



Faculty of Social Science

Department of Sociology

SOCM04: Master's (Two Years) Thesis

**A Gendered Approach to Understanding Salinity Intrusion
Impacts: A Case Study on a Coastal Region of Bangladesh**

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TABLE OF CONTENTS

	Page no.
ABSTRACT	01
ACKNOWLEDGEMENTS	02
ABBREVIATIONS	03
Chapter I: Introduction	04 - 08
1.1 Background of the Study	04
1.2 Aims of the study	06
1.3 Research Questions	06
1.4 Preview of the study findings	06
1.5 What is specified in the rest of the chapters and the logic behind it?	07
Chapter II: Literature Review	09 - 19
2.1 What is salinity? How and why salinity is increasing in Bangladesh?	09
2.2 How salinity affects the coastal women and adolescent girl's life and livelihoods?	11
2.2.1 Salinity and water insecurity	12
2.2.2 Salinity and food insecurity	13
2.2.3 Salinity and health insecurity	14
2.2.4 Salinity and social insecurity	15
2.2.4.1 Social insecurity pertaining to coastal marriage and family structure	15
2.2.4.2 Social insecurity pertaining to violence against women	16
2.2.4.3 Social insecurity pertaining to health, hygiene and well-being	16
2.2.4.4 Social insecurity pertaining to education and work security	17
2.3 Reflections- What is needed?	18

Chapter III: Theory and Methodology	20 - 31
3.1 Theory	20
3.2 Concepts	22
3.2.1 Social insecurities concerning daily necessary tasks	22
3.2.1.1 Pertaining to marriage and family structure	22
3.2.1.2 Pertaining to violence against women	23
3.2.1.3 Pertaining to health and well-being	23
3.2.1.4 Education and work security	23
3.3 Background of the Study Area	24
3.4 Information about Interview	25
3.5 The way of interview	26
3.6 Sampling	27
3.7 Performing interviews and keeping a record	29
3.8 Data analysis	29
3.9 Ethical Considerations	31
3.10 Limitations of the study	31
Chapter IV: Findings (Part I)	32 - 54
4.1 Gender division of salinity effects/Disproportionate effects of salinity and the mechanisms of those effects on coastal women and adolescent girls	33
4.1.1 Pertaining to coastal marriage and family structure	33
4.1.1.1 Marriage insecurity, dowry demand, and child marriage	33
4.1.1.2 Grass widow, Divorced women, and Polygyny	39
4.1.1.3 Increase the number of women-headed families	40
4.1.2 Pertaining to violence against women	41
4.1.2.1 Sexual harassment	41
4.1.2.2 Victim of domestic/Intimate partner violence	42
4.1.3 Pertaining to health and well-being of coastal women and girls	43

4.1.3.1 Threat to menstrual health and hygiene management	43
4.1.3.2 Increased disease burden	45
4.1.3.3 Mental stresses of women and adolescent girls	46
4.1.3.4 Victims of malnutrition	47
4.1.4 Pertaining to education and work security	49
4.1.4.1 Low educational attainment	49
4.1.4.2 Burdens of domestic roles	51
4.1.4.3 Wage discrimination	52
Chapter V: Findings (Part II)	55 - 62
5.1 Coastal women and men’s perception of ‘gender roles’ and nexus between salinity, gender roles, and women and girl’s unfortunate situations	55
5.2 Perceptions of coastal marriage and family structure	57
5.3 Perceptions of violence against women	57
5.4 Perceptions on women and adolescent girl’s health, hygiene, and well-being	58
5.5 Perceptions on women and adolescent girl’s education and work security	59
Chapter VI: Discussion	63 - 70
6.1 Summary of the findings	63
6.2 Critical analysis	67
6.2.1 Structural drivers of salinity-induced social uncertainties	67
6.2.2 Inadequacy of institutional attempts	69
6.2.3 Social acceptance	70
6.2.4 Lack of recognition of social problems	70
Chapter VII: Conclusion	73 - 75
7.1 Gender sensitivity: A key requirement of salinity related research	73
7.2 Contributions of the study to climate change research	74
7.3 Scopes for the future researchers	74

Maps:

Map 1: Water salinity map for coastal Bangladesh from 1967 to 1997	10
Map 2: Soil salinity map of coastal Bangladesh from 1973 to 2009	11

Tables:

Table 1: A comparative study of the salt-affected agricultural land area from 1973 to 2009	13
Table 2: Salinity induced negative factors affecting coastal female's quality of life N=15 (10 women and 05 Adolescent girls)	53
Table 3: Identified gender roles from the respondents (both males and females)	55
Table 4: Coastal males, females, and adolescent girl's understandings of nexus between salinity and social uncertainties	60
Table 5: At a glance: Salinity induced social insecurities and the key drivers of those social insecurities of coastal women and girls	71

Figures:

Figure 1: Nexus between salinity and livelihood insecurities of coastal women and adolescent girls	12
Figure 2: Nexus between marriage insecurity, dowry demand and child marriage	38
Figure 3: The process of malnourishment of coastal women and girls	48
Figure 4: Salinity, disease burden, and the poverty trap	69

References	76 - 82
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Appendix A: Topics for the Interviews	83
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Appendix B: Interview Schedule	84
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Appendix C: Selected Photographs	87
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ABSTRACT

This study sheds light on the salinity-induced social insecurities of coastal women and adolescent girls of Bangladesh and shows how salinity contributes to creating and intensifying those insecurities. Moreover, the study explores the gendered division of labor and shows how coastal female's gender roles are accelerating to their deprivation and disadvantaged situation. Besides, it explores coastal men's perceptions and understandings of gender roles, social insecurities, distressing situations, and prioritizing events. Using semi-structured interviews and a thematic analysis approach, the study blends its findings with eco-feminist theorizing and feminist political ecology theory. This study identifies eleven social issues related to coastal women and girl's marriage and family structure, health, hygiene and well-being, education and work security, and violence against them. Findings show that salinity-induced social aspects affect the coastal women's and adolescent girls' entire lives so disproportionately and profoundly that nowadays, they turn to be marginal among the country's marginalized people. Moreover, the traditional gender roles of coastal women and girls make them the critical victims of salinity intrusion. However, their male counterparts accept the gender role discrepancies as an evident and inevitable social norm. Therefore, the study argues that gender-specific and context-specific attempts are necessary to break the salinity trap of coastal women and adolescent girls. Furthermore, this paper incorporates the concepts of radical realism and radical adaptation. It suggests that we should place 'gender equality' as a core component of further research on salinity and planning policies and practices at the structural and institutional levels. As the study is an initial attempt to understand salinity from the sociological point of view, future researchers have the opportunity to explore each of the identified social issues in an in-depth manner and suggest sustainable solutions for the coastal women and girls to way out from their horrifying conditions.

Keywords: Climate change, Salinity intrusion, Gender roles, Social insecurities, Gender equality

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Dilafroze Khanam; August 14, 2021

ABBREVIATIONS

AFP	Agence France-Presses
BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi Taka
DPS	Deposit Pension Scheme
FAO	Food and Agriculture Organization
GO	Government Organization
HSC	Higher Secondary Certificate
IPCC	The Intergovernmental Panel on Climate Change
IWMI	International Water Management Institute
NGO	Non-government Organization
PID	Pelvic Inflammatory Disease
SRDI	Soil Resources Development Institute
SSC	Secondary School Certificate
SMT	Salinity- Marriage Trap
SI	Social Insecurities
UNICEF	United Nations Children’s Emergency Fund
UTI	Urinary Tract Infection
UK	United Kingdom
USD	United States Dollar
UN	United Nations
UNDP	United Nations Development Programme
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

Chapter I

Introduction

1.1 Background of the Study

A quotation by S.T. Coleridge, “Water, water everywhere, nor any drop to drink” in his famous ballad “The Rime of the Ancient Mariner” allegorically expresses the critical situation of the coastal areas of Bangladesh. Though the entire coastal area is surrounded by water, people are not benefited from the resource as the water is extremely salty. Moreover, this saltwater, caused mainly by sea-level rise, is also responsible for increasing the salinity level of the coastal land areas (Saroar, 2015, SRDI, 2010).

Salinity intrusion (both water and soil salinity) is a harsh reality and bitter truth for the coastal districts of Bangladesh because the entire life of each coastal inhabitant is affected by salinity intrusion (Khanam, 2019). Salinity affects the basic needs of coastal people, i.e., food, shelter, clothing, health, and education that cover every walk of their lives (Rahman, 2009). A Staff Writer of The Los Angeles Times named Henry Chu penned the situation nicely after visited the coastal zone of Bangladesh on 21 February 2007-

Global Warming has a taste in this village. It is the taste of salt. Only a few years ago, water from the local pond was fresh and sweet on Samit Biswas' tongue. It quenched his family's thirst and cleansed their bodies. But drinking a cupful now leaves a briny flavor in his mouth. Tiny white crystals sprout on Biswas' skin after he bathes and in his clothes after his wife washes them (Chu, 2007, Para 1-3).

Salinity is significant for its impacts on the social and ecological life of the coastal people (Mustari and Karim, 2014). It destroys the natural features of coastal water, soil and damages the farmed lands, biodiversity, fresh drinking water sources, and livelihood resources that are responsible for degrading the quality of coastal people's life (Mustari and Karim, 2014). As a result, it is crucial to know the overall impacts of salinity on the socio-economic lifestyle of the coastal people.

Moreover, salinity has gender dimensions; specifically, salinity does not impact the male and the female equally (Rahman, 2009; Alston, 2015; Khanam, 2019). Furthermore, the direct and indirect risks and vulnerabilities of salinity intrusion associated with women and girls living in coastal

districts are intensified thousands of times when social, economic, political, cultural, and religious issues are blended with it. For example, women of coastal areas have to walk an average of three to five kilometers daily to collect fresh drinking water as the local ponds and often deep tube well water is contaminated by salinity (Alston, 2015; Saroar, 2015). Consequently, this freshwater scarcity converts the simple and traditional tasks of coastal women, i.e., cooking, child-rearing, elderly caring, daily chores, etc. are challenging to perform (Alston, 2015). Consequently, the challenges directly or indirectly victimized the women and adolescent girls of coastal areas by introducing domestic violence, sexual harassment, dowry demand, marriage insecurity, and other social complexities that are yet to be understood from the sociological point of view. Thus, the overall arrangement intensifies the marginalization of coastal women and adolescent girls. In addition, the patriarchal social structure blows the fire of their sufferings as they possess the sole responsibility of domestic works as well as care tasks, especially to children and elderly family members (Rahman, 2009). So, there is a strong connection between female's gender relations, their socio-economic situations, their sustainable livelihood, and environmental issues.

Several studies have been conducted to identify the effects of climate change on women's vulnerability and the gender dimensions of climate change. However, the truth is, substantial social impacts of salinity (both water and soil) on women and adolescent girls are still far from clear with an in-depth understanding. Therefore, increased salinity and its effects on livelihoods and adaptation alternatives of coastal female inhabitants are needed to be investigated in great detail. In addition, the association between salinity and related social issues has never been studied before, as natural scientists did most of the climate change-related studies. However, salinity also needs to be addressed from a social science perspective, especially from the sociological point of view, because there is a blankness of studies to see the association between salinity and gender issues. Besides, no study explores the mechanisms of salinity-induced vulnerabilities and the effects of those vulnerabilities on coastal women and girl's socio-economic, educational, and family life. So, this study is unique and significant to demonstrate a gendered approach to understanding salinity intrusion impacts and the mechanisms of creating coastal women and girls' social insecurities in Bangladesh.

1.2 Aims of the study

The study is an attempt to investigate salinity intrusion from a gendered approach. Broadly the study has a threefold objective: firstly, the study aims to present salinity-induced challenges for coastal women and girls along with the socio-economic, environmental, and cultural dimensions of those challenges. Secondly, it seeks to supplement data with an in-depth understanding of the casualty and mechanisms of salinity-induced uncertainties that turn coastal women and adolescent girls into the key victims of salinity. Thirdly, it aims to understand the coastal men's perceptions of the disproportionate effects of salinity intrusion and the nexus between those uneven effects and women's gender roles.

1.3 Research Questions

1. To what extent and how do the salinity-induced burdens disproportionately affect coastal women and adolescent girls?
2. How do women and adolescent girls of the coastal areas attribute causality/understand the mechanisms of salinity-induced insecurities?
3. To what extent do women and girls understand gender roles to be a part of their problem or unfortunate situation?
4. How do the coastal men understand the mechanisms of the women and girls disproportionate effects, and how do they perceive those effects?

1.4 Preview of the study findings

The study findings show that salinity disproportionately affects (directly and indirectly) coastal women and adolescent girls by creating several challenges and crises related to their food and water security, health, education, work security, and social protection. Salinity hampers the social protection of coastal women and girls by imposing the risk of sexual harassment and domestic or intimate partner violence. Besides, salinity increases the risk of marriage insecurity, dowry rate, and child marriage tendencies (can be termed as 'Salinity- Marriage Trap') among the coastal women and girls. Also, salinity changes the marriage and family structure of the coastal areas by increasing the number of grass widows, divorced women, and polygyny. Moreover, salinity is

responsible for girls' low education achievements, menstrual health, hygiene management crisis, and impoverishment among coastal women and girls.

Surprisingly, coastal males often do not understand the casualty of the mentioned disproportionate effects of salinity on women and girls; on the contrary, women and adolescent girls understand the linkage between their hardship and salinity very well. However, they are always trying to cope with the adversities as they have no other options. For example, one girl interviewee (Interviewee 5) said, "*coping with the adverse effects of salinity is the only coping strategy for us.*"

The findings of this study are significant because it is the first attempt to reveal the social aspects of salinity and explores the mechanisms of creating disproportionate effects on coastal women and adolescent girls. Besides, the findings are significant for the stakeholders interested in working with climate justice and sustainable development for the coastal areas of Bangladesh. Moreover, the study explores several latent and sensitive issues of coastal women and girls. Those issues should be the key concern for the government, non-governmental development organizations, and voluntary organizations if they plan any policy. Furthermore, the study presents in-depth information on the issues that were insufficient in the previous literature. So, anyone who is interested in doing future works on any of the identified research themes mentioned in this thesis will find the findings valuable and informative.

1.5 What is specified in the rest of the chapters and the logic behind it?

In the first chapter, I present the study's background, aims, and research questions. Moreover, I also present a short preview of my research findings in this chapter to make my reader more eager to know the next steps and remain glued throughout the thesis. In the second chapter, I critically analyze the previous literature to present the social realities of salinity, where I categorize the previous findings into four broad categories and several sub-categories. In addition, in the second chapter, I also show the present salinity (both soil and water salinity) situation of Bangladesh and a brief description of why salinity is increasing in the country's coastal areas. In the third chapter, I critically analyze theories and concepts related to my study and briefly present my study area. Moreover, in the third chapter, I discuss methodological considerations in a detailed manner, i.e., tools to collect primary data and the process of utilizing the tools, sampling procedures, record keeping, data analyzing process, ethical issues, and limitations of my research method.

Both the fourth and fifth chapter of my study deals with the presentation of research findings. More specifically, in the fourth chapter, I present the uneven effects of salinity on coastal women and adolescent girls and the mechanisms of creating those varying effects, and the fifth chapter contains the coastal people's (men, women, and adolescent girls) perception of the casualty of those uneven effects. In the sixth chapter, I present a very brief summary of my study findings. Then I give a critical analysis section to blend eco-feminism and feminist political ecology approach with my study findings.

Finally, I conclude this study by accepting Ferree's concept of "radical realism" and Alston's concept of "radical adaptation." I narrowed down the concepts to say that gender equality must be at the center of salinity issues, addressing its uneven impacts or designing policies, strategies, and practices. Furthermore, I briefly describe the contributions of this study in the field of climate change research and give directions for future researchers in the seventh, the last chapter of my dissertation.

Chapter II

Literature Review

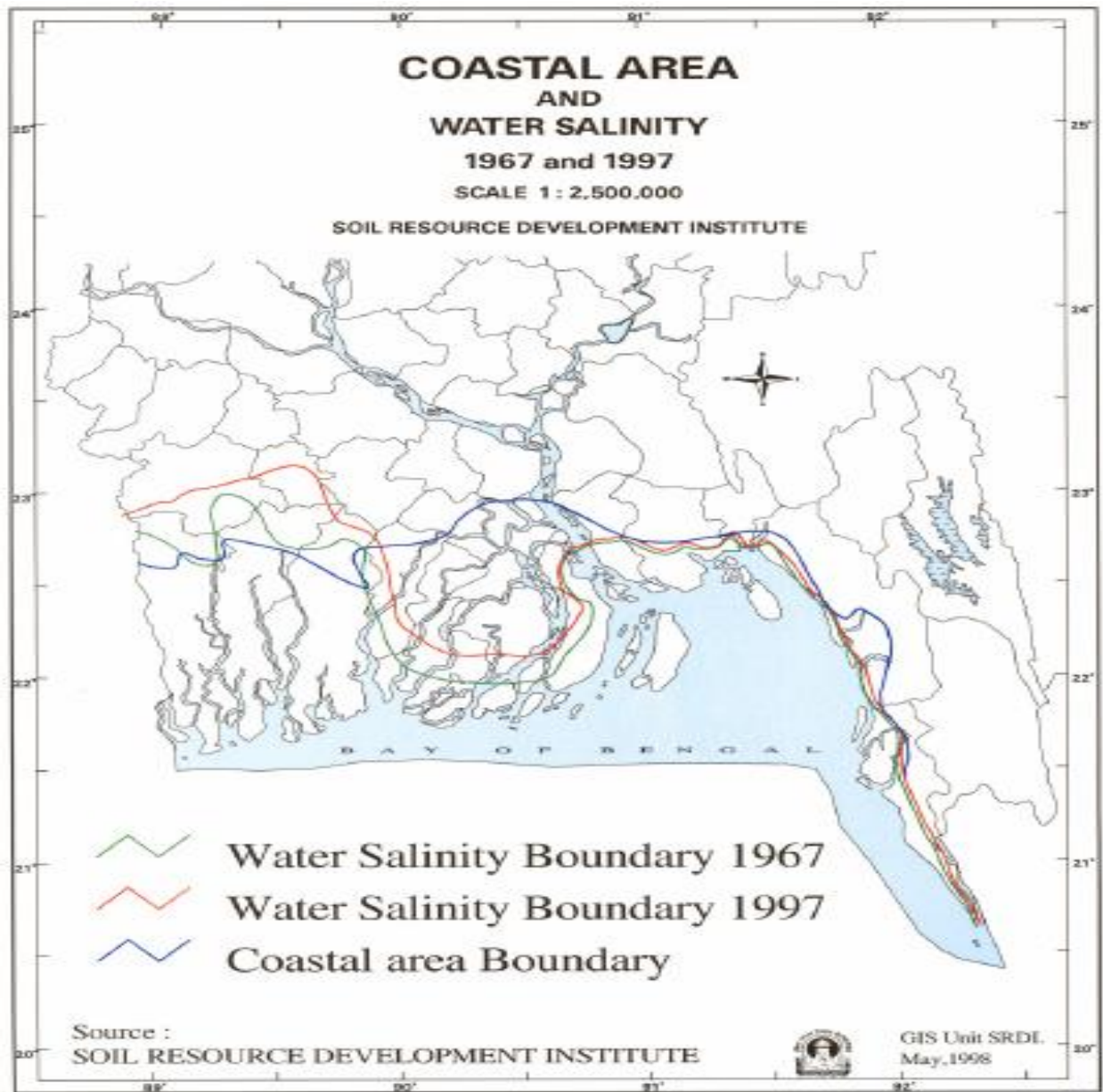
This chapter evaluates the past research findings that are related to the thesis. I start the chapter by introducing the salinity problem, how and why salinity is increasing, and the future projections of salinity intrusion in Bangladesh. Furthermore, I briefly shed light on the four categories of effects of salinity on coastal women and adolescent girls. Among them, my key focus is on the social insecurities that are created and amplified by salinity. Here, I present the social insecurities identified from the previous literature and compare and contrast them from my point of view. Finally, I have identified the research gap that I will try to fulfill with an in-depth understanding throughout my thesis. The thesis will simply explore the social aspects of salinity and the mechanisms from a gendered approach and portray a holistic picture of ‘salinity and women.’

2.1 What is salinity? How and why is salinity increasing in Bangladesh?

Salinity is two-dimensional, such as water salinity and soil salinity. Scientifically, salinity is the saltiness of soil and water. More specifically, the excessive amount of salt that coastal water and soil contain. Broadly speaking, several reasons are responsible for coastal salinity intrusion in Bangladesh i.e. natural disasters (like cyclones, tornadoes, and storm surges), the geographical location of the coast, and upstream withdrawal of freshwater, and most importantly sea-level rise (Sarwar, 2005; IPCC, 2007).

Evidence shows that 170 million people around the world would be affected by sea-level rise-induced climate events including salinity intrusion and among them 35 million people would be from the coastal areas of Bangladesh (Sarwar, 2015). Scientists claim that the area coverage (both soil and water) under the saline zone is expanding rapidly (Sarwar, 2015). Salinity is a new form of natural disaster for Bangladesh that destructively affects the coastal physical environment as well as its social environment (Sarwar, 2015; Alston, 2015; Khanam and Dina, 2020). The following maps can clearly show the increasing tendency of the salinity of Bangladesh.

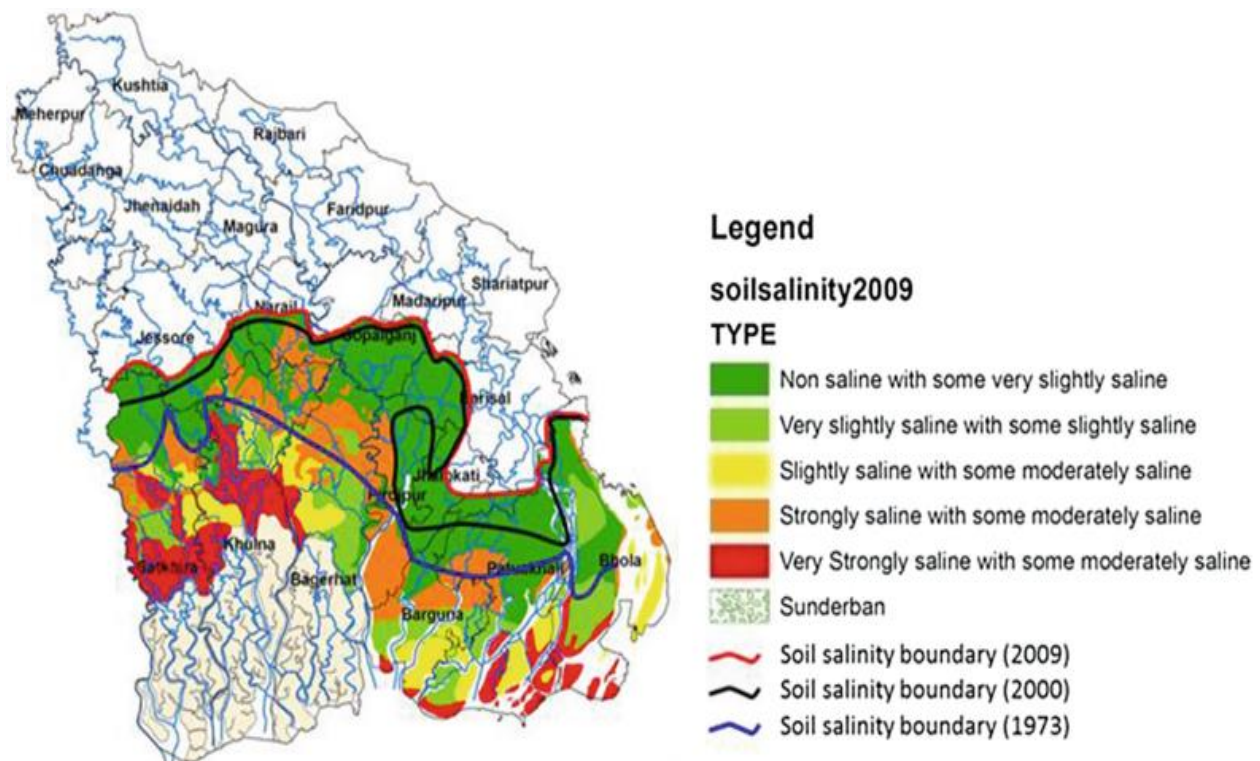
Map 1: Water salinity map for coastal Bangladesh from 1967 to 1997



Source: Bangladesh Soil Resource Development Institute (SRDI), 1998a

Another map was developed by SRDI (2010) to compare the soil salinity tendencies of coastal areas from 1973 to 2009. The map shows that soil salinity increases at a higher rate as compared to water salinity.

Map 2: Soil salinity map of coastal Bangladesh from 1973 to 2009



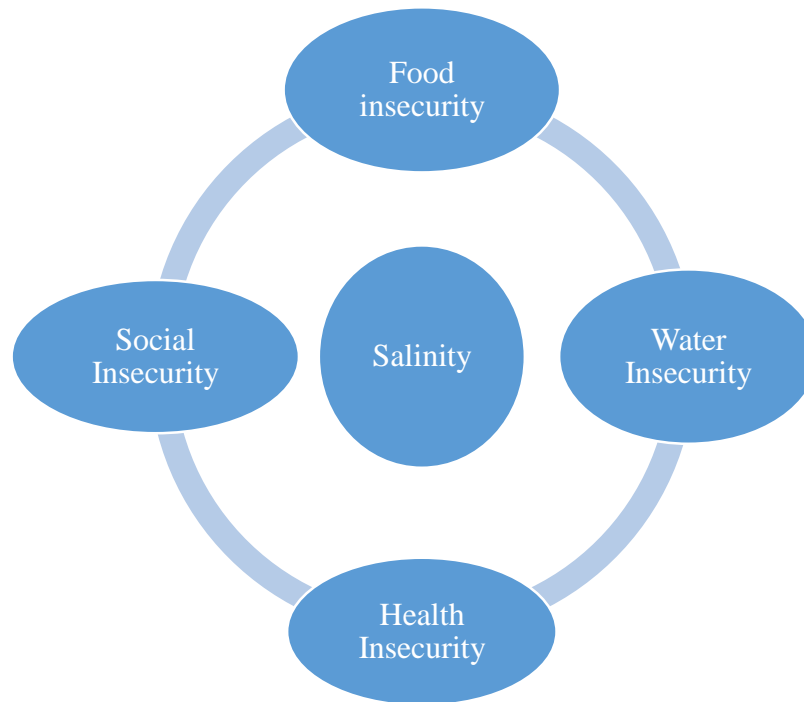
Source: Bangladesh Soil Resource Development Institute (SRDI), 2010

2.2 How salinity affects the coastal women and adolescent girl's life and livelihoods?

As mentioned earlier, saline-contaminated coastal areas have been mounting very hurriedly and it has posed tough challenges for the lives and livelihood securities of extremely natural resource-dependent coastline communities of Bangladesh (Saroar, 2015). In the coastal districts of Bangladesh, “the entire life of every person is affected by saline water” (Khanam, 2019, p. 55). In addition, salinity negatively affects the basic needs of the coastal inhabitants, such as food, shelter, clothing, health, education, and entertainment that covers each walk of their livelihoods (Rahman, 2009).

Salinity predominantly affects the coastal women and girls' lives and livelihoods by imposing four categories of insecurities, i.e., food insecurity, water insecurity, health and hygiene-related insecurity, and social insecurity.

Figure 1: Nexus between salinity and livelihood insecurities of coastal women and adolescent girls



Source: Encouraged by (Khanam and Dina, 2020)

2.2.1 Salinity and water insecurity

Today, 1.4 million coastline inhabitants suffer from the scarceness of fresh drinking water and water for irrigation throughout the dry season each year (Dasgupta, 2017). Moreover, future projections demonstrate that Bangladesh's 3.2 million extremely poor coastline people would have been inexorably affected by rising water salinity (Dasgupta, 2017). Because of saline-contaminated groundwater, almost 70 percent of coastal inhabitants collect drinking water from nearest ponds (Bagri, 2017). Coastal women and adolescent girls are the key accountable person from each house to collect pond water to drink, so gender discrepancies are evident in this case (Alston, 2015). For example, UNICEF (2013) showed that 89.6 percent of coastal women and girls collect water for their family members in Bangladesh, whereas only 4.6 percent of men do the same job. Henceforth, women and girls are forced to walk a minimum of 3-7 kilometers every day to fetch drinking water for their families (Alston, 2015). Moreover, water insecurity compels the coastal communities to buy drinking water from the vendors. Evidence showed that about 10

percent of the earnings of coastal poor people are spent on water purchasing that intensifies their poverty and women and girls are the key victims of such poor conditions (Bagri, 2017).

2.2.2 Salinity and food insecurity

Salinity destroys the soil quality and shrinks the coastal agricultural production two or three times (Alston, 2015; Faruque and Ali, 2005). For example, Ali (2005 cited in Sarwar, 2005) demonstrates that coastal rice production decreased by 69 percent from 1985 to 2003. Moreover, Ahsan (2010) conducted a comparative study on salinity intrusion and showed that salinity is increasing worryingly in the coastal districts and is attenuating the coastal agronomic production every year.

Table 1: A comparative study of the salt-affected agricultural land area from 1973 to 2009

Salt affected area (000'ha)			Salt affected area increased during last 9 years (000'ha) (2000-2009)	Salt affected area increased during the last 36 years (000'ha) (1973-2009)
1973	2000	2009		
833.45	1020.75	1056.26	35.51 (3.5%)	222.81 (26.7)%

Source: (Ahsan, 2010, p. 5)

In addition, salinity destroys the traditional sources of nourishment for rural coastal inhabitants by destroying their homestead fruit trees and vegetable gardens (Saroar, 2015; Alston, 2015; Nahian et al., 2013). Though plantation of homestead forest (fruit, non-fruit trees, and vegetables) is a tradition of rural Bangladesh, and the village inhabitants largely depend on them to fulfill their nutritional essentials, now those days are gone forever.

Besides, salinity creates scarcity of grazing land as well as hay harvests for livestock of coastal districts. Alam et al. (2017) reported that more than 200 hectares of new fodder cropland of coastal areas are affected by salinity every year. Consequently, the coastal livestock is harshly suffered by

food inaccessibility (Alston, 2015). Furthermore, Nahian et al. (2013) confirm that salinity unfavorably affects poultry farming in the coastal districts.

In addition, salinity also destroys the coastal belt's traditional fish resources that are considered the critical source of protein for coastal inhabitants, especially women and children. Evidence shows that water salinity and cyclones conjointly destroy the traditional fish sources across the coastal zones (Alam et al., 2017). Besides, study showed that 17 percent of families living in coastal areas claimed the unavailability of sweet water fish in their nearest rivers (Maumita, Biswas & Muktadir, 2015). All the mentioned factors impose considerable risks to the coastal inhabitant's food security. Alston (2015) showed that coastal women and girls are core victims of food insecurities; for example, they suffered most from malnutrition.

2.2.3 Salinity and health insecurity

Study showed that coastal people intake excessive amounts of salt compared to the recommended level from their daily drinking water. For example, in 2002, WHO and FAO jointly recommended the daily sodium intake of a person is 2g/day (Nishida et al., 2004 cited in Khan et al., 2011) however, coastal people intake 5-16g/daily by their drinking water alone in the dry seasons (WHO, 2003 cited in Khan et al., 2011).

Salinity increases health risks among coastal people, especially for women and children (Zaman, 2017). For example, Nahian et al. (2018) showed that regular intake of saline water is strongly connected with a high risk of blood pressure (prehypertension and hypertension). Moreover, the study showed that coastal women had a 31 percent higher probability of being hypertensive than men (Nahian et al., 2018). In addition, coastal pregnant women who drink saline water regularly had a five times higher risk to suffer from (pre)-eclampsia (a disease categorized by high blood pressure during and after pregnancy) than women who drink non-saline water (Vineis, Chan & Khan, 2011). Moreover, coastal women also have a higher risk of maternal mortality, miscarriage, and maternal morbidity (WaterAid Bangladesh, 2014).

Besides, studies showed that coastal women and girls are the primary victims of gynecological health complexities and severe skin diseases (Ahmed et al., 2009; Sharmin and Islam, 2013). In addition, Gobeshona (n.d. p. 3) provided a brief list of diseases presenting the most common health

complexities of coastal women and girls such as “Early or delayed menarche, infertility or compromised fertility, inability to carry a baby to term, pregnancy compromise, birth defects, congenital abnormalities, and low birth weight babies, premature delivery, leucorrhea, Pelvic Inflammatory Disease (PID), Urinary Tract Infection (UTI), Abdominal Discomfort, Obese, Disabled childbirth, Sexual uninteresting (Sexual problem).”

2.2.4 Salinity and social insecurity

Salinity and related social insecurities are the key focus of my thesis. I categorize the social issues of salinity into four distinct categories that are nicely fit under the umbrella term ‘Social insecurities’ such as i) social insecurity pertaining to marriage and family structure ii) social insecurity pertaining to violence against women iii) social insecurity pertaining to health, hygiene, and well-being and iv) social insecurity pertaining to education and work insecurity.

2.2.4.1 Social insecurity pertaining to coastal marriage and family structure

Salinity adversely affects the coastal inhabitant’s marriage and family structure. For instance, salinity creates the risk of marriage insecurity for coastal men and women; however, women are the key victims of this tendency (Khanam, 2019; WaterAid Bangladesh, 2007 cited in Rahman, 2009). Khanam (2019, p. 57) reported that 91.82% of coastal girls claim that “saline water-induced skin problems are responsible for their marriage insecurity.” Further, the study showed that salinity intrusion accelerates the coastal dowry demand that victimizes the women and marriageable girls miserably (Khanam, 2019). Moreover, salinity also increases child marriage tendency among the coastal inhabitants. Alston (2015) displayed that the average marriage age of girls living in coastal districts is 12 -17 years. Besides, 58 percent of coastal parents withdraw their daughters from academic activities for child marriage (Alston, 2015).

In addition, salinity intrusion also proliferates the number of female-headed families in the coastal districts (Alston, 2015; Khanam et al., 2021), and these female-headed families are very vulnerable in nature (Alston, 2015). Also, Khanam et al. (2021) displayed that because of the salinity-induced unemployment problems, the male members living in coastal districts are compelled to migrate internally to the cities, especially during the lean seasons of every year. Furthermore, these migrated males often start a new family life by marrying the women living in the cities and thus

leave the earlier family members in the rural coastal villages. These tendencies turn the coastal family into a female-headed family and place its members into extremely vulnerable conditions.

2.2.4.2 Social insecurity pertaining to violence against women

Here, violence against women includes two social issues related to coastal women and adolescent girls, such as sexual harassment and domestic/intimate partner violence. Several studies claimed that women and adolescent girls are the victims of harassment and assault while collecting fresh drinking water from long distances (Abedin et al., 2013; Ahmed et al., 2009; WaterAid Bangladesh, 2007 cited in Rahman, 2009). Moreover, Ahmed et al. (2009, p. 58) further duplicated the findings by writing – “Woman, in their daily struggle to collect potable water, face difficult circumstances, even sexual harassment and assault.” Besides, Rhaman (2010) claimed that women and girls who work in the shrimp farms are also the victims of harassment and torture by the shrimp farm owners. However, UNICEF (2016) claimed that salinity has no direct impact on coastal child protection and safety in Bangladesh.

In addition, evidence showed that salinity is responsible for increasing domestic violence and intimate partner violence among coastal women. For instance, coastal women and girls are compelled to spend on average three/four hours daily to get non-saline drinking water (Ahmed et al., 2009). Consequently, they are forced to manage the mentioned extra hours by sacrificing their household tasks or schooling to cope with the situation (WaterAid UK, n.d., Para. 3). Moreover, salinity also imposes additional workloads on coastal women and girls, like fuel and fodder collection (Ahmed et al., 2009). Hence, coastal women and girls have failed to perform their household responsibilities appropriately, so they face domestic violence and intimate partner violence from their family members and husband (Alston, 2015).

2.2.4.3 Social insecurity pertaining to health, hygiene, and well-being

Here, health, hygiene, and well-being related social insecurities include four issues, i.e., menstrual health and hygiene management crisis, disease burden, malnourishment, and extreme mental stress.

Saltwater consumption threatens coastal women and girl’s menstrual health as well as their hygiene management. For instance, 92.8 percent of coastal women and girls claimed that salinity

adversely disturbs their menstrual health and hygiene by - “creating rash and fungal infections, itching in sensitive areas, sweating due to hot weather, feeling uncomfortable and also urinary tract infections” (Khanam and Dina, 2020, p. 74). In addition, studies also showed that coastal women and girls undergo unbearable gynecological health issues due to their consumption of salty water to a large extent (Khanam and Dina, 2020; Zaman, 2017). For example, Zaman (2017) showed that 66 percent of women living in coastal areas suffer from salinity-induced gynecological health complications.

Moreover, coastal women and girls also suffer from malnutrition, a direct impact of reduced agronomic production of the coastal districts. For instance, Alston (2015) showed that when a family suffers from a low food supply, the situation compels the female family members (wife, mother-in-law, daughters) to eat less than the male members.

In addition, salinity imposes heavy mental stress on coastal women and girls (Rahman, 2009; Shohel et al., 2011). For instance, women leave their children alone at home (because they often have no one to take care of their children) while they are going to fetch water, which increases their mental stress (Rahman, 2009). Moreover, salinity-induced skin diseases increase the mental pressure of coastal women and adolescent girls. For instance, Shohel et al. (2011) showed that 32 percent of female respondents of his study areas suffer from mental stress due to their skin diseases.

2.2.4.4 Social insecurity pertaining to education and work security

Coastal women and girls’ education and work security-related social vulnerabilities can be largely categorized into three categories- firstly, low educational attainment, secondly, the burden of domestic roles, and thirdly, wage discrimination.

Study showed that salinity intrusion affects the coastal women and girl’s literacy rate profoundly. For instance, coastal parents often withdraw their daughters from schooling to assist their families in getting non-saline drinking water from distant sources (Zaman, 2017; Water Aid, n.d; Sharmin and Islam, 2013). In contrast, UNICEF (2016) claimed that salinity has no direct impact on coastal children’s schooling; it indirectly increases illiteracy by negatively affecting coastal people’s food, water, and health.

Furthermore, salinity-induced water crisis imposes huge workloads on coastal women's domestic roles and responsibilities. Consequently, coastal women and adolescent girls do not get plenty of time and energy to perform their household tasks, i.e., elderly care and child care, food preparation, bathing, washing clothes, etc. (Rahman, 2009).

Also, coastal women and girls who work in the local shrimp farms (the main economic activities of the coastal districts) as day laborers or algae cleaner face wage discrimination regularly. Islam (2016) showed that wage discrimination among coastal male and female workers is widespread and socially accepted. For instance, in the aquaculture field, men get BDT 300 as wage, where women get BDT 240 per day, and women receive it by saying, "this is the system in our area" (Islam, 2016, p. 16). Besides, female laborers are threatened to be discharged from work if they want to attempt against this system (Islam, 2016).

2.3 Reflections- what is needed?

The nexus between salinity and the mentioned social insecurities are yet to be explored. Literature on social insecurities is insufficient and disorganized because no in-depth study was done on the social effects of salinity. Though the mentioned social effects of salinity were identified from previous literature, in most cases, the literature contains only one/two lines or a paragraph on an issue. For example, studies acknowledged the relationship between water salinity and sexual harassment, but no researcher provides in-depth information about the mechanisms or other related risks to the issue. Again, literature on the relationship between salinity and domestic violence is not properly identified as no relevant study has been done yet to reveal the association. Also, the literature only says that prolonged consumption of saline water increases the suffering of coastal women and girls but does not say why coastal women and girls consume saline water to a larger extent than men or boys? The answer to the question is significant to understand the vulnerability of coastal women and girls, and my thesis will explore the issues later on.

Furthermore, evidence showed that women and adolescent girls are more susceptible to diseases than their male counterparts in coastal areas. However, most of the mentioned findings are grasped from scientific studies that ignore the social aspects of salinity. For example, how women and adolescent girls are compelled to expose more to saline water or the consequences of disease burden or the health-seeking behaviors of the coastal women and adolescent girls, what are the

social barriers of women and girls in the case of health-seeking etc. In addition, no existing literature can explain the association among salinization, marriage insecurity, increased dowry, and child marriage tendencies (Salinity-Marriage Trap) of coastal areas. The mechanism, consequences, and the way out are essential issues that are yet to be understood in-depth. These are the issues that the thesis will elaborate later on.

Moreover, no previous literature answers the questions- how do the coastal men perceive the mentioned social insecurities and women's gender role? How do they feel about participating in the coastal women's gender roles, or how do they view the work burden of coastal women and girls? And how do they prioritize the coastal women and girl's mental and physical crises? From my observations, it's crucial to find out the answers to the questions to understand the gender dimensions of salinity. My study will answer the questions for the first time in its later chapters.

Chapter III

Theory and Methodology

This chapter will give you an outline of my research process as well as a brief analysis of my theoretical framework. The chapter is divided into three parts, the first part is called ‘theory’, the second part is ‘concepts’, and finally, the third part is ‘methodology’. In the theory part of this chapter, you will get a short and critical analysis of the feminist approach from an environmental perspective, along with justifications for using the theories. In the concepts part, I give a brief discussion of the concepts that I focus on both in the literature review chapter as well as my data analysis chapter. Moreover, in the methodology portion, you will get comprehensive information related to my study area, research method, data collection techniques and processes, sampling procedure, data analysis approach, and their justification and examples where needed. Finally, the chapter ends with a brief discussion of my ethical issues and the limitations of my methodology.

3.1 Theory

Gender is well-defined as the social processes and associations that shape the identity of women and men at a specific time and place (Alston, 2015). Gender is socially constructed and serves as a marker of differences and inequalities and is reinforced through social practices (Enarson, 2012). Therefore, it is one of the most noteworthy indicators of vulnerability (Alston, 2013, FAO 2007b, Lane and McNaught, 2009), especially “during and after climate crises” (Alston, 2015, p.10). UN Women Watch (2011) said that, unlike men, women are the most vulnerable group to the effects of climate change, and their vulnerability increases if they depend on their natural resources for livelihood, for example, the responsibility to collect water, food, and fuel. One of the main focus of my thesis is salinity and the gender roles of coastal women and adolescent girls. In the later chapters, the thesis will show that the people’s daily tasks are gendered in the coastal areas, and there is a clear and unavoidable line of distinction between the male and female roles in their household. Moreover, salinity, especially water salinity, a climate change-induced disaster, affects coastal women much worse than men. For example, the scarcity of sweet drinking water, fuel, food, and fodder increases the vulnerabilities of coastal women with physical effects as well as mental stress (will be discussed later), resembling the statement as mentioned earlier of UN Women Watch (2011) and Alston (2015).

So, understanding the vulnerability of women and adolescent girls entails feminist analysis, especially to answer the questions like- how salinity creates coastal women more vulnerable? What factors are responsible for shaping the coastal women's responses? How do poverty level, family structure, the cultural context, and social values of coastal women affect the salinity issues?

A feminist theory like eco-feminism links the oppression of women and nature in the same manner, arguing that the subsistence actions of women have always been overlooked for their non-monetary value in the capitalist society (Shiva, 1993). Shiva (1993) linked capitalism, colonialism, and patriarchy as the oppressive factors for women's subordination and considered eco-feminism as the feminism of ordinary women. I am referring to the author because I support the idea of patriarchy as an oppressive force. In the later parts of my thesis, I will show that patriarchy is one of the most influential factors for coastal women and adolescent girls' subordination and vulnerability. Moreover, the concept of the non-monetary value of women's work is also related to my thesis. The work burden of the coastal women and adolescent girls induced by salinity isn't recognized by their society due to its non-monetary value that I will discuss later.

In addition, another feminist approach called Feminist Political Ecology put women at the center of environmental issues, like water, food security, adaptation, and sustainability issues. As Enarson (2012) said, gender discrimination, environmental degradation as well as disaster vulnerability is interlinked so, ignoring the relationship perpetuates degradation and reduces the adaptive capacity of women. As a result, we have to consider the specific context of women's livelihood that means the "everyday/every night worlds" (Smith, 1992, p. 17) of women. We should also focus on "critical social and gendered impacts and solutions that build resilience" (Alston, 2015, p. 8). I mentioned the theory because, in the later chapters of the thesis, I will show that water and soil salinity intensively affect every day/every night worlds of coastal women's life. Their whole life is a narrative of deprivation, subordination, and gendered tasks; however, they are not the center of the environmental issues. I emphasize the idea of every day/every night worlds of coastal women because this term tells that the entire life of each coastal woman is circled by the works of growing and cooking food, collection of fuel, and most importantly, collection of drinking water from long distances by ensuring that they are adjusted to their own space and place. For example, as gendered tasks, coastal women are responsible to notice first the shortage of water, child unwellness, elderly care, schooling to their child, maintenance of the home, livestock pens, stoves,

even if their family fell in some danger that harms the family member's well-being by ignoring her physical safety and mental health. All the mentioned gendered tasks are non-monetary and are not valued by society though they are highly valued for sustaining the existing social and family structure of coastal areas that will be discussed later.

3.2 Concepts

I identified a series of concepts from my previous literature, made groupings of them with similar traits, and considered them my research themes because it will assist my analysis of gender tasks or gender consequences related to salinity. The research themes are understood in-depth throughout my study and explored elaborately in my analysis chapters later. Brief categorizations of the concepts are as follows-

3.2.1 Social insecurities concerning daily necessary tasks

Insecurity, feelings of uncertainty are created in many ways among coastal people, especially among women and adolescent girls. It can be developed through several dimensions like food, water, health, and socio-economic. Salinity is the main responsible factor for creating all four dimensions of insecurity among the coastal women, and most significantly, they are influenced by each other. For example, food and water insecurity affect the health of coastal women by creating malnutrition, skin diseases, and additional disease burdens. Again water insecurity affects the social well-being of the coastal women in several ways, i. e., by creating marriage insecurity, time poverty, domestic violence, sexual harassment, early marriage, etc. I am presenting my research themes by following groupings that will be discussed elaborately in the analysis chapters -

3.2.1.1 Pertaining to marriage and family structure: Salinity affects the marriage and family structure of the coastal areas severely by increasing women-headed households, grass widow (a woman who is separated from her husband or a woman who is living apart from her partner), divorce, and Polygyny (a man has more than one wife at the same time). Moreover, salinity also increases the risk of marriage insecurity (inner feelings of being threatened or fear of not being married or parent's fear of not being able to marry off their offspring), dowry (a cultural practice where the bride's family gives a large amount of money, jewelry or other properties to the groom's

family) and child marriage (in Bangladesh, marrying before 18 years is considered as child marriage for females) that I put under marriage and family subgroups.

3.2.1.2 Pertaining to violence against women: Salinity threatens the social protection of coastal women and adolescent girls by creating the tendencies of violence against women. For example, sexual harassment and domestic/intimate partner violence are the key threats to the social protection of coastal women and girls. So, I put the mentioned themes in this category.

3.2.1.3 Pertaining to health and well-being: Salinity creates severe health complexities and disease burdens, especially for women and adolescent girls as they are primarily exposed to saline water. The dominant health complexities of women are skin diseases, respiratory diseases, urinary tract infections, malnutrition, and mental stress. Moreover, the menstrual health and hygiene management crisis (the availability, affordability, and accessibility of safe and hygienic-sanitary materials, personal awareness on the issue, and access to clean water during menstruation) is a crucial well-being related challenge for coastal females.

3.2.1.4 Education and work security: Salinity affects the schooling of the coastal adolescent girls and makes them the victim of low educational attainment (in Bangladesh, it means 8th-grade education). Moreover, salinity imposes a work burden on women and adolescent girls both at the family level (increasing burden of domestic roles) and at the professional level (creating wage discrimination).

The above-mentioned social insecurities create a complex situation for coastal women and adolescent girls. These are the key focuses of my thesis, and I will present the nexus between salinity and the above-mentioned social insecurities, their mechanisms, and the gendered approach of such insecurities with in-depth information on the rest of the chapters.

3.3 Background of the Study Area

The study area of this thesis is a coastal village named *Jhapa*. It is situated in *Padmapukur Union* under *Shymnagar Upazila* (sub-district) at *Satkhira* district in Bangladesh. The study area is situated in the Southwestern coastal zone of Bangladesh, and the area is covered by the world's largest mangrove forest named *Sundarban*. The total population of *Jhapa* village is 3,158 comprises 1,601 men and 1,557 women (Padmapukur Union, 2015). The village is almost circled by the river *Kholpetuya* and the river is full of extremely saline water. Because of extreme salinity, the local people have minimal employment opportunities, a high poverty rate, and a low literacy rate (37%) (Padmapukur Union, 2015). As a result, the people of the *Padmapukur Union* rely mainly on the natural resources of the area. Moreover, the Livelihood Vulnerability Index put *Padmapukur Union* in the worst position (Didar-Ul Islam, Bhuiyan & Ramanathan, 2015).

To realize the extremely vulnerable condition of the study area, I am presenting empirical evidence from *Satkhira* district as the statistical data of the *Jhapa* village is not available. The scientific studies proved that the *Satkhira* district is one of the highly saline-prone areas of the country (Rabbani, Rahman, and Mainuddin, 2013). Its agricultural land area is also facing the effects of increased salinity (Islam, 2004; Ahmed, 2008). For example, the net cultivable land area of *Satkhira* has decreased by 7 percent from 1996 to 2008 because of salinity (BBS, 2008). Moreover, 71 percent of cultivable land areas in *Shymnagar Upazila* (sub-district of *Satkhira*) are affected by a high level of salinity (SRDI, 2010).

Besides, Rashid et al. (2004) and Ashraf et al. (2002) presented that the worst salinity situation is reported in *Satkhira* along with the other three districts of Bangladesh. Moreover, Integrated Regional Information Networks (2007) revealed that from 1948 the saline water intrusion of coastal districts i.e. *Patuakhali*, *Barguna*, *Pirojpur*, *Bagerhat*, *Khulna*, and *Satkhira* have risen by 45 percent. Furthermore, UNICEF (2016) reported that in *Satkhira* “salinity increases, heat increases, crops and fishes are not produced” (p. 42). Because of extreme salinity, the main economic activity of *Shymnagar Upazila* (sub-district) of *Satkhira* turns to aquaculture, especially prawn farming and tiger shrimp farming from crop production (Ahmed, 2008).

3.4 Information about Interview

The study utilizes the Qualitative method as it anticipated achieving the depth of understanding (Patton, 2002, Butina, 2015) of the gender dimension of coastal salinity intrusion. Moreover, the qualitative approach helps to understand and explore the issues related to salinity, i.e., socio-economic aspects of salinity, gender roles, and their effects in a better and detailed way and also helps to develop a theory (Creswell, 2013).

The research utilizes interviews as well as secondary textual analysis of several reports to collect secondary data. The research reports that I reviewed are- UNICEF's report on Youth Conference on Climate Change 2017; The World Bank report on Coping with Climate Change in the Sundarbans 2020; UNICEF's report on Learning to Live in a Changing Climate: The Impact of Climate Change in Bangladesh 2016; IWMI Working Paper on A Framework to Understand Gender and Structural Vulnerability to Climate Change in the Ganges River Basin: Lessons from Bangladesh, India, and Nepal; Report on Gender and Water Poverty: Salinity in Rampal and Saronkhola, Bagerhat financed by the Embassy of the Kingdom of the Netherlands; UNDP report on Climate Change Gender and Vulnerable Groups of Bangladesh; and WaterAid end-line study report on Climate Resilience WASH Programming in Coastal Areas of Bangladesh.

However, the main source of the primary and original information of this thesis is the face-to-face interview. I used semi-structured interviews to collect data from the field. The study selects semi-structured interviews because the study wants to explore real-life experiences and the technique allows achieving rich data. As my study field is unexplored and a new issue (salinity) is focused through gender lens, a semi-structured questionnaire allows me to probe and clarify the aspects that are raised. Furthermore, I studied several sensitive issues related to women and adolescent girls, so I need to establish rapport with my interviewees and a semi-structured interview process helps me to do it easily (Noaks and Wincup, 2004). Moreover, semi-structured interviewing helps me understand and examine the social reality of gender roles from the respondent's point of view as they can clearly understand my project's aims (Noaks and Wincup, 2004).

3.5 The way of interview

For conducting semi-structured interviews, I have prepared myself with a list of the themes identified by the previous literature I mentioned earlier. Then, I have developed an instruction guide by sequencing those themes to be explored and to stay focused on my research objectives. However, I did not ask the same questions to my respondents because all are not appropriate for them. For example, the most significant themes to understand the vulnerability of coastal women like increasing the number of women-headed families, grass widow, divorced women, and polygyny did not match with adolescent girls because in most cases, they have not the relative experiences. However, I have utilized the same themes, obviously not the same questions (that are applicable for women), to the married men to understand their perceptions, actions, and prioritization of the activities. For example, to understand the mindset of my male interviewees, I have asked them ‘why his wife and his daughter always collect water for their family and why he does not go to fetch water?’ And to understand the prioritized action, I asked them, ‘What are the steps you take to ensure menstrual health and hygiene management facilities for your female family members?’ From the questions, I want to understand the gender role disparities, the perception of coastal males on the gender division of labor, and the role of patriarchy to create the social values towards women, and most importantly, to understand whether a man recognizes the disproportionate effects of salinity on women or not.

Moreover, I probe my female interviewees to know their understandings on gender issues by asking several questions like ‘Why do not they send boys to fetch water? Why do not they refuse to give dowry? Do they accept domestic violence? Do they discuss the problem of menstrual hygiene with their husband? Is menstrual hygiene management a priority in their families or not? Should menstrual hygiene management be presented as a problem to their male counterparts?’ I asked those questions to my female interviewees to know their understanding of gender role disparities and whether they take the gender role disparities for guaranteed or not?

Additionally, I was eager to know whether or not they understand that if their gender roles are changed, their situation will also be improved. However, some of my questions that are related to sensitive issues like menstruation, domestic violence, etc. the interviewees feel shy to answer. Moreover, one of my questions regarding marriage insecurity I found my interviewees had a lot to

say. For example, in response to the question ‘how does salinity create marriage insecurity?’ most of my respondents (including male, female and adolescent girls) extensively describe the process. Most of them shared their own experiences or siblings, daughters, sons, nearest relatives, friends, and neighbors’ experiences.

3.6 Sampling

Twenty-five face-to-face interviews were conducted with the female, male and adolescent girls from the study area. Out of these twenty-five interviewees, ten were female, ten were male, and five were adolescent girls aged from eighteen to nineteen years. I found that all the studies studying climate change or salinity and gender issues focused only on females. However, I thought it is also essential to ask the males because, in patriarchal social culture, women’s vulnerability won’t change as long as the male members understand the situation or recognize the issue as a problem and take steps to prioritize the problems at the institutional level. Besides, as males are the head of the family and possess all decision making power in the family, religion, education, and other social institutional levels so their consciousness, mindset, perception, and understanding is most significant to feel the present situation of women in coastal areas that is why I decided to include them as my interviewees. For example, at the time of the interview, all the male respondents said that they never go to collect water even when they have no work to do or pass their leisure time because from their childhood they know that water collection is a female task. Therefore, it is disrespectful for males to participate in female works. So, as a social scientist, I think it’s essential to explore such thoughts and practices to understand coastal women’s vulnerability.

Moreover, the rationale of including adolescent girls in the interviewees’ list is that statistics showed that adolescent girls are the key responsible person along with the women to fetch drinking water from distant sources. Moreover, past research findings showed that adolescent girls are the key victims of early marriage, malnutrition, low educational attainment, and several salinity-related health complexities. However, three were married among the five adolescent girl respondents, as early marriage is a common phenomenon in the study area. Moreover, they all have completed their Secondary School Certificate (SSC) course, and now they have stopped their academic activities. They all were Muslim and came from low-income families.

All my male and female interviewees were married and aged from twenty to fifty years, and their education level was up to 10th grade. My interviewees were further categorized by their religious beliefs. Two females and two males were selected from the Hindu community, and the rest were from Muslims (the dominant inhabitants of the country) to understand if there was any variance of the perception based on their religious background. Moreover, all the interviewees were selected from economically vulnerable groups (their monthly family income was BDT 3000 to 5000 taka/ 300 to 500 USD) as the poverty level is very high in coastal areas, and most people belong to this class. Besides, because of their low economic status, these people failed to afford to buy drinking water from the vendors; as a result, their female family members were compelled to fetch water from long distances.

The study area is selected purposively. Moreover, the study used snowball sampling to select the respondents from the study area because the sampling helps identify the “information-rich cases” associated with the phenomenon of interest with limited resources (Patton, 2002). Furthermore, the research themes contain several sensitive and personal issues so, the study selects respondents through recommendations and references to get available and willing participants who have the better ability to communicate experiences as well as give opinions in an expressive, eloquent and insightful manner. I select my interviewees through convenient reasons and necessity because I was previously warned that the people of the coastal areas are very introverted, and they do not want to share their livelihood complexities with anyone coming from the outside area. So, I seek assistance from one of my female colleagues (born and bred in the study area) for rapport building with the respondents. My colleague introduced me to her elder sister, a university student, helped me much in community mapping and rapport building with the selected participants, and accompanied me throughout my two phases of fieldwork.

Finally, I want to mention that, in the statistical sense, my sample is not representative as the sample size is very small in comparison to the population of the village. However, the data represented in the findings tell that though the interviewees came from divergent backgrounds, their responses converge. Thus, my interviewees have relative variance in their background but they have convergent information that suggests that the lessons learned from them cannot be generalized in an absolute sense, but one can take it as more general information.

3.7 Performing interviews and keeping a record

Each of the interviews took one and a half hours; however, the interviews with the male respondents took less than one hour. Most interviews with women and adolescent girls were conducted in the afternoon because the participants remain comparatively free. However, some interviews were taken in the evening at the respondent's homes after completing their daily household chores. In addition, I took four interviews with the male respondents on the roadside small tea stalls in the village. I took the other six to their home in the evening and night because they were busy in the daytime with their income-generating activities. I did all the interviews in one-to-one presence as the interview contains several issues related to the respondent's personal life and intimate relationship. Moreover, as a female interviewer, I got the opportunity to talk to my female interviewees without any interference from other family members because their social values do not permit any unknown male interviewer to speak to a woman individually.

After taking permission from the respondents, I have recorded all the interviews to capture the interview data effectively. As I have conducted the semi-structured interviews, I have to concentrate more on the conversation and remain focused on the interview content, so the interview recording makes my journey easier for me. Moreover, the interview recordings help me to transcript the data as verbatim transcription.

3.8 Data analysis

I analyze the data by using thematic analysis because it helps me interpret the particularities of the location under study from my participants' perspectives. Moreover, it also insists on presenting the social reality of coastal areas by using illustrative quotations or "selective quotations from what participants say" to meet my demand for "depth" (Silverman, 2014, p. 377). Themes that are used at the time of interviews, also used in my analysis chapter.

For qualitative thematic analysis, I pulled out the "subject's categories" from their talk and "coded in terms of a social science category" (Silverman, 2014, p. 229). For coding, I have highlighted a sentence or often a paragraph and given it a conceptual label by using "words that people use, as well as modifying, somewhat, those phrases" (Silverman, 2014, p. 227). For example, one woman (Interviewee- 8) said, "*I am working 8 to 10 hours daily in different shrimp farms around my*

locality. The farms hire only women and adolescent girls to work because they can hire us with low payment compared to our male counterparts. Here women's labor is available and cheap. We are working at the rate of BDT 80 to 100 taka (1 USD) daily; however, the farms need to pay BDT 150 to 180 taka (2 USD) daily to hire male labor. We are compelled to work in the farms as we do not have work to do in paddy fields, poultry farms, or anywhere." I have coded the paragraph using the sociological term 'wage discrimination' and put the code into the 'Education and work security category' in my analysis chapter discussed later.

I approached my interviewees with a naturalist orientation because I wanted to elicit the "authentic accounts of subjective experience" of coastal people from their point of view (Silverman, 2014, p. 318). Moreover, the approach assists me in designing my semi-structured interview guides that allow my respondents to use "unique ways of defining the world" and "raise important issues not contained in the schedule" (Denzin, 1970, p. 125). The process helps me to generate data that "produce in-depth interpretations of participants' lifeworlds" and assists me in coding and categorizing my data to produce "thematic accounts" (Roulston, 2010, pp. 217-18). However, my overall approach is constructionist, but I add critical elements and do not take what my interviewees said to me for granted. I can say that I am a constructionist because I rely a lot on my interviewee's narratives and try to work on their information however, I do not blindly follow them because there are moments while I use my critical stance on what they say. For instance, one of my female interviewees engages her daughter to fetch water four kilometers far from her home. During my interview, I asked her, 'Have your daughter ever been the victim of sexual harassment?' She (Interviewee- 5) replied, "*It's a common phenomenon here. Not only my daughter but also every girl who goes to fetch water faces sexual harassment often. We are accustomed to the tendency. As a girl, we know that we have to face it throughout our life*". I further added 'Have you ever complained to the police against sexual harassment?' After hearing my question, the woman (Interviewee- 5) replied, "*Are you mad? At an early age, I faced eve-teasing, vulgar comments, and now my daughter heard such words. However, we always ignored those words because we had to go out. It is a do-or-die situation for us. So, we shouldn't be bothered about it*". The statement above indicates that interviewees did not recognize that sexual harassment is a challenge for child protection; however, they became accustomed to it. Simply saying, she shows insecurity, but fails to understand it. In my analysis, I used a critical angle to interpret such statements in several themes, so I can say that I am not a true constructionist in the real sense.

3.9 Ethical Considerations

At the beginning of my interviews, I promised my interviewees that their responses would only be utilized for study purposes and their names and addresses would be kept secret. Moreover, I have detailed my research area and aim to ensure their understanding and consent to my study. Besides, I did not give any kind of reward to my participants that are “common to researchers who work with poor people in the Third World” (Silverman, 2014, p. 270); however, my respondents participate voluntarily. As the study contains sensitive themes and often interviewed parents and children or husband and wife from the same family, I have interviewed them separately and without the presence of any other family members.

3.10 Limitations of the study

For choosing semi-structured interviews, I had limited control over what my respondents said that consumed my fieldwork time. In some cases, I had to interview the same respondents twice in my two-phase’s interview. Moreover, for utilizing snowball sampling my study can be highly criticized for biases and my low control over the sampling procedure. Finally, my study can be criticized for using the qualitative method as the method isn’t representative in the statistical sense.

Chapter IV

Findings (Part I)

The study is an attempt to investigate salinity intrusion from a gendered approach. Briefly, this study wants to explore the salinity-induced disproportionate effects on coastal women and girls and the mechanisms of those effects. Most importantly, this study also analyzes the nexus between salinity-induced social insecurities of women and girls, their traditional gender roles, and their understandings of the connections among them. Furthermore, this study also wants to know the coastal men's understandings of causality of the salinity-induced uncertainties of women and girls as well as their perceptions of it.

Both chapters IV and V deal with research findings, and I have divided the chapters into two parts where chapter IV and chapter V are titled 'Part I' and 'Part II,' respectively. In both chapters, you will discover my research findings according to my study objectives. For instance, chapter IV comprises my first and second objectives (to what extent and how do the salinity-induced burdens disproportionately affect coastal women and adolescent girls? And how do women and adolescent girls of the coastal areas attribute causality/understand the mechanisms of salinity-induced insecurities?).

To make this chapter (Chapter IV) more familiar to the readers, I present my findings with four broad categories that I have used in my literature review and also the methodology chapter. I have identified eleven social issues of salinity intrusion on coastal women and adolescent girls and placed them into the four categories, i.e., a) pertaining to coastal marriage and family structure (marriage insecurity, increases dowry rate, child marriage, increase the number of women-headed families, grass widow, divorced women, and polygyny); b). Pertaining to violence against women (sexual harassment and domestic violence); c) Pertaining to health and well-being (threat to menstrual health and hygiene management, increased disease burden, mental stress, and malnutrition); and d) Pertaining to education and work security (wage discrimination, increased burden of domestic roles, and low educational attainment).

4.1 Gendered division of salinity effects/Disproportionate effects of salinity and the mechanisms of those effects on coastal women and adolescent girls

4.1.1 Pertaining to coastal marriage and family structure

Salinity intrusion affects the marriage and family structure of coastal people profoundly. In this section, I am portraying seven marriage and family-related issues (i.e., marriage insecurity, dowry demand, child marriage, divorce, grass widow, polygyny, and women-headed family structure) that are significantly influenced by salinity intrusion. The following seven issues make coastal women and adolescent girl's positions more vulnerable to their family and society-

4.1.1.1 Marriage insecurity, dowry demand, and child marriage

Dowry demand, marriage insecurity, and child marriage conjointly affect coastal women and girls and worsen their situation. Moreover, these three social problems have sharp negative impacts on each other, and the condition can be termed as 'Salinity-Marriage trap' for the coastal girls of Bangladesh. Marriage insecurity increases dowry demand as well as child marriage. The factors responsible for creating marriage insecurity are also responsible for fostering dowry and, at the same time, child marriage. Women have their own experiences (as a marriageable girl/mother of girls), or they often see their neighboring families suffer from the mentioned challenges. Several factors are related to marriage insecurity, fostering early marriage, and increasing dowry demand in coastal areas. For example-

i). The unattractiveness of the marriageable coastal girls

Long-term consumption of saline water has visible effects on coastal women's bodies and makes them unattractive. Saline water creates coastal girls unattractive (in the traditional sense) in many ways-

a). Darker skin tone

Both males and females of the coastal area have darker skin tones because of the extended consumption of saline water. After prolonged consumption of saline water, the bright skin color turns dark brownish, and that of the dark gets darker and looks rusty. As Bangladesh has a patriarchal society, this kind of skin tone is challenging for marriageable coastal girls to marry off.

The situation creates marriage insecurity and encourages the groom's family to take dowry. As a dowry, in most cases, the groom's family demands cash currency as well as motorbikes or other types of motor vehicles. One of the unmarried adolescent girl respondents (Interviewee-12) said, *"My father has tried to marry off me with a dowry of five lakhs taka (5, 00000 BDT); however, he failed to find a groom. I know that the main cause of it is my unattractiveness of my darker skin."*

b). Premature skin aging

Saline water contains dissolved salts (most of it is sodium chloride) and other chemicals that make the water very rough. For prolonged consumption of saline water, the skin of coastal girl's turns rough, pale, and uneven with wrinkles that can be termed as 'premature aging'. Their skin loses its softness and tenderness very quickly (parents believe it starts at the age of twelve or thirteen years). One adolescent girl respondent (Interviewee-11) said, *"Because of the acidic effects of saline water, our faces look much matured with wrinkles, saggy and shrivel skin."* As a result, when the parents fail to marry off their girls at an early age, the dowry demand increases as the girl's age goes up. In most cases, first, the parents try to arrange a standard dowry and then knock the matchmakers to search for a groom. An adolescent girl (Interviewee- 14) said, *"Everyone knows that we, the coastal girls, have dehydrated and rough skin with darkness. As a result, the local males and people from the other parts of the country do not show interest in marrying us. This situation is solely responsible for early marriage and continuing the dowry tradition"*.

c). Hair loss, reddish hair, and premature gray hair

For coastal people, hair fall, reddish hair, and premature gray hair are the combined effects of prolonged consumption of saline water. One of the adolescent girl respondents (Interviewee- 13) said, *"I have reddish hair using saline water, and I know other girls who have gray hair already. Long consumption of saline water destroys our hair roots quickly, so we start losing our hair at the very beginning of our life. As a result, our parents are compelled to marry off us at an early age. I do not find any fault in these tendencies"*. Besides, a woman (Interviewee- 2) said, *"If you compare a city woman and a coastal woman, you will see the city woman has more beautiful, long, and voluminous hair as compared to the coastal woman. Women who are thirty to thirty-five years old have fragile, rough and unsmooth hair for continuous use of saline water"*.

ii). Skin diseases

Coastal women are the key consumer of saline water. So, with extensive exposure to saline water, skin diseases are prevalent among them. All 15 female respondents tell about saline water-induced skin diseases and claim that everyone suffers from skin diseases at least once in their lifetime. Three reasons are responsible for extensive saline water exposure -

Firstly, coastal women are only responsible person for performing daily household chores (washing dishes, clothes, food preparation) by using saline water. Moreover, they also use saline water during their daily bathing and lavatory activities. These kinds of saline water consumption create skin diseases.

Secondly, evidence showed that the poverty rate of the coastal areas rises from 8% to 56% when the salinity levels stay at peak, and the other associated factors (inundation risk and market access of the coastal people) remain most harmful levels (World Bank, 2015). At extreme salinity, poor coastal women and young girls start working in shrimp farms (the main economic activity in the coastal areas). They engaged themselves in cleaning the algae from the shrimp farms and got BDT 80-100 as their wage. They work six hours a day by soaking the lower portion of the body in the saline water. Continuous and long-term consumption of saline water creates itching, severe skin infection, and sore in both legs and hand's fingers.

Thirdly, in coastal areas, women living in extreme poverty engage themselves in shrimp fry collection from their nearest river to meet their living expenses. They start the fry collection late at night (4 am) and continue to work till morning (8 am). Unfortunately, this long-term saline water exposure creates various types of skin diseases, along with itching and genital infections.

On average, women and adolescent girls are working with saline water for five to seven hours daily. The long time saline water consumption makes them unattractive to the marriageable males both inside and outside of the locality. One of the adolescent girl respondents (Interviewee- 15) said, *“When the matchmaker starts talking about any marriage, at first they ask about the skin diseases of the girls. If a girl has any kind of skin disease, marriageable male and their parent, do not show any interest in marrying them. However, we have no other way except working with*

saline water to support our family financially.” Thus, skin diseases, especially women, enforce the risk of marriage insecurity, early marriage, and dowry demand for coastal people.

iii). Lack of communication facilities

Saline water destroys the coastal communication system. Due to salinization, roads and other infrastructures have very short durability. As a result, people from town areas and other parts of the country do not want to have a marital relationship with coastal regions. This tendency also increases marriage insecurity and the dowry demand of the groom’s family. A woman (Interviewee- 3) said, *“Due to natural disasters, our localities always submerge under saline water that destroys our roads and communication systems every year. So, males (outside the locality) are not interested in marrying here, which also creates marriage insecurity and encourages the parents of the marriageable males to demand more dowries”*.

iv). Local male’s unwillingness to marry coastal girls

The reluctance of local marriageable males to match the local girls also intensifies the risk of marriage insecurity, dowry demand, and early marriage. The problem has two dimensions-

Firstly, most of the marriageable local males and their parents prefer to establish marital relations with the females living in non-saline areas of the country. A woman (Interviewee- 7) describes the situation nicely, *“Males, as well as their parents, always show keen interest to marry girls who are living in the areas of sweet water because they want to take the credit that their bride is beautiful with brighter skin tone as compared to ours. This unsecured situation pushes the coastal girls into a deprived and frustrating position. Moreover, it increases tension among the parents of the coastal girls. Consequently, they even sacrifice their food and other basic needs to accumulate resources for paying the demanded dowry. Besides, parents always try to marry off their daughters at an early age, something like parents start searching for grooms after the birth of a daughter.”*

Secondly, marriageable males from the other parts of the country do not show interest in marrying girls from the coastal belt for the reasons mentioned above. This reality also creates marriage insecurity among the coastal girls and increases dowry demand among the marriageable males. A sample study of Water Aid identified the situation. It said, *“The skin of adolescent girls becomes rough and unattractive due to the use of saline water. Men from outside the area do not show their*

interest in marrying these young girls” (Rahman, 2009 cited in Khanam, 2019). These two-fold uncertainties (both inside and outside locality) push the coastal girls to a marginalized and deprived position.

v). Educational status of women

It is astonishingly accurate that in coastal areas, the educational status of young girls increases the risk of marriage insecurity and dowry demand. The situation can be called ‘the more the education of the coastal girls, the more the dowry demand and marriage insecurity’ they have. One woman (Interviewee- 10) said, *“For us, education itself is a hindrance. If we go to school, we will be aged. We will lose our attractiveness, mildness, and tenderness. So, our parents will face challenges to find grooms for us. For example, if my parents marry off me at the age of ten to fifteen years, they will manage a groom for me with lower dowry demand like BDT 20,000. However, if I want to study higher, I will be aged twenty to twenty-five at least, and at that age, my parents will be unable to find a groom with dowry ranging from BDT 1, 00000 to more. So our educational status increases our marriage insecurity and dowry demand jointly”*. An adolescent girl (Interviewee- 3) added, *“If you search, you will find girls who have completed Higher Secondary Certificate (HSC) program. Still, their parents failed to manage grooms for them because no one shows interest in marrying them. Now they are a burden for their families. They live with their parents and help them economically by cleaning algae in the local shrimp farms”*. The respondent also added, *“The unemployment rate is very high in Bangladesh. As a result, we cannot manage any job with our certificate. So, with or without education, we are destined to work in shrimp farms. It’s better to marry at an early age, start our family life as soon as possible and save our parents from social humiliation (without marriage, girls staying with their parents are considered a social disgrace both for the daughters and their parents)*. A woman, the mother of three daughters (Interviewee- 6) said, *“We need to marry off our daughters rather than their literacy.”* So, in extreme saline-prone areas, education itself is a burden for coastal girls and their families. In addition, educational status intensifies the risk of dowry and child marriage by creating marriage insecurity among young coastal girls.

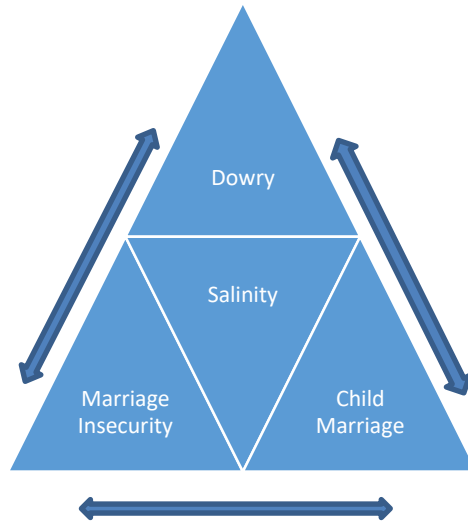


Figure 2: Nexus between marriage insecurity, dowry demand, and child marriage (Author’s illustration)

Salinity creates marriage insecurity both for the male and females of the coastal areas; however, women are the hard hitter of the problem. The main reason lies in the existing power structure of the society where women stay at the bottom of the power ladder. In our patriarchal society, women have no voice, especially in the coastal areas where the poverty rate (per month household income is BDT 1,980) and the illiteracy rate is very high (Shohel et al., 2011). Moreover, dowry is a common practice in coastal areas. An adolescent girl (Interviewee- 11) said, *“Our parents always try to find grooms from higher status for us; hence, they are always willing to pay dowry as compensation for our unattractiveness.”* However, parents, who cannot pay dowry, are compelled to compensate for their inability by paying the marriage expenditures of their daughters, another dimension of dowry.

Dowry system and also child marriage have power dimension. An adolescent girl (Interviewee-13) said, *“We, the daughters, are the burden of our family. After marrying off us, our family feels relaxed. Consequently, they try to marry off us at any cost and with anyone. Everybody (local leaders, local government, law enforcement agencies, teachers, religious leaders) knows our situation; however, no one has contributed to changing our ill fate. We know that we are the most powerless people in the coastal areas”.*

4.1.1.2 Grass widow, Divorced women, and Polygyny

Salinity has an indirect effect on increasing the number of grass widows, divorced women, and polygyny in the coastal zone of Bangladesh. Four critical factors are identified from the interviews that are entirely absent in the non-saline areas of the country-

Firstly, as revealed earlier, salinity increases the work burden of coastal women and girls as they fetch drinking water from 3-7 kilometers of distance every day. Besides, women, who have infants or toddlers, have to carry both the water pitcher and the baby. Consequently, after a certain age, they suffer from extreme tiredness and intolerable back pain. Moreover, for prolonged consumption of saline water, women suffer from severe skin diseases and genital infections. The factors mentioned above are responsible for creating women's uninterestedness in having sexual relations with their husbands. Consequently, it proliferates coastal women's risk of being divorced, separated, grass widowed, and victim of polygyny.

Secondly, coastal women's physical unattractiveness also increases the above-mentioned risks. A woman (Interviewee- 4) said, *"Males saw beautiful ladies while working in the towns or non-saline areas, but at home, he has a wife who does not look beautiful to him. Besides, increased workloads induced by salinity make his wife pale, tired and often create physical complexities. So, it's natural that the coastal males will be polygynous"*.

Thirdly, during the lean seasons, the migration of the coastal males to the brickfields or cities without accompanying family members (wife, children, and parents) also encourages them to be polygamous. It also increases the risk of being divorced or grass widowed among coastal women.

Fourthly, because of the high poverty rate, the coastal males often believe that two/three wives will support him to meet his family expenditures. A woman (Interviewee- 6) said, *"Coastal poor people often believe that the more the number of wives, the more the income will be. As wives from low-income families engage themselves in shrimp fry collection and day laborers in shrimp farms, they can earn money. The money helps the man to maintain his family"*. This attitude also encourages them to be polygynous.

In the coastal areas, males, who are Muslim, have tended to be polygamous more than the Hindu religion. They often have two or three wives at a time living in the same house. This unique family

structure can be termed a ‘plural family’ (comprising husband, two/three wives, and children coming from the wives). An adolescent girl (Interviewee- 9) said, “*Parents who are living with extreme poverty or are unable to manage the demanded dowry, marry off their daughters with polygamous coastal males.*”

4.1.1.3 Increase the number of women-headed families

Increasing women-headed families in the coastal areas of Bangladesh is an indirect effect of salinity that pushes women to be marginal among marginalized people. Respondents identified several reasons behind the tendencies, and the grounds are not pleasant at all.

Firstly, because of salinity, coastal areas have minimal employment opportunities. As a result, during lean seasons (from December to February) usually, males migrate to the brickfields situated on the outskirts of the nearest cities. They also migrate to the closest districts as rickshaw pullers, day laborers, or agriculture laborers. During the migratory period, males build new relationships or remarry another woman at their new workplaces. Consequently, the family that the migrated male left on the coast turns to a female-headed family, and the woman has to take all responsibilities of her family members and children.

Secondly, most shrimp farms are owned and operated by wealthy people from outside the coastal belt. They often marry the coastal women and start their family life near their shrimp farms. However, it is seen that after several years they left or divorced their wives and went back to their original community. Consequently, the coastal women they left behind or divorced lead the rest of their lives alone. This tendency also increases the number of women-headed family and the women compelled to take all the responsibilities on their shoulders.

Thirdly, due to unemployment in coastal areas, males often go into Sundarban (the world’s largest mangrove forest) for cutting trees and making fuel from them to sell in the local markets. Moreover, honey hunters also go into Sundarban to collect honey and sell it to meet their family expenditure. Unfortunately, the ‘Royal Bengal Tigers’ (the world’s most rare and giant wild cats alive today) often attack the males while cutting trees or hunting honey and leaving their lives. From 2001 to 2011, 519 male members died from tiger attacks from fifty villages in the *Satkhira* district (AFP, 2020). After the death of her husband, ‘the tiger widows’ took the responsibilities

of the family though society called her ‘unlucky witch.’ One woman (Interviewee- 9) said, *“Words are not enough to express the sufferings of tiger widows, overnight they have to take the family responsibilities without any savings. Moreover, in our society, the tiger widows have no social status and nobody wants to meet her, cooperate with her, or be willing to assist her after such brutal experience.”*

4.1.2 Pertaining to violence against women

This section presents the nexus between salinity intrusion and two social issues i.e. sexual harassment and domestic or intimate partner violence against coastal women and adolescent girls.

4.1.2.1 Sexual harassment

Salinity adversely affects the social protection of coastal women and adolescent girls. Respondents claim that they face sexual harassment several times in their life. More specifically, salinity increases the risk of sexual harassment among coastal adolescent girls and women in four different ways-

Firstly, to get non-saline drinking water, women and adolescent girls have to walk an average of 3-7 kilometers daily. While they collect water from distant sources (far from their village), they are sexually harassed by males in several forms like- a). Eve teasing (South Asian term to refer to a state of sexual harassment) b). Physical contact by touching and pinching c). Whistling d). Through sexual comments e). Ignore women’s unwillingness and propose love and affair repeatedly d). Looking at them with bad intentions etc. An adolescent girl (Interviewee- 11) said, *“We use Kalash (traditional local water jar) as a pitcher, and the pitcher bends our body, which shows our body curves when we carry the water. Males tease us with bad indications of our bodily position.”* Another woman (Interviewee- 1) said, *“There are many small tea stalls in the roadsides. The males and adolescent boys (who are not involved in formal education) pass their time with idle talks. We have to cross those tea stalls to go to collect water. So, we are the easy victims of eve-teasing, whistling and sexual comments.”*

Secondly, in coastal areas, women are involved in shrimp fry collection from the nearest rivers. Women have to go to the river late at night (4 am) because it’s the time for the tide, and fry collection is extensively dependent on it. Therefore, the time frame of fry collection increases the

risk of sexual harassment of women and adolescent girls of coastal areas. A woman (Interviewee-4) said, *“although we go to the river as a team (consisting of 8 to 10 women), we netted the fry individually and far from each other. At that time, males working as night guards of the shrimp farms often harassed us sexually”*.

Thirdly, without any other agricultural production, the coastal economy depends on shrimp farming. Many shrimp farms exist in the coastal areas and coastal males are engaged in farm activities like laborers, guards, night guards, etc. Males, working at night, left their female counterparts alone in the house where the females are the easy target of sexual harassment by the other males.

Fourthly, while women and girls work at the shrimp farms as day laborers, algae cleaners, or other activities, they face sexual harassment from the farm owners and the male staffs or co-workers.

4.1.2.2 Victim of domestic/Intimate partner violence

The salinity intrusion of coastal areas also influences domestic violence and intimate partner violence. Most of the respondents claim that they have experiences of domestic or intimate partner violence in their life. Salinity increases the risk of violence in four ways-

a). Inability to finish household chores on time: Women and girls spend several hours of a day collecting drinking water, fuel, fodder; as a result, they face challenges to finish their daily household chores on time. It introduces disputes among the family members, especially between husband and wife. In extreme cases, it leads to domestic and intimate partner violence, divorce, and so forth. A woman (Interviewee- 7) said, *“Salinity itself is a burden for us. It imposes an enormous workload on us that is unbelievable among the women who live in Sweetwater areas. Our husbands beat us for minor reasons; for example, if I failed to prepare his food on time, he would start beating me without noticing my extensive workloads.”*

b). Sexual uninterestedness: Conjugal life of coastal women is affected by salinity. Married women feel that salinity is a challenge for them to establish physical relationships with their husbands that severely impact their family life and increase their risk of being victims of intimate partner violence. Three significant factors are responsible for creating women’s uninterestedness in physical relations with their husbands (i). Huge work burden imposed by salinity ii). Long time

consumption of saline water creates severe itching problems in the sensitive genital area iii). Severe skin diseases and infection around the genital area due to long walks for water collection. A woman (Interviewee- 10) said, *“because of enormous work pressure, I feel exhausted at night when my husband comes closer to me. Moreover, severe itching and infection around the genital area lessen my sexual needs. As a result, my husband isn’t satisfied with our sex life, so I often have to face violence”*.

c). Frustrations of coastal males due to unemployment: Both soil and water salinity limit the employment opportunity of coastal males. For example, salinity destroys the fertility of agricultural land and turns it into unproductive; traditional fish sources, livestock, and poultry are destroyed by salinity. The situation is frustrating for the males, especially for the low-income family. So, men’s frustration and poverty conjointly increase women’s risk of being the victim of domestic violence. For example, a woman (Interviewee- 5) said, *“We are poor, and my husband has no regular work to make money for our family, but he demands good food from me and often beats me for it. I know that his frustration encourages him to do that.”*

d). Non-fulfillment of dowry demand: Dowry is prevalent in Bangladesh and coastal areas. Poverty and unemployment of coastal males increase the dowry demand even after marriage. Unfortunately, the unfulfilled dowry demand often turns into physical violence against women.

4.1.3 Pertaining to health, hygiene, and well-being of coastal women and girls

This section presents four issues related to health, hygiene, and well-being of coastal women and girls i.e., a threat to menstrual health and hygiene management, increased disease burden, mental stress, and malnutrition.

4.1.3.1 Threat to menstrual health and hygiene management

Due to water salinity, maintaining menstrual health and hygiene is an extreme challenge for coastal adolescent girls and women, especially from December to February (the time salinity reaches its peak). All the female respondents claim that they face extreme hardship during their menstruation because of using saline water. Water salinity affects menstrual health and hygiene of coastal women and adolescent girls in several ways-

Firstly, women and adolescent girls regularly use saline water for bathing, cleaning clothes, and lavatory activities. During the menstrual cycle, they wash their used old clothes in saline water and dry them in hidden places in the house. Then, they use the clothes interchangeably and preserve them for subsequent use. Women and adolescent girls use the same clothes for 4/6 months following the same process. A woman (Interviewee- 3) said, *“Because of poverty and cloth shortage, women and girls are unable to change clothes frequently, so they use the same clothes for several months as an absorbent.”* However, after every wash with saline water, the clothes get stiffer and harder, creating discomfort for every subsequent use. The clothes also make wet feelings and rashes in the vaginal area. An adolescent girl (Interviewee- 13) said, *“Menstrual time is a challenging time for us. Those who can preserve rainwater wash their menstrual cloths with it. However, those who can’t preserve rainwater use saline water for washing the clothes that are responsible for making the clothes hard and uncomfortable.”* Moreover, their sufferings peak when they walk 3-7 kilometers for water collection wearing those clothes. The clothes create itching, rashes, skin infection, and gynecological complexities of coastal women and adolescent girls. A woman (Interviewee- 10) added, *“Wearing the hard clothes we have to take a long walk for water fetching. You will be unable to imagine our discomfort and sufferings we face during menstruation”*.

Secondly, women and adolescent girls, who collect shrimp larva and crabs from the river, full of saline water suffer severely during their menstrual period. Women and girls have to stay longer (4/5 hours daily) to catch the larva and crabs. Moreover, women and girls who work in the shrimp farms as algae cleaners also stay 6 hours daily in the saline water of the farms during their menstruation cycle. In both cases, women and girls suffer from skin diseases, itching problems, and infections regularly. It turns into the worst level during their menstrual time as they are compelled to work by soaking the lower body part into the saline water. One woman (Interviewee- 1) said, *“We took skin diseases and gynecological problems as our fate. We know that we would not be able to avoid the situation as we are poor. The water that we use daily is so salty that soap cannot make foam from it. Can you believe it? How will it clean our bodies? ”*

Thirdly, lack of availability, affordability, and unconsciousness among coastal adolescent girls and women, they mostly use old clothes as an absorbent during menstruation. Adolescent girls follow their mothers and more senior female relatives to maintain menstrual health and hygiene. An

adolescent girl (Interviewee- 15) said, *“We cannot talk with our father or brothers regarding menstruation because menstruation is leveled as a female issue in our society. It is embarrassing if any of our male family members identify us at the time of menstruating. Besides, living in a conservative society, our mothers and we are unable to buy sanitary napkins from the city shops as all the shopkeepers are male. Moreover, our poverty does not allow us to buy sanitary napkins, so we use clothes like our mothers and grandmothers.”* As a form of absorbent, old clothes introduces several health complexities, especially gynecological health problems like extreme itching in the vaginal area, rash, fungal infection, urinary tract infection, etc. Moreover, the mentioned complexities and the fear of leaking blood, the school and college-going girls miss their schooling two/three days in each cycle.

4.1.3.2 Increased disease burden

Salinity increases the disease burden for coastal people, especially among women and adolescent girls. Both male and female respondents acknowledged that women and girls are the key victims of salinity-induced diseases. Women and girls identified the following salinity-induced mechanisms for their disease burden-

Firstly, women and adolescent girls consume saline water frequently, which induces skin diseases and severe ocular problems. One woman (Interviewee- 2) said, *“Saline water creates a severe ocular problem. It always creates reddishness inside our eyes that looks like an allergic infection.”*

Secondly, women and adolescent girls, who work in shrimp farms as algae cleaners or those who catch shrimp larva, crabs from the river, stay in saline water for a more extended period. Therefore, they are more prone to disease burdens (skin diseases, gynecological health complexities especially menstrual cycle, cold, and cough, etc.).

Thirdly, women and girls collect drinking water from 3-7 kilometers distances, and they have to stay in a queue and wait for a long time. On average, the water collection process takes two/three hours a day. Moreover, women and girls leave their homes late at night (4 am) for shrimp fry collection and return at 8/10 am daily. Women and girls cannot use toilets throughout these long periods because they have no toilet facilities at that time. This situation also increases their risk of disease burden.

Fourthly, malnutrition of coastal women and adolescent girls also increases their risk of being the victim of weakness, anemia, low blood pressure, underweighted babies born, and other diseases burden.

Fifthly, the muddy roads of coastal areas have very short longevity, and they frequently break because the soil contains extreme salt. In addition, the salty soil has very low stickiness, making it fragile and arid, so it cracked, especially in dry seasons. Consequently, salinity creates massive dust that increases the coastal people's respiratory diseases, especially women and adolescent girls, because they have to walk long distances daily to fetch drinking water.

4.1.3.3 Mental stresses of women and adolescent girls

Though the reasons are different, all the female respondents claim that they have to go through mental stresses at various stages of their life. They feel that salinity intrusion is the critical reason for their increased mental stress. They claim that their relatives living in the non-saline districts of the country do not face such mental stress at all, or their relatives cannot even think of these types of stress. Salinity-induced significant factors of increased mental stress are-

i). Child's insecurity: Coastal women, who are pregnant, fetch water from distant sources that increase health complexities both for the mother and the child. Even after the delivery, mothers are compelled to collect water. Mothers, who have infants or toddlers, always feel stressed about managing another person to take care of their child while she goes to fetch water especially, women who have no other female family members. So, water collection (both before and after delivery) imposes mental stress among coastal women. A mother (Interviewee- 6) said, *“Women of our area suffer from extreme mental stress related to their child-caring, especially while they go to fetch water. For example, they have to fetch water during their whole pregnancy period. I have even seen a mother who gave birth to her child immediately after carrying the pitcher (weighing more than twenty kilograms) to collect water. Besides, women also have to fetch water immediately after the birth of the child. After the child's birth, the mother has to manage another woman from her neighbors to take care of the infant while collecting water. In the coastal area, we have a common practice to lock up the child in its leg and leave it alone in the house while its mother goes to fetch water. The entire situation is horrible for us.”*

ii). Unattractiveness and skin diseases: Salinity-induced unattractiveness and severe skin diseases increase tension among adolescent girls and their parents. Moreover, stress turns into misery while unattractiveness and skin diseases lead to women's marriage insecurity and increases dowry demand. Though salinity creates marriage insecurity for both sons and daughters, patriarchal society imposes more pressure on the daughter's parents because they have to pay the demanded dowry for their daughters. One adolescent respondent (Interviewee- 11) said, *"We are the burden of our parents and family members. As soon as my parents can marry us off, they will get rid of their stress and tension and feel relaxed"*.

iii). Migration of male members: Coastal poor and unemployed males migrate internally during the lean seasons. After their migration, the family turns into a 'woman-headed family,' and the woman has to take all her family responsibilities, including water collection. This situation intensifies her mental stress and vulnerability. Moreover, there is a common tendency among the migrated males to remarry another woman from the migrated localities and start a new family. The polygynous trend of the coastal males is also responsible for increasing women's tension and stress.

iv). Work burden: Salinity-induced work burden is another significant factor for coastal women and adolescent girl's mental stress. For example, a woman (Interviewee- 9) said, *"During dawn to dusk, I am running to end up my family responsibilities. Every day I have to do the same tasks, face the same pressure; hence I am going mad."*

4.1.3.4 Victims of malnutrition

Salinity directly impacts coastal people's nutritional status, especially on adolescent girls who need additional dietary food than the boys to supply the nutritional deficiency caused by their menstruation. Moreover, married women also need extra nutritional supplies to overcome pregnancy complexities and give birth to a healthy baby. Besides, women and adolescent girls need more nutrition to be strong enough to carry the pitcher (*Kalash*) weighing more than twenty kilograms from 3-7 kilometers distances. One adolescent respondent (Interviewee- 12) said, *"We have to walk one hour to collect fresh drinking water for our house. I do not go to fetch water because I have not enough strength to bear the weight of the Kalash (a pitcher). I have been suffering from weakness and anemia for several years."*

The critical factors of malnourishment of coastal women and adolescent girls are-

Firstly, homestead forestry, vegetation, fruit trees, poultry, and livestock rearing are impossible in coastal areas. So, salinity directly impacts coastal people's food insecurity. One woman (Interviewee- 1) said, *"We have lost the local fish sources due to saline water, so we cannot catch fish from the rivers and ponds. We only have nurtured fishes that are only for sale. We cannot afford to rear cows, goats, even hens or ducks due to the scarcity of their food. Before 1995, we had fifteen cows, but when salinity became extreme, they all died. Moreover, algae grown in shrimp farms cannot be used as fodder for the cows because it causes dysentery of the cows. Consequently, we failed to manage nutritious foods like- fruits, vegetables, milk, meat, eggs, fish, and meat."*

Secondly, a tradition exists in every family where women and girls always take food after their male members' eating and drinking. This is because women and adolescent girls have very low status at home, especially in low-income families. So they are the last consumers and take the leftover foods that are not enriched with adequate calories and nutrition.

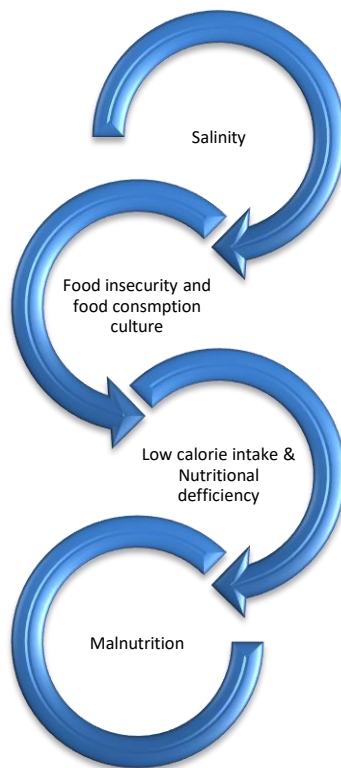


Figure 3: The process of malnourishment of coastal women and girls (Author's illustration)

Thirdly, child marriage, teenage pregnancy, and immature childbirth also accelerate malnourishment among coastal women and adolescent girls. A woman (Interviewee- 8) said, *“After 8th grade, most coastal girls dropped out from academic activities. Then, they got married, and after their marriage, they immediately try to give birth to a child because they feel unsecured due to the polygamous tendencies of coastal males.”* So, the malnourished teenage pregnant girls give birth to another malnourished child, and it is a vicious circle for the coastal poor women and girls.

4.1.4 Pertaining to education and work security

Here, I am presenting the effects of salinity on coastal women and adolescent girls' educational attainment and their work security and the mechanisms of those effects. This section addresses three education and work-related issues of coastal women and adolescent girls, i.e., low educational attainment, the burden of domestic roles, and wage discrimination. Almost all the respondents mentioned the issues at different times and ways during their interviews.

4.1.4.1 Low educational attainment

Though UNICEF (2016) said, “salinity has no direct impact on schooling, it indirectly increases illiteracy by negatively affecting food, water, and health of coastal people”, in her study Zaman (2017) showed that salinity affects literacy rate profoundly especially for the coastal adolescent girls. I have identified several factors that are responsible for the low educational attainment of coastal adolescent girls-

Firstly, marriage insecurity and child marriage increase the risk of low educational attainment of coastal girls as parents always try to marry off their daughters. One adolescent girl respondent (Interviewee- 14) said, *“Our parents have no attention on our educational status. However, the sole aim of our family is to marry off us when we go menstruating. Therefore, the majority of us will be married off when we will be 9th or 10th-grade students. One cannot be able to break the tradition if she wouldn't be determined and pig-headed. However, our brothers never face these challenges.”*

Secondly, menstrual health-related challenges are also responsible for the low educational attainment of coastal girls. Study shows that 88.57% of girls feel uncomfortable using old clothes as an absorbent and 82.86% of girls claimed that they missed school days during menstruation because of blood leakage (Khanam and Dina, 2020). One adolescent girl respondent (Interviewee-13) said, *“I miss three or four school days during my menstrual cycle in each month. I have to take a long walk each day to go to school. I use old clothes as an absorbent, and you know the clothes get hard and rough after several washes by saline water. I find no interest in walking three or four kilometers to go to school by wearing such uncomfortable clothes.”*

Thirdly, long-distance and lack of proper transportation facilities to go to school is another challenge for girls. Salinity decreases the longevity of roads, bridges, schools, and other infrastructures of coastal areas. So, rickshaws, auto-rickshaws, and other traditional vehicles are not available for transportation for coastal girls. As a result, they have to take a long walk, often three or four kilometers, to school. A woman (Interviewee- 2) said, *“While I was a young girl, I had to take a long walk from muddy, sloppy roads beside the river. The long-distance of the school, lack of transportation compels my parents to stop my studies, and after some days they marry off me”*. Moreover, the risk of being teased while walking to the school fosters the low educational achievement of the coastal girls.

Fourthly, as mentioned earlier, women and adolescent girls have to invest several hours for collecting drinking water. As a result, adolescent girls often sacrifice their academic activities for helping their mothers to collect drinking water, which is another challenge for their educational achievements. Moreover, the often excessive workload of mothers compels them to withdraw their daughters from schools to assist at household activities, especially when their mothers get sick.

Fifthly, poverty and patriarchal culture in coastal areas also discourage girls from getting schooling. Most significantly, parents from low-income families have enormous workloads, especially income-generating work to manage their livelihood expenditure, so they cannot give proper care and attention to their child’s literacy. Besides, poverty compels coastal parents not to provide educational expenses for their children. In addition, patriarchal society always prioritized male children to carry the family’s legacy. Hence, parents always encourage their sons to get schooling rather than their daughters. One adolescent girl respondent (Interviewee- 11) said, *“The*

mindset of our parents is always biased to our brothers. Our parents always tell our brothers that they should be educated and settled in higher social positions but they never utter such encouraging words to me.” Another (Interviewee- 12) added, *“as we are poor, my parents cannot bear mine and my brother’s educational expenses, so they only allow my brother to go to school.”*

4.1.4.2 Burdens of domestic roles

Salinity imposes an extensive workload upon coastal women that are absent in other parts of the country. Salinity increases women’s burden of domestic roles in the following ways-

i). Water collection from distant sources: Regular water fetching practice increases the work burden and stress of coastal women and girls. A woman (Interviewee- 1) said, *“We cannot drink water from the tube wells because it is too salty. If you preserve the tube well’s water overnight, you will see a layer of salt on the top of the water in the morning. Therefore, I walk six kilometers daily to collect drinking water from a water filter established by an NGO. Water collection is extra work for us. We have to bear the stress of water collection throughout our life.”* Another woman (Interviewee- 3) added, *“We know that water is called life, but it is death to us. Can you imagine every woman has to walk three, four, five, or even seven kilometers every day carrying one/two pitchers weighing twenty to twenty-five kilograms? Sometimes, it happens that she has to carry the extra burden of a baby along with that pitcher”.*

ii). Challenges in fuel collection: Coastal women are also responsible for collecting fuel that is another challenge for them and intensifies their workload. A woman (Interviewee- 4) said, *“Before extreme saline water intrusion, most coastal families raise cows and use cow dung as the main source of fuel. Besides, homestead forest was another significant source of wooden fuel on the coast. However, extreme salinity destroys livestock fodder completely, and at present, no one can raise cows because of the scarcity of fodder. Moreover, if the cows eat algae from the shrimp farms, they will suffer from extreme dysentery, and we cannot use their dung as fuel. In addition, no homestead forest, fruit trees, or vegetation are possible due to extreme soil and water salinity. All the factors make fuel scarcity in the coastal districts”.* Another woman (Interviewee- 6) added, *“In our childhood, we walked through paddy fields to search for cow dung because at that time cows were available at the households. After collecting the raw cow dung, we made an impressive fuel to put dried tree branches inside and cover them with the raw cow dung. Then we kept it in*

direct sunlight for several days to tighten and dry it very well. Lastly, we preserve those fuels and use them through the years. However, those days are gone, now we are suffering badly to collect fuel especially, the poor women who cannot purchase wooden fuel or gas”.

4.1.4.3 Wage discrimination

Wage discrimination is prevalent in Bangladesh; however, in coastal areas, wage discrimination takes another form with a combination of both economic deprivation and disease burden for women and adolescent girls.

Coastal women and adolescent girls work in shrimp farms as day laborers to clean algae. The farm owners always prefer female labor because they pay 80 to 100 BDT (one dollar) to each female labor daily, whether they have to pay 180 to 200 BDT (two dollars) for male labor. So, males receive two times higher wages as compared to females. Moreover, with long exposure to the farm’s saline water, women are victims of disease burdens. So, women have to compensate more to earn money from the shrimp farms compared to their counterparts. However, they receive half the wage as the males for the same work. One woman (Interviewee- 5) said, *“Our financial condition compels us to work in unhealthy saline water in the farms though we all have itching problems and skin infections the farm owners give us a minimal amount of wage. We have no other work like- working in the paddy fields, raising livestock, poultry farms, vegetable gardens, catching fish because salinity destroys all the alternative work opportunities”.* Another woman (Interviewee- 7) added, *“We take the discrimination as guaranteed so, we never complain against it. We curse our fate, not the farm owners”.*

To show the severity of salinity-induced social insecurities of the coastal women and adolescent girls, I am presenting the following table-

Table 2: Salinity induced negative factors affecting coastal female's quality of life N=15 (10 Women and 05 Adolescent girls)

Social issues/aspects decreasing quality of life	No. of direct victims	No. of respondents mentioned the issue (watching neighboring women or relatives)	Total
Marriage insecurity	08	07	15
Dowry demand	09	06	15
Child marriage	11	04	15
Grass widow	0 (As I have no widow respondent)	09	09
Divorced women	0 (As I have no divorced respondent)	09	09
Polygyny	06	09	11

Women-headed family	0 (As I have no respondents from those family)	08	08
Sexual harassment	03	06	09
Domestic/Intimate partner violence	12	03	15
Menstrual health and hygiene management crisis	15	0	15
Increased disease burden	15	0	15
Mental stresses of women	15	0	15
Victim of malnutrition	12	03	15
Low educational attainment	10	04	14
Burdens of domestic roles	15	0	15
Wage discrimination	05	10	15

Chapter V

Findings (Part II)

This chapter deals with my 3rd and 4th objectives (To what extent do women and girls understand gender roles to be a part of their problem or unfortunate situation? How do the coastal men understand the mechanisms of the women and girls' disproportionate effects and how they perceive them?). Simply, I am presenting how the coastal male and female interviewees understand the connection between salinity and women's gender roles, how concerned they are with their present condition, and what perceptions they have of their situation. Here I am presenting the mentioned aspects by using four categories- i). Perception of coastal marriage and family structure, ii). Perception of violence against women, iii). Perception of women and adolescent girl's health, hygiene, and well-being, and iv). Perception of education and work security of coastal women and adolescent girls.

5.1 Coastal women and men's perception of 'gender roles' and nexus between salinity, gender roles, and women and girl's unfortunate situations

As I mentioned earlier, there is a clear and unavoidable line of distinction between coastal men's and women's gender roles. Men do most of the income-generating activities, and women do the hardest, time-consuming, and heterogeneous activities without any economic value.

Table 3: Identified gender roles from the respondents (both males and females)

Gender	Gender roles	Nature of gender roles
Male	Works in the fields, factories, shrimp farms, brickfields, day laborers, fishermen, shopkeepers, transport workers, etc.	Have monetary value

Female	Fetching water, food preparation, fuel collection, raising children and schooling them, maintaining livestock pens, making and maintaining traditional stoves by using clay, elderly care, etc., specifically, every minutia of the households	Non-monetary
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A woman (Interviewee- 8) complains against the invisibility of their daily work and male’s attitude towards their works by saying, *“Our works and labors are unseen. Male members think we do not do any work; we just prepare food, eat, and waste time sitting idly or gossiping. Men think so because they work and earn to bear our family expenses; however, we work hard, but we do not earn.”* Another woman (Interviewee- 9) uttered with frustration, *“Our non-monetary gender roles are our main enemy.”*

For economic value, men’s works are viewed as essential, esteemed, and prestigious on the other hand, women’s works are considered low esteemed, less important, and low prestigious. As a result, if a man or a boy participates in any women’s work, he is humiliated and devalued by his fellows as well as by his community. So, men and also women never prefer to engage their husbands or boys in female-oriented activities. One male (Interviewee- 18) said, *“We have a socially accepted norm where female works are viewed as low prestigious, so none of us shows interest in participating with female works and dares to break the tradition. For example, we spend our leisure time at the village tea stalls idly, but we never thought to fetch water with the water jar. From our childhood, we saw that women go to fetch water while carrying the water jars, so, in our imagination, water jars are symbolized as a female utensil. Therefore, no man is interested in carrying a water jar as they are feared to be humiliated by society and labeled as ‘half ladies’ (male with no masculine characteristics).”*

Another male (Interviewee- 16) added, *“Boys at the age of 10 to13 often accompany their mothers or sisters to collect water; however, you would never see fifteen years or above older boys carrying water. A girl studying at college always goes to fetch water, but a boy of the same age never goes because he sees the act as low prestigious for him. It is inherent to our mindset. I believe it is impossible to break the tradition.”*

So, gender roles are evident among coastal people, and they developed through their socialization process. Both males and females perceive the roles from the same point of view. As a result, parents, especially mothers, work hard to collect water, fuel, and fodder; however, they never seek help from their husbands or sons. She never wants to see her male family members be humiliated by her society. Surprisingly, the tendencies are common irrespective of my respondent's religion, educational and economic status.

5.2 Perceptions of coastal marriage and family structure

All the interviewees acknowledged that they feel insecure about marrying off their offspring, especially their daughters so, they always try to marry off them at a young age. One male (Interviewee- 20) said, *“In the coastal area, any woman living without marrying is a very humiliating and shameful act both for the person and for the family. So, we always try to marry off our daughters at an early age”*. Another adolescent girl (Interviewee- 14) added, *“We are preparing for marriage after our birth just like marriage is our life. We are accustomed to this kind of thinking because we are living within the salinity trap.”*

Moreover, dowry is another accepted culture among male and female respondents. Females have not the courage to refuse to give dowry to the groom's family because they are subordinate and always dependent on the male members. Females have no voice and have no economic support, so they have to support the tradition. In the coastal areas, the tradition of dowry is so dominant that parents start DPS (Deposit Pension Scheme, a common financial savings plan that permits the clients to deposit month-to-month and get a handsome quantity at maturity) after giving birth to each female child to meet dowry demand during her marriage.

5.3 Perceptions of violence against women

Sexual harassment is the most significant threat to adolescent girls' protection. Parents of every girl know about the risk of sexual harassment of their daughter; however, they are not anxious about it because they are accustomed to the culture. Both father and mother have the same point of view to ignore it, and both acknowledged that they never thought of taking legal action to protect their daughter from sexual harassment. One male (Interviewee- 17) said, *“I know sexual harassment commonly occurs while my 13 years old daughter goes to fetch water from the ponds*

however, she usually did not mention it to me. If she complains, I suggest her to keep quiet. Because, if my community knows about it, I will face difficulties to marry her off". Another male (Interviewee- 21) added, "sexual harassment is a very common culture not only for the coastal districts but also all over our country. We know that every girl goes through such kinds of experiences in our society. Consequently, except in extreme cases, girls never thought of informing it even to their family members".

Domestic violence and intimate partner violence are other threats to women's protection; however is also a common culture in the coastal areas, especially among low-income families. Most of the male respondents understand its connection to salinity intrusion. For example, one male respondent (Interviewee- 19) said, "In our society, domestic violence occurs all the time. I feel that it has a relationship with salinity though it often occurs for economic factors. However, you know, here economic factors are influenced by salinity intrusion".

Coastal women accept violence because they have no other way to avoid it. One woman (Interviewee- 10) said, "We are powerless because we do not have economic support. If I leave my husband's family because of violence, I will starve, and my children will face an ill fate. However, my husband will have no loss. If I leave his house because of violence, he will remarry immediately after my absence". Coastal women face violence against them at different times, but they rarely complain against their husbands to the law enforcement agencies. Instead, they took it as their fate and always tried to cope with the culture throughout their life.

5.4 Perceptions on women and adolescent girl's health, hygiene, and well-being

One of the most significant health crises of coastal women and adolescent girls is the menstrual health and hygiene management crisis (discussed in the previous chapter); however, most coastal males do not have any idea about the issue. Moreover, only a small portion of male interviewees said that their wives frequently suffer from gynecological health complexities. Still, they do not know whether it is caused by saline water consumption or not.

On the contrary, I asked my female interviewees why they do not share their menstrual health complexities with their husbands. One woman (Interviewee- 5) replied, "As a female, we have a very low status in our family, so we do not have any priority regarding menstrual health and

hygiene management from our male members. We know that these are our problems, and we have to solve them. In addition, we are illiterate women; we even do not know how to describe our gynecological problems with male doctors. Moreover, we are not allowed to visit the male doctors individually. So, we often go to the physician when we have no other way or in an emergency.” An adolescent girl (Interviewee- 15) said, *“Menstruation is not an important issue for us. However, we know that we always remain at risk of starvation, so discussion and demand for menstrual hygiene products are a luxury. We never thought of it even I had not heard about sanitary napkins in my life.”*

In addition, most male interviewees are not adequately aware of the association between salinity and increased diseases of coastal women and adolescent girls however, a small portion of them properly understands it. Surprisingly, none of my male interviewees understand the increased mental stress of coastal women and adolescent girls. They took the issues very lightly and showed no interest in talking about the effects. On the other hand, female interviewees know that they are victims of salinity-induced disease burden and mental stress; however, they are accustomed to it. One woman (Interviewee- 2) said, *“I am afraid my daughter and I will pass through the same bitter experiences that my mother had had. In reality, all poor coastal girls have the same destiny.”*

In addition, all males, females, and adolescent respondents understand that salinity negatively affects their water, food security, and nutritional status. Moreover, they know that women and adolescent girls are the key victims of salinity-induced malnourishment.

5.5 Perceptions on women and adolescent girl’s education and work security

The work security of coastal women has two dimensions: wage discrimination (discussed earlier) and lack of freedom to expense their income. Due to their subordinating position in their families as well as society, women always face deprivation and discrimination regarding wages. All males and females respondents know about wage discrimination, but most of them failed to understand its connections to salinity. Women were unable to realize that they should not face wage discrimination even they should be paid more wages than the male workers because saline water consumption imposes more risk to females than males.

Moreover, women often feel deprived as they cannot spend their earnings according to their will, but they do not complain. One female (Interviewee- 4) said, *“I catch shrimp fry daily, and my husband sells them in the local markets. I never ask him about the money earned from selling those fries because he purchases the necessary things for our family.”* Another female (Interviewee- 7) added, *“We have no priority in our family. We earn, but we cannot spend our earnings as we wish. We have to give the money to our husband to maintain our family expenses. We are accustomed to it, so we never ask for our share from my husband.”* On the contrary, most of the male interviewees acknowledged that they did not think of the issue. A male respondent (Interviewee- 23) said, *“Women cannot go to the markets alone so, what do they do with the money? I meet the expenses of our family, so the money should be on my hand, and its common sense.”*

In addition, regarding the educational attainment of the offspring, male members' decisions are dominant. Among my ten male interviewees, four have school-going daughters. During the interview, they show reluctance to send their daughters to schools because they identified marriage insecurity as the main reason (elaborately discussed in the previous chapter). One of my male respondents (Interviewee- 25) said, *“We want to marry off our daughters at an early age, but schooling makes them aged and creates a risk to their next married life. We are accustomed to this culture, it is our lifestyle, and I do not find anything wrong with our culture.”* In addition, most of the female respondents who have daughters also hold the same views on that issue.

Table 4: Coastal males, females, and adolescent girl’s understandings of nexus between salinity and social uncertainties

Social uncertainties	No. of women understand the nexus between salinity and social uncertainties	No. of men understand the nexus between salinity and social uncertainties	No. of adolescent girls understand the nexus between salinity and social uncertainties	Total
Marriage insecurity	10	10	05	25

Dowry demand	10	09	05	24
Child marriage	10	10	05	25
Grass widow	08	10	05	23
Divorced women	08	10	05	23
Polygyny	08	08	05	21
Women-headed family	06	09	05	20
Sexual harassment	06	07	05	18
Domestic/Intimate partner violence	08	09	05	22
Menstrual health and hygiene management crisis	10	01	05	16
Increased disease burden	10	03	05	18

Mental stresses of women	10	00	05	15
Victim of malnutrition	10	10	05	25
Low educational attainment	10	04	05	19
Burdens of domestic roles	10	06	05	21
Wage discrimination	02	00	01	03

Chapter VI

Discussion

This chapter brings together the study on salinity intrusion in Bangladesh, focusing on the impacts of women and adolescent girls. It outlines findings on salinity intrusion, the social insecurities of women and girls, mechanisms of those insecurities, nexus between salinity and gender roles, and finally, men's perception, understandings, and prioritizations of those insecurities and their connection with the gender roles. I am dividing this chapter into three parts, i.e., in the first part, I give a quick summary of my research findings, then I critically analyze my results, blending them with the feminist approach (eco-feminism and feminist political ecology theory) and past literature, and, in the final part, I give directions for future researchers.

6.1 Summary of the findings

Salinity both directly and indirectly imposes social insecurities on coastal women and adolescent girls, and it disproportionately affects coastal men and women. Throughout the study, we see that women and adolescent girls are the hard hitters of climate change-induced both water and soil salinity. This study reveals the blatant and harsh realities of the social impacts of salinity intrusion on coastal women and girls, especially those living in extreme poverty. The study also reveals the dire consequences for women and adolescent girls and the mechanisms of those consequences—their child marriages, their abandonment, their domestic work burdens, intimate partner violence, challenges of schooling of their daughters, their marriage insecurities, and so on. This research also reveals that women and adolescent girls feel the real effects of salinity intrusion more keenly. Salinity intrusion's most devastating and crushing consequences fall squarely on the coastal women and adolescent girls' shoulders.

Salinity changes the marriage and family structure of the coastal areas of Bangladesh by creating marriage insecurity, increased dowry demand, and child marriage. Surprisingly, all three are interlinked and influenced by each other, termed as 'Salinity- Marriage Trap' for the coastal females. Salinity-induced coastal girl's unattractiveness and lack of proper communication facilities make the people (both inside and outside the coastal areas) unwilling to marry them.

Moreover, the schooling of the coastal girls increases their age, and as they age, they lose their tenderness and smoothness of the skin so, the parents are compelled to marry off them at a young age. Thus, the situation increases the dowry demand, child marriage, and marriage insecurity of coastal girls and works as a trap for the coastal adolescent girls.

In addition, salinity affects the marriage and family structure of the coastal areas by introducing grass widows, divorced women, and polygynous culture. High poverty rate, out-migration of the coastal males to the brickfields or cities, coastal women's physical unattractiveness, and sexual uninterestedness proliferate their risk of being divorced, separated, grass widowed and victim of polygyny. Besides, salinity increases the number of women-headed families in the coastal areas by migration of male members and also creating 'the tiger widows.' The female-headed families are very vulnerable because it destroys the family's food security and imposes the responsibilities of taking care of family members as well as family resources to the women.

Moreover, salinity also has adverse impacts on coastal child protection and violence against women as it increases the risk of sexual harassment of coastal women and adolescent girls while they go to collect water from distant sources, catch shrimp fry from the river, work at shrimp farms, migration of the male members as well as while the male members of a family work outside at night. Salinity also increases the risk of being victims of domestic violence and intimate partner violence of coastal women. Reasons like inability to finish household chores on time, sexual uninterestedness, frustration of coastal males due to unemployment, poverty, and non-fulfillment of dowry demand increase the risk of domestic and intimate partner violence against the coastal women.

In addition, salinity threatens the health, hygiene, and well-being of coastal women and adolescent girls in several ways. For example, salinity creates severe menstrual health and hygiene management crisis in different ways like skin diseases, genital infections, extreme itching problems, etc., among women and adolescent girls, especially during the menstrual circles. Moreover, a latent and overlooked issue is after every circle of women and adolescent girls wash their used absorbent clothes with saline water. The salt of the water turns the clothes hard and stiff after every wash. So, when women and girls use the clothes next time, it hurts them, causes extreme itching, rashes, skin infection, and gynecological complexities. Besides, adolescent girls miss two

to three school days because they fear leakage of menstrual blood due to using old clothes as an absorbent and uncomfortable feelings with the hard, stiff clothes during schooling.

Salinity creates numerous health complexities among females as they are the main exposures to saline water. Moreover, women and adolescent girls of the coastal areas also suffer from malnutrition as they have very limited nutritional supply sources (food shortage, no homestead fruits and vegetation, scarcity of livestock, and lack of traditional fish). Besides, in patriarchal social culture, women and girls are less prioritized in the family as well as society, so they sacrifice more regarding food and nutritional demand. Also, child marriage, teenage pregnancy, and immature childbirth accelerate malnutrition among coastal adolescent girls.

Furthermore, salinity adversely affects the academic activities of coastal adolescent girls. It makes them the victim of low educational attainment by creating several challenges like- marriage insecurity, child marriage, menstrual health-related risks, poverty, patriarchal culture, long-distance educational institutions, as well as lack of proper transportation system. Most importantly, adolescent girls collect water from long distances and the task takes several hours every day, so the girls have to sacrifice their schooling to manage time for water collection.

Besides, salinity imposes work burdens on women and adolescent girls both on the family and professional levels. At the family level, salinity increases the burden of domestic roles by imposing water, fuel, and fodder collection duty that takes several hours daily. Moreover, at a professional level, salinity creates wage discrimination for women and adolescent girls as they receive half of the salary compared to their male counterparts though females suffer more adversely with the long time exposure to saline water.

So, from the above summary, it can be said that the “everyday/every night worlds” (Smith, 1992, p. 17) of each woman and girl living in coastal areas are heavily influenced by saltwater intrusion. Moreover, their whole life is a narrative of deprivation, subordination and gendered tasks that shows that they are not the center of the environmental issues.

Later, the study tries to understand how the coastal male, female and adolescent girls perceive the mentioned vulnerabilities and whether they understand the causality of the vulnerabilities or not. The study found that in the coastal areas, people have distinct and inevitable lines of distinction in

men and women's gender roles where men generally do the earnings activities on the contrary women do the household chores that are time and energy-consuming but are not income generating or non-monetary (Shiva, 1993).

Besides, in coastal social norms participating in women's activities is a low prestigious and defamatory act for the men so they never thought of sharing women's responsibilities as well as women never wanting to engage their husband or sons in their works. Their socialization process develops this mindset so, coastal males and females view gender roles as an apparent social norm.

Moreover, coastal women and adolescent girls perceive social challenges like sexual harassment and domestic violence as very usual and natural acts in their society, so they never thought of taking legal steps against the acts rather than trying to cope with the situation. Surprisingly, both male and female respondents understand the relationship between salinity and their social challenges. However, most male respondents do not know that saline water consumption creates severe gynecological health problems for their female family members, especially during menstruation. In addition, males do not understand the coastal women's disease burden and mental stress increase by salinity; however, women understand the casualty very well.

Both male and female respondents understand that salinity creates marriage insecurity and increases the dowry demand for adolescent girls. Consequently, both of them support child marriage for their daughters. Moreover, male interviewees did not understand the causal relationship between salinity and social realities like grass widows, divorced women, increase number of women-headed families, and polygyny.

In addition, women and adolescent girls are deprived of the freedom to expense their earnings as well as lack to exercise decision-making power regarding their education and work opportunities; however, male members, especially the earning members of each family, are responsible for making all decisions for the family.

6.2 Critical analysis

Salinity intrusion can be termed a wicked problem because it has many interlinked social issues influenced by one another, so no straightforward solution is possible to overcome them. Nowadays, the entire coastal zones are suffering from the adverse effects of salinity. Future projections show a huge possibility of suffering especially, the women and adolescent girls soon from saltwater intrusion. Moreover, women and adolescent girls are at the forefront of the sufferings, and they are the noteworthy players against the unbalanced battle of saltwater intrusion.

6.2.1 Structural drivers of salinity-induced social uncertainties

The social uncertainties mentioned throughout this research turn to severity by our existing social structure, cultural context, and socially approved gender roles; these are termed ‘the structural drivers of salinity-induced social uncertainties’.

In a patriarchal society like Bangladesh, the leading cause of women’s and girl’s social insecurities is their subordinated social position and males' prioritization (Shiva, 1993) of our society and family. However, salinity increases their subordination and less prioritization compared to the women and girls living in the other districts of the country. For instance, domestic and intimate partner violence, early marriage, dowry demand, and malnourishment are exemplified by our patriarchal social structure. Here, we socialize with a mindset of men’s privilege on the contrary to women’s disempowerment. And salinity intrusion intensifies the mentioned uncertainties by creating the risk of marriage insecurity, skin diseases, gynecological health complexities, imposing work burdens, low academic attainment, and increasing unemployment.

Furthermore, patriarchal social norms restrain women and girls from land rights, property rights, equal distribution of water and other resources, rights of productive assets, and also food security. Hence, coastal women and girls exist at the bottom of the power ladder because of their subordinate and marginal social position. They are considered as the marginalized section of people in our country. The mentioned inequalities make them more vulnerable to environmental degradation (Enarson, 2012), i.e., salinity intrusion. So, it can be suggested that a more balanced distribution

of power, as well as resources, can be the key components to change the marginalized and subordinated condition of the coastal women and girls.

In addition, patriarchal social structure blended with religious misconceptions as well as insufficient knowledge regarding climate change (both for women and religious leaders) turns the coastal women and girls insecurities into the most dangerous and unacceptable forms. For instance, Alston (2015) showed that the coastal rural religious leaders believe and spread the misconception that climate change is a curse for Bangladesh and it is created because women and girls of our country as they go out from the houses and involve themselves in academic as well as income-generating activities. These kinds of misconceptions, dominance, and lack of awareness intensify women and girls' insecurities a hundred times.

Also, our socialization process contributes to increasing the social insecurities of coastal women and girls. For instance, coastal men know that getting non-saline water is time-consuming, laborious, and challenging. Though men are physically stronger than women, most of the men restrain themselves from water collection. The fundamental cause of this tendency is they are socialized to know that water collection is a female task. They also feel that it is demeaning and humiliating to do the female tasks. As one male respondent (Interviewee - 22) said that *“If we look at a pitcher, in our imagination, we see a woman carrying it, not a man. We saw our mothers carrying it, now our wives are carrying it and in daughter will carry it in the future. It's the system; it's our culture.”* These kinds of social norms, values, and mindsets also increase the suffering and insecurity of coastal women and girls.

The findings of this study showed that the social impacts of saltwater intrusion are unevenly distributed among the coastal inhabitants. So, it seems like resilience resources are also unevenly distributed. In addition, negative consequences of saltwater intrusion have different impacts on intersectionality (i.e., gender, ethnicity, religious identity, class, etc.). For instance, coastal Muslim women and girls have restrictions on their movement (i.e., they are not permitted to visit the local doctors or go outside their homes without any male escort even they have to take a male child with them). However, women from the other religions have not these sorts of social and religious obligations. So, intersectionality is one of the key components that increase the social insecurities of coastal women and girls.

Moreover, poverty is another significant element that affects all the mentioned insecurities and makes the women and girls most vulnerable in their families as well as society. For example, salinity, disease burden, and poverty are influenced by one another and it can be called a ‘trap’ because all forms of disease burden increase the risk of the coastal people being poorer.

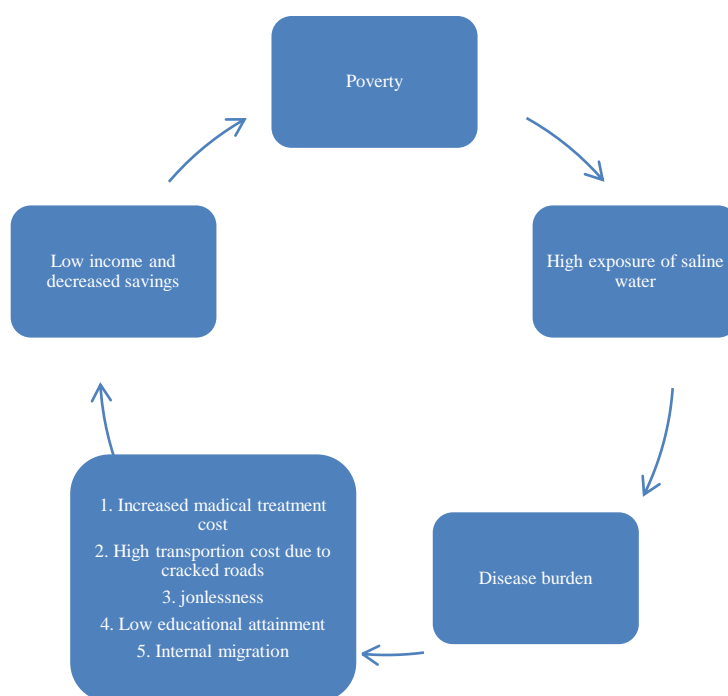


Figure 4: Salinity, disease burden, and the poverty trap (Author’s illustration)

The trap makes the coastal people’s daily life miserable and horrific as it significantly affects their literacy rate, joblessness, nutritional status, mental stress, and migrating tendencies. In all cases, women and adolescent girls are the key victims.

6.2.2 Inadequacy of institutional attempts

Lack of institutional attempts (both from GO and NGOs level) have accelerated the mentioned uncertainties. For example, Coirolo et al. (2013) showed that the policies and actions taken from Government (GO) have failed to reduce the social vulnerabilities of the coastal women and girls and also failed to cover the harshness of the coastal disaster impacts. Most significantly, at the institutional level, there is no gender-specific as well as context-specific institutional attempts to reduce the distressed conditions of coastal women and girls.

6.2.3 Social acceptance

Social acceptance of gender roles and the marginalized position of coastal women and girls is another challenge that intensifies the severity of the mentioned social uncertainties. For example, one female respondent said that every significant stakeholder of the coastal areas like- teachers, law enforcement agencies, religious leaders, political leaders know the marginalization of the coastal women and girls. Still, they never tried to erase the situation. Consequently, the situation gains social acceptance and increases their social vulnerabilities.

6.2.4 Lack of recognition of social problems

Coastal inhabitant's inability to understand the existing problems of coastal districts (child marriage, low academic achievement, dowry, marriage insecurity, polygamy, menstrual health crisis, mental stress, domestic and intimate partner violence) as social problems is another significant factor for coastal women and girl's victimization. The coastal inhabitants are completely accustomed to the mentioned social insecurities. Consequently, they do not recognize the problems as social problems for their community and never feel the urge to remove them from their daily lives.

Table 5: At a glance: Salinity induced social insecurities and the key drivers of those social insecurities of coastal women and girls

	SI related to marriage and family	SI related to violence against women	SI related to health, hygiene, and well-being	SI related to education and work security
Social Insecurities (SI)	<ul style="list-style-type: none"> i). Marriage insecurity ii). Child marriage iii) Dowry demand iv). Grass widow v). Polygyny vi). Women-headed families vii). Divorce 	<ul style="list-style-type: none"> i). Sexual harassment ii). Domestic and Intimate partner violence 	<ul style="list-style-type: none"> i). Menstrual health management crisis ii). Disease burden iii). Increase mental stress and sickness iv). Malnourishment 	<ul style="list-style-type: none"> i). Low educational attainment ii). The burden of domestic roles iii). Wage discrimination

Key drivers of social insecurities of coastal women and girls	
Structural drivers	<ul style="list-style-type: none"> i). Gender roles ii). Patriarchal social structure iii). Cultural context iv). Low educational attainment v). Intersectionality vi). Unequal distribution of resources/assets vii). Lack of land and property rights viii). Unequally distribution of resilience resources ix). Religious misinterpretation/ ignorance x). Socialization process xi). Question of class xii). Existing power structure
Institutional attempts	<ul style="list-style-type: none"> i). Lack of gender-specific policies ii). Lack of context-specific attempts iii). Inadequate social protection policies
Social acceptance	Widespread social acceptance of gender disparities/gender roles
Lack of recognition of social problems	Inability to understand/feel the existing social problems

Chapter VII

Conclusion

7.1 Gender sensitivity: An essential requirement of salinity related research

Bangladesh is struggling with significant challenges to climate change-induced events, and one of them is salinity intrusion in coastal districts. Around 35 million inhabitants, representing 29% of the country's population living in 19 coastal districts (BBS, 2008), are directly and indirectly affected by saltwater intrusion. Moreover, among the people, almost half of them are female, and they are the hard hitter of it and the key players in the battle against saltwater intrusion. However, the country's existing social structure, power dimension, religious culture, cultural context, and economy make their battle most burdensome and turn them into the most marginal people of the country.

In the coastal areas of the country, the existing patriarchal social structure along with the gendered division of labor of women and girls influence their access to schooling, information, resources, and socio-economic actions as well as environmental actions that consequently impede their sustainable development. Findings of this study showed that the coastal women are solely responsible for the well-being of the family members; they are increasingly heading their families as the male members migrate away for economic activities. Moreover, they constantly struggle with the customs and norms that demean them, and they are the last consumer concerning water and food access. Besides, they are continuously experiencing violence against them and they suffer from child marriage, marriage insecurity, dowry disputes, diseases burden, mental stress, low academic achievements and work burdens. In addition, they are responsible for care tasks and significantly, health and well-being of themselves, their family members as well as their livestock. As a whole, it can be said that “every day/every night world” (Smith, 1992) of the coastal women's life is intensively affected by water and soil salinity and their entire life is a narrative of misery, subordination, and gendered tasks.

So, to describe their condition, I want to pay more attention to Ferree's (2012) concept of “radical realism.” The concept allows “an analysis of the possibilities that climate change provides for a reimagined space where gender equality is centralized” (Alston, 2015, p. 174). Moreover, Alston's

concept of “radical adaptation” (2015, p. 174), is also significant in this analysis. The concept of radical adaptation allows us to put a ‘gendered approach’ into our daily practices and policy development in an obligatory and transparent way while designing any strategy to assist the marginalized community (Alston, 2015). For my research, I prefer to narrow down the concepts (both radical realism and radical adaptation) to argue that the ‘gendered approach’ should be centralized to understand coastal salinity-induced social insecurities and their mechanisms. Also, without being gender-sensitive and focusing on gender roles and gender equality, we will be unsuccessful in breaking the salinity trap as well as assisting the marginal women and girls into reducing their burden, misery, and ill fate. Moreover, at the policy level, our key focus should be on more ‘gender-specific’ as well as ‘context-specific’ attempts to bring sustainable development for marginal coastal women and girls.

7.2 Contributions of the study to climate change research

Finally, for the very first time, this study sheds light on the specific social insecurities of coastal women and adolescent girls and shows how salinity contributes to creating and intensifying those insecurities. Moreover, the study explores the gendered division of labor of the coastal males and females and shows how female’s gender roles are contributing to accelerate their deprivation and disadvantaged situation. Furthermore, for the first time, this study also examines how the coastal males perceive and understand gender roles, social insecurities, women and girls’ sufferings, and their prioritizing events. Also, this study incorporates the concepts of “radical realism” and “radical adaptation” for the first time to include ‘gendered approach’ as the core component of the assessment of salinity-induced social insecurities as well as related policy development to increase the resilience power among coastal saline-prone marginal women and adolescent girls. In brief, the mentioned aspects are the core contribution and significance of this study in coastal salinization research from social dimensions and global climate change research in the broader context.

7.3 Scopes for the future researchers

The study is an initial attempt to discover the present condition of women and adolescent girls living in extreme saline-prone coastal districts of Bangladesh. This study showed that coastal inhabitants are the backward section of the country, and women and girls are the most backward among them. Besides, coastal women and girls are the key victims of the global climate change-

induced salinity problem. They also lack sustainable livelihoods till today. So, future researchers have the opportunity to explore the coastal women and girl's destitute conditions in an in-depth manner and can also discover each of the social issues/research themes analyzed briefly in this study. Moreover, in future studies, social researchers can critically analyze the coastal males' perceptions and understandings on gender discrepancies of salinity-induced social aspects to find sustainable solutions for the coastal areas of Bangladesh.

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Appendix A: Topics for the Interviews

Semi-structured interviews were conducted for this study by succeeding the following interview topics.

1. Background information of the interviewees (name, gender, age, religion, educational status, profession, etc.)
2. Relationship between salinity and coastal adolescent girl's marriage insecurity
3. Relationship between salinity and child marriage
4. Relationship between salinity and dowry demand
5. Relationship between salinity and grass widow, polygyny, women-headed families and divorce
6. Relationship between salinity and sexual harassment
7. Relationship between salinity and domestic and intimate partner violence
8. Relationship between salinity and menstrual health management crisis
9. Relationship between salinity and women and adolescent girl's disease burden
10. Relationship between salinity and increased mental stress
11. Relationship between salinity and malnourishment
12. Relationship between salinity and adolescent girl's low educational attainment
13. Relationship between salinity and women and adolescent girl's burden of domestic roles
14. Relationship between salinity and women and adolescent girl's wage discrimination
15. Coastal males and females perception of nexus between salinity, gender roles and women and girl's deprivation
16. Male interviewee's understandings, perception, and prioritization of the above-mentioned study themes

Appendix B: Interview Schedule

Informants	Sex	Age	Marital Status	Religion	Educational status	Interview date
Interviewee -1	Female	37	Married	Hindu	5 th grade	September 23, 2020
Interviewee -2	Female	20	Married	Muslim	8 th grade	September 29, 2020
Interviewee -3	Female	26	Married	Muslim	8 th grade	September 30, 2020
Interviewee -4	Female	30	Married	Muslim	6 th grade	September 30, 2020
Interviewee -5	Female	36	Married	Muslim	4 th grade	October 02, 2020
Interviewee -6	Female	45	Married	Muslim	No education	October 02, 2020
Interviewee -7	Female	48	Married	Muslim	No education	October 03, 2020
Interviewee -8	Female	39	Married	Muslim	5 th grade	October 04, 2020

Interviewee -9	Female	27	Married	Hindu	10 th grade	October 05, 2020
Interviewee -10	Female	26	Married	Muslim	10 th grade	October 06, 2020
Interviewee -11	Adolescent girl	18	Married	Muslim	SSC	October 07, 2020
Interviewee -12	Adolescent girl	18	Unmarried	Muslim	SSC	October 08, 2020
Interviewee -13	Adolescent girl	19	Married	Muslim	SSC	October 10, 2020
Interviewee -14	Adolescent girl	19	Married	Muslim	SSC	October 11, 2020
Interviewee -15	Adolescent girl	19	Unmarried	Muslim	SSC	October 12, 2020
Interviewee -16	Male	24	Married	Muslim	10 th grade	October 13, 2020
Interviewee -17	Male	28	Married	Muslim	10 th grade	October 14, 2020
Interviewee -18	Male	39	Married	Muslim	8 th grade	October 16, 2020

Interviewee -19	Male	35	Married	Hindu	8 th grade	October 17, 2020
Interviewee -20	Male	30	Married	Muslim	8 th grade	October 18, 2020
Interviewee -21	Male	46	Married	Muslim	No education	October 19, 2020
Interviewee -22	Male	48	Married	Muslim	No education	October 20, 2020
Interviewee -23	Male	33	Married	Muslim	8 th grade	October 21, 2020
Interviewee -24	Male	39	Married	Hindu	5 th grade	October 22, 2020
Interviewee -25	Male	22	Married	Muslim	10 th grade	October 23, 2020

Appendix C: Selected Photographs

Photography 1: Coastal women and adolescent girls are struggling to collect non-saline drinking water. Pictures are adopted from Akash (2021)







Photography 2: Coastal agricultural land area, women and girls are collecting crab and shrimp fry, Women and adolescent girls are going to collect non-saline drinking water and Women and adolescent girls are working in the shrimp farms (Pictures captured at fieldwork, 2020)





