংবা সিদ্ধান্ত গ্রহণ প্রক্রিয়ায়?
14. How women can be engaged in policy level dialogue and representation for water governance issues?
নারীদেরকে পানি আইন এবং পানি নীতিমালা ও নীতিমালা সংক্রান্ত ডায়ালগে কিভাবে অর্ন্তভুক্ত করা যেতে পারে?
15. Is there an accountability mechanism? does it answer to people from all genders equally?
এখানে কি জবাবদিহিতার কোন ব্যাপার থাকে? এটা কি নারী-পুরুষ সবার কাছেই দায়বদ্ধ?
16. Is the investment made in water governance 'worth it' for people from all genders?
সঠিক পানি ব্যবস্থাপনার জন্য সরকারকর্তৃক যেসকল পদক্ষেপগুলো নেওয়া হয়েছে বা খরচ করা হয়েছে সেটা কি নারী-পুরুষ নির্বিশেষে সবার জন্যই মঙ্গলকর?
17. Water governance policy and practice at local and national level includes a gendered-perspectives in their decision-making process?
গ্রাম, কমিউনিটি, এবং জাতীয় পর্যায়ে পানি ব্যবস্থাপনা নীতিমালায় যেসব পদক্ষেপ গ্রহণ করা হয়েছে সেগুলো কি নারী-পুরুষ উভয়ের অংশগ্রহণ এবং সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য সমান?
18. Do you think a gendered/gender based policy/practices will really minimize the gap? How?
আপনি কি মনে করেন একটি নারী-পুরুষ সমতাভিত্তিক আইন, কিংবা নীতিমালা এই সমস্যাগুলো সমাধান করতে পারবে? কিভাবে?
19. What are the sufferings women having in their life due to salinity intrusion and also for the water governance issues?
পানি অব্যবস্থাপনা এবং অতিরিক্ত লবণাক্ততার কারণে নারীদের জীবনে কি ধরণের দুর্ভোগ পোহাতে হচ্ছে?
20. Do men support them? If not, why? How men can support women in taking forward in decision making process?
পুরুষেরা কি নারীদের এসকল দুর্ভোগ নিরসনে সহায়তা করে? যদি না করে, কেন করেনা? পুরুষেরা নারীদের সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য কিভাবে সাহায্য এবং সহযোগিতা করতে পারে?
21. What should be the strategies to enhance women's skill, knowledge, and confidence to take part in decision-making process related to water governance?
পানি ব্যবস্থাপনায় সিদ্ধান্ত গ্রহণ প্রক্রিয়ায় অংশগ্রহণের জন্য নারীদের দক্ষতা, জ্ঞান, এবং আত্মবিশ্বাস বৃদ্ধির জন্য কি কি পদক্ষেপ গ্রহণ করা যেতে পারে?

Appendix 12: KII with Agriculture Officer

1. What are the govt policies/laws in agricultural work? Is it equal for all? Or is there any discrimination between men and women?
কৃষিকাজের জন্য সরকারের কোন আইন কিংবা নীতিমালা কি আছে? এটা কি সবার জন্য সমান? নাকি এর মধ্যে নারী-পুরুষের বৈষম্য আছে?
2. What do you think policy is implementing effectively regularly? Or is there any lacking in implementing the policy?
আপনি কি মনে করেন এই আইন বা নীতিমালাগুলো সঠিকভাবে মেনে চলা হচ্ছে? নাকি হচ্ছেনা? না হলে, কারণগুলো কি?
3. What are the entitlement do you have related to agriculture/farming? Do you have any card for the Farmers? If you have what do you get as a benefit from these?
কৃষিকাজের জন্য কি কি ধরনের সুবিধা আছে? আপনারা কি কৃষক কার্ড দেন? যদি দিয়ে থাকেন তবে তা থেকে কি কি ধরনের সুবিধা কৃষকরা পেয়ে থাকেন?
4. What do women get from the government? Do they have card also like men? Do they use their card like men: farmers? If yes, how? They are also doing the same work?
সরকার থেকে কি নারীদের জন্য বিশেষ কোন সুবিধা আছে? তারা কি কোন কৃষি কার্ড পায় পুরুষের মত? তারা কি পুরুষের মত সেই কার্ড গুলো ব্যবহার করতে পারে? নারীদের কার্ড পাওয়ার যোগ্যতা কি? যদি উত্তর হয়, কিভাবে? তারা কি পুরুষের মত একই ধরনের কাজ করে থাকে?
5. If no, why don't they have these cards? What are the reasons? They do not need these cards? They don't work as farmers? What is the scheme of getting these cards? What are the uses of these cards? Don't women need these?
যদি উত্তর না হয়, তবে কেন নারীদের কোন কার্ড নেই? এর পেছনে কারণগুলো কি? তাদের কি এই কার্ডগুলো প্রয়োজন হয়না? তারা কি কৃষক হিসেবে কাজ করেনা? এই কার্ডগুলোর প্রয়োজনীয়তা কি? নারীদের কি তা প্রয়োজন নেই?
6. How is the benefits of water resources distributed across men and women both? Is it same for both men and women? Or is there any difference?
পানি সংক্রান্ত সুবিধা এবং সম্পদসমূহ নারী এবং পুরুষের মধ্যে কিভাবে বন্টিত হয়? এটা কি উভয়ের জন্য একইরকম? নাকি এর মধ্যে পার্থক্য আছে?
7. If there are differences, what are the differences between men and women in receiving water related benefits?
যদি পার্থক্য থেকে থাকে, তবে পানি সংক্রান্ত সুবিধা এবং সম্পদসমূহে নারী এবং পুরুষের মধ্যে কি ধরনের বৈষম্য রয়েছে?
8. Are men and women both getting sufficient and same service from water governance?
পানি ব্যবস্থাপনার ক্ষেত্রে নারী এবং পুরুষ কি একই ধরনের এবং পর্যাপ্ত সেবা পেয়ে থাকে?
9. How women are engaged in water (natural resources) issues? What are the challenges women facing in water governance issues?
নারীরা কিভাবে প্রাকৃতিক সম্পদ কিংবা পানির ক্ষেত্রে সম্পৃক্ত? নারীরা পানি সংক্রান্ত কি কি ধরনের সমস্যার সম্মুখীন হয়ে থাকে সমাজে?
10. What have the remedies you/government/other NGOs taken to get rid of these challenges? Is there any specific example?
এই সমস্যা সমাধানের জন্য আপনারা কি কি ধরনের পদক্ষেপ গ্রহণ করেছেন? আপনি/ সরকার/ এনজিও? কোন উদাহরণ দিতে পারবেন?
11. What are the reasons women doing farming/agricultural work?
নারীরা কেন কৃষিকাজে সম্পৃক্ত হয়?