Gender-Ethnicity Intersectionality in Climate Change Adaptation in the Coastal Areas of Bangladesh

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Abstract: Climate change effects are not uniform and have disproportionate impacts among different groups of people within communities. It is therefore important to understand the underlying issues of intersectionality for climate change adaptation and human well-being. This paper aims to measure human capabilities and freedom of choice by analyzing perceived climate change impacts and current climate change adaptation ability among ethnic and non-ethnic communities in Bangladesh. This study applies a range of participatory rural appraisal tools and key informant interviews to assess impacts of climate change when considering gender and ethnicity. Women in the coastal regions have less access to resources and services because of social capital and cultural practices and this directly or indirectly influences their adaptation to climate change. Women have limited or no participation in decision-making processes at family or community levels and this impacts their vulnerability and well-being. In consequence, women's capabilities must be focused on moderating their vulnerability and risk, and developing effective adaptation to the adverse impacts of climate change and natural hazards.

Keywords: gender; ethnicity; intersectionality; climate change adaptation; capability approach; coastal regions; Bangladesh

1. Introduction

The adverse consequences of climate change have quite uneven geographies. They also have uneven impact on societal groups differentiated by generations, age class, income group, occupation, and gender [1–3]. Developing countries and the poorest people face the impacts of climate change disproportionately and this exacerbates inequities in lives and livelihoods including health, access to adequate and nutritious food, clean water, and other resources [1,3]. In particular, women's vulnerability to natural disasters and climate change has been highlighted through many studies around the world [4–8]. However, there is more to this inequality than physical and biological differences between genders. Notably, variation in the magnitude of vulnerability between sexes and their corresponding capacities to adapt depends on social, economic, and political factors and contexts [9–12]. Gender-focused researchers are yet to perform a comprehensive overview of women's levels of economic well-being [13] and factors enhancing or impeding women's capabilities to adapt to the adverse impacts of climate change [4]. Climate change is gender sensitive and women are more sensitive than men to climate change, which is also linked to women's socio-economic position [5,6,14]. In particular, women and ethnic minorities are more vulnerable to the impacts of climate change due to limited opportunities for participation in economic activities, personal income for fulfilling basic needs, access to health system and state of health, access to education, and freedom of movement (mobility). For instance,

in the 1991 cyclone disaster in Bangladesh, 140,000 people were killed, of which 90% were women [15].

The negative consequences of climate change, disasters, and correlation with gender in Bangladesh, have attracted some scholarly attention [6,9,16–19]. However, while gender is one of the obvious and most studied aspects of the uneven distribution and adverse consequences of climate change, there are other less well researched aspects. Ethnicity, which comes with corresponding boundaries of action that are imposed by social norms and consequent lack of freedom of choice and livelihood options, is also important. In Bangladesh, there are several ethnic communities with diverse social and cultural differences. Yet, there are almost no studies about how climate change impacts vary between ethnic groups or whether an interplay of gender and ethnicity amplifies or impedes individual chances of successful adaptation. This paper makes steps towards closing the gap in the literature on women's freedom of choice and climate change adaptation with participation at the family and community level to adapt to climate change impacts. We explore how social capital and cultural aspects interact with freedom of choice and the well-being of the poor and vulnerable women (ethnic and non-ethnic) in the coastal regions of Bangladesh.

We address this gap by looking at the difference in perceptions of climate change impacts and adaptation options by gender and ethnic group within the poorest coastal communities in Bangladesh. We focus on freshwater availability as the primary concern for local people, and on migration as an adaptation option. Decreasing fresh water availability due to rising sea levels has been signaled by various authors as a major climate change impact [7,20–23], while many authors have suggested that migration is the primary adaptation measure open to people in this area [24–32]. It is becoming clear, however, that migration may not be an option for all groups within the population, and that the inability (or an absence of a free choice) of some sections of the population to move is creating clusters of trapped populations in the most vulnerable zones in Bangladesh (Figure 1).
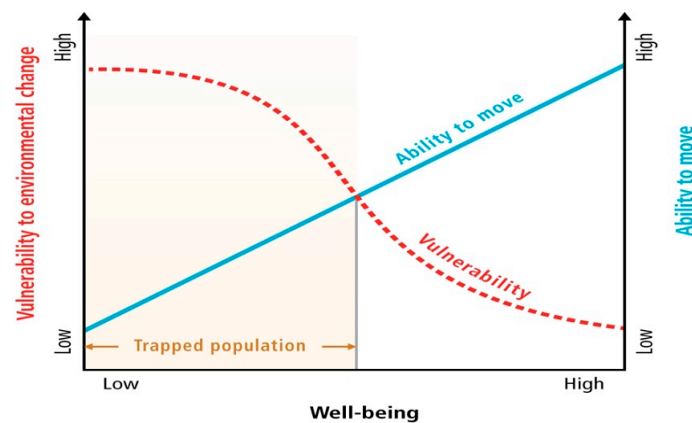
Figure 1. Relationship between vulnerability to environmental change and mobility showing that populations most exposed and vulnerable to the impacts of climate change may have least ability to migrate (source: [1]).

We used focus group discussions to shed light on the following research questions: (1) Are the impacts of climate change, particularly as regards decreasing freshwater availability, perceived and experienced differently by different ethnic groups and between genders?; and (2) Do ethnicity and gender amplify or impede freedom of choices with respect to adaptation, particularly as regards the ability to migrate? While much has been said about climate extremes and high-end scenarios, it is also important to also investigate the socio-economic vulnerability extremes in climate adaptation and identify to what extent gender and ethnicity play a role here.

This paper continues as follows. Section 2 presents the theoretical framework within which the field work (described in Section 3) was carried out. We present the results on the experiences of climate change as perceived by ethnic and non-ethnic coastal communities

differentiating by gender in Section 4. These results are accompanied by data on the access to resources and freedom of choice that influence their capability to migrate as an adaptation option. Section 5 draws conclusions.

2. Trapped Population: Freedom of Choice, Well-Being and Climate Change Adaptation through the Lens of Sen's Capability Approach

The ability of the poor and vulnerable women to migrate depends on their economic structure, social status and ability of access to resources and opportunities [33–35]. The freedom of choice for women to migrate also depends on their social networks and social capital. If they lose their social capital, then their freedom of choice is impacted and they are trapped by vulnerability and risk of climate change with relatively similar geophysical conditions. This study concentrates on women's vulnerability, freedom, and well-being at the family and community level to respond/adapt to climate change and to live a life in dignity and integrity. The paper is rooted in the 'capability approach', where freedom is seen as an essential element of human well-being and the opportunity or ability to make decisions as per an individual's own choice [36]. In other words, capabilities refer to genuine freedoms a person "enjoys to lead the kind of life he or she has reason to value" [37]. Freedom is a primary property and right of human beings who are confronting the physical world. Freedom is related to the opportunity to achieve the things people value and their reason to value, which is also concerned with the ability to achieve [36]. The capability of a person is usually defined in relation to their ability to function and it reflects what they can actually do while being within a certain context [38]. This paper applies this perspective to study how various degrees of individual freedoms among social groups differentiated by gender and ethnicity impact climate change adaptation. Naturally, there are diverse factors affecting the freedom of an individual person, which we see here as conversion factors (Figure 2). There are for instance personal, social, cultural and environmental conversion factors [39]. Individual capabilities also depend on resources and functioning within different contexts as well.
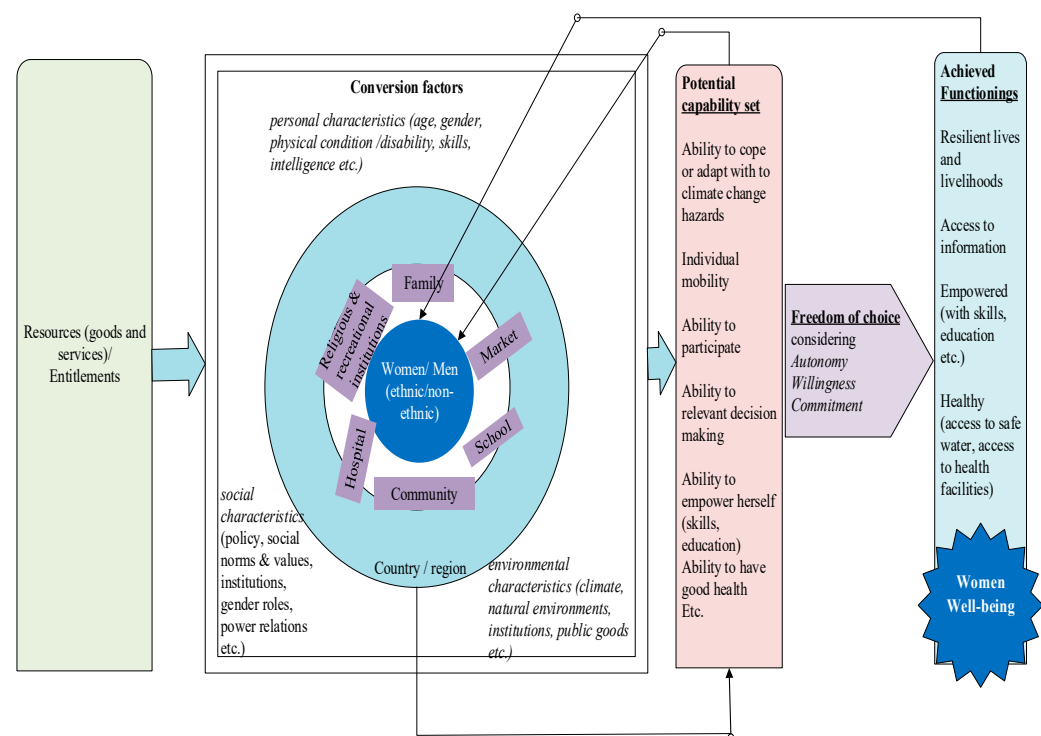
Figure 2. Capability approach and evolving capabilities (source: adapted from [40]).

Adverse consequences of climate change affect individuals and communities around the world but are distributed unevenly geographically and socially [41,42]. People who are

already in vulnerable positions in society—women and some ethnic groups in particular—feel the adverse impacts most acutely [43]. According to Amartya Sen, there are five instrumental freedoms that, if present and if individuals have access to them, will provide opportunities for them to "act in their own self-interests and reduce their vulnerability" [44]. Access to these instrumental freedoms—namely political, economic, and social freedoms, transparency guarantees, and protective security—are necessary, for example, for women to gain a better quality of life and acquire the capabilities they need to act as their own agents of change [37]. Thus, climate change plays a vital role from the perspective of the capabilities approach: it puts some instrumental freedoms under pressure by altering the conversion factors. Severe environmental changes, drinking water scarcity, salinity intrusion, etc., undermine livelihood options as well as the health conditions of people involved.

In the context of climate change, migration is sometimes seen as one of the adaptation options. Yet, the ability of people to migrate depends on their economic and social status and on their ability to access resources and opportunities [33–35]. The freedom of choice of various social groups to migrate also depends on their social networks and social capital.

3. Materials and Methods

We conducted a PRA study in the four upazilas (sub-districts) from Khulna, Satkhira, and Bagerhat districts in the southwestern coastal region of Bangladesh (Figure 3); and for the ethnic Munda community, we conducted FGDs and interviews in Satkhali, Syamnagar, under Satkhira district. This region suffers frequent natural hazards and disasters, including flooding, cyclones, and storm surges, water logging, drought, etc., due to its geophysical condition. It is also predicted to be adversely affected by climate change. We used a mixed methods approach for collecting information at family/household level and community level.
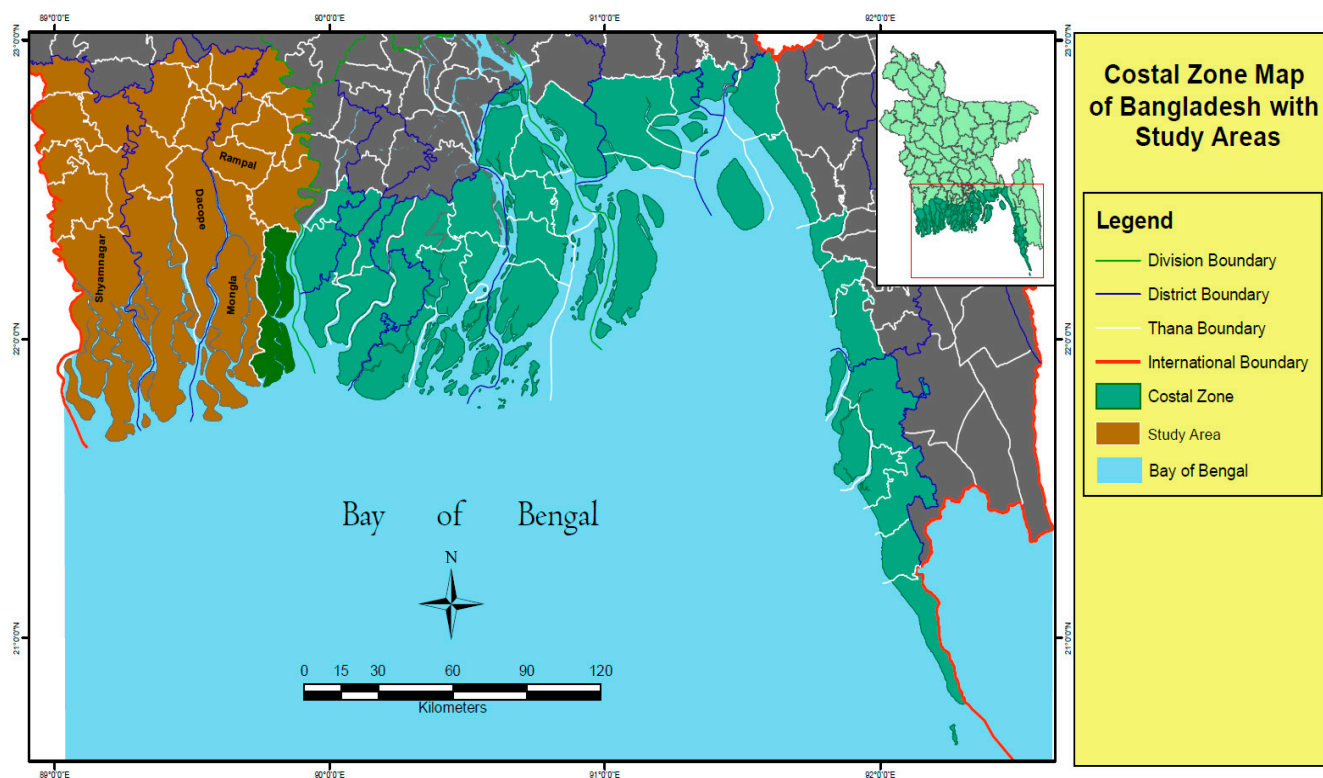
Figure 3. A map showing study areas in the south-west coastal zone of Bangladesh.

These districts are also among those where disparity between male and female is the highest in terms of education (literacy rate), income (wage rate), health (nutrition), etc., according to a gender disparity analysis carried out over 64 districts in Bangladesh [45]. There are also significant ethnic diversities in the region with the presence of both ethnic (*Munda*) and non-ethnic communities. The study area also has diverse religious and cultural practices and ethnicities. There are Hindu, Muslim, and Christian people living within communities who may have different socio-economic conditions and gender traditions.

The initial 'primary contact' with households and the community was made through NGOs working in the study area and local government institutions (specifically members and chairpersons of the union councils). A 'reconnaissance' survey was made in the study areas, and we conducted a *transect walks* to source preliminary information in the selected study locations. This informal process made it possible to meet people, familiarize with the communities and to understand the local context better. The methods used to gather data were: (1) key informant interviews using open questions; (2) a total of 12 focus group discussions (FGDs) with a checklist of a set of queries following occupations, gender and ethnicity, decision making, access to resources and services, social networks and interactions; (3) interaction (11 key informant interviews) with local governments representatives and NGOs; and (4) secondary literatures. The Munda people live in clusters within villages but are separated from the mainstream community. In the study, almost 80% of the respondents were women in the non-ethnic community because of the absence of the male members of the family due to men working during the daytime. In contrast we found men to be available during the daytime for interviews in the ethnic community, as the ethnic women work in the fields during the daytime (found in six FGDs). Another six FGDs were conducted focusing on migration, water resources, and livelihood issues with different compositions of participants (male, female, mixed group, farmer, fisher-folk, and day laborer, etc.). By profession they are daily labor, fisher, and other natural resource collectors (from the mangrove forest, Sundarbans). A total of 8–10 persons attended in each of the FGDs and the age of the participants ranged from 22 to 60 years. Data were also collected (*as part of the PhD study*) through a semi-structured questionnaire on socio-economic conditions, livelihoods, gender equality, access and constraints to resources and social networks, as well as perceptions of climate change and adaptation practices and climate change migration practices. The results presented in the next section are a summary of the data gathered in the exercises mentioned above. The issues are mentioned in order of importance, based on the frequency and emphasis that they were given by participants.

4. Results and Discussion

We present the results of this field work to answer our two research questions. In particular, we first identify any potential differences in the perspectives on climate change as perceived by ethnic and non-ethnic communities, differentiating between male and female respondents. Since adverse consequences of climate change in this region mostly affect freshwater availability, we further investigate how this problem disproportionately impacts men and women inhabitants in ethnic and non-ethnic communities. We continue by presenting the cumulative results of the focus group discussions and interviews regarding women's participation in decision making within a household as well as aspects of migration decisions our respondents consider important. By combining the information from the focus group discussions (FGDs), particularly 6 (six) FGDs within the people in an ethnic community and we also analyze mobility in accordance with gender and ethnicity for social networks and access to institutional opportunities and services. We identify if there are differences across genders and across cultural-ethnic groups, and whether the differences along these two dimensions amplify or attenuate the capabilities of the corresponding sub-groups to exercise their freedoms when adapting to climate change.

4.1. Perceptions of Climate Change and Its Consequences

Table 1 shows that the local people in the study areas observe climate change in their daily lives in the form of seasonal changes, changing rainfall patterns, extreme weather conditions (high temperature, etc.) and changes in frequency and intensity of natural disasters. As extreme weather conditions become worse, people in the study areas experience some differentiated impacts according to their gender and ethnicity. Decreasing availability of freshwater is however seen by all as the most central issue, even though this may be expressed in different terms by men and women. In general, men seem to look at the problems that climate change brings through the prism of a more long term and strategic horizon, while women seem to be more focused on daily family needs. Thus, women observe climate change consequences only as far as they disrupt the daily lives within their family circle, while men compare the current situation to that in the past and foresee more long-term consequences and trends for the community at large, although it differs to some extent based on the context at the family level.

This major difference in female vs. male position is identical within the traditional and ethnic community as described below:

Table 1. Perceived climate change impacts.

Gender	NON-ETHNIC Community	ETHNIC (MUNDA) Community
MEN (Think strategically for comparatively longer time span, more community oriented, linked to governance and institutional decision making)	Increasing frequency and intensity of the natural hazards in the region	
	Increasing saline water intrusion affecting availability of fresh water	
	Increasing variation of temperature and rainfall	
	Duration and characteristics of seasons changed (there are officially six seasons in Bangladesh but considering changing seasonality, now only three major seasons can be perceived (summer, rainy, and winter)	
	Agriculture and livelihoods become vulnerable (loss of agricultural production due to natural hazards, i.e., cyclones, flooding, and storm surges, etc.)	Livelihoods (mostly non-agricultural) become vulnerable (as natural resources are depleting in the surrounding areas, less opportunity to get jobs in agricultural production systems in the areas)
	Natural resources depletion (fish, crabs, etc.), they use to harvest for their livelihoods	Natural resources depletion (mostly forest and non-forest resources, shrimps fry), which they collect and sell for their livelihoods
WOMEN Daily short-term concerns, concentrate only on own family circles, satisfy essential family needs	Fresh water crisis due to increased salinity because of rising sea level	
	Daily lives and livelihoods become harder because of extreme weather conditions, which impact agriculture and fisheries	Daily lives and livelihoods become harder because of extreme weather conditions, which affect their daily incomes (during disasters, they cannot have work for daily family earnings, etc.)
	Harder to maintain good health because of lack of nutritious foods (lack of locally grown vegetables and fruits) but have access to modern health care	Simiarly, lack of locally grown vegetables and fruits thus lack of nutritious food. Moreover, they depend on traditional health treatments because of the limited access to modern healthcare
	Face challenge in homestead gardening due to extreme weather (salinity, drought, flooding, etc.), which would constitutes a large share of family subsistence	Homestead gardening contributes very little to families' food consumption as they are landless and have exceedingly small house plots

The perceptions of the participants of this study, as presented in Table 1, are in line with expert opinion. Salinity intrusion has been indicated as one of the crucial environmental factors in the coastal areas of Bangladesh, impacting on land, water, biodiversity, and human health [46]. The coastal zone of Bangladesh can in fact be considered a 'live example' of climate change impacts on the lives and livelihoods of the people. In the field survey, it was found that people in these areas have less homestead (vegetables and fruits) production and they face the difficulty of seasonal homestead gardening, especially in the dry season because of fresh water scarcity. For this reason, this study went into more depth on this topic.

4.2. Access to Freshwater Resources

In the south-west coastal region of Bangladesh, scarcity of freshwater (considering quality, access, and availability) is the primary or most important impact of climate change [47]. Salinity (intrusion) is one of the migration drivers in the coastal areas (particularly in the study areas) of Bangladesh as it affects the lives and livelihoods of the coastal people [48], and by the end of the twenty-first century water is probably going to be more saline [49]. Salinization in both surface and ground water and the soil in the south-west coastal regions of Bangladesh is one of the major problems noted in this study. This has adverse effects on the agricultural production system, the coastal ecosystem, biodiversity, human health and, overall, on livelihoods. In the coastal areas of Bangladesh, salinity intrusion is a major cause of reduction of freshwater availability and agricultural productivity, which directly impacts on lives and livelihoods in that region [50]. Salinity intrusion is one of the environmental risk factors for the local communities (men and women, ethnic and non-ethnic), which affects their capabilities differently. In the focus group discussions (FGDs), we found insightful information on the prevailing water resources situation of the study area. Based on the FGDs analysis, we outline the following sections on access to water resources to visualize following the question of what is the access to freshwater resources by various social groups (gender and ethnicity) and how the individual freedoms inclined. Women and children in coastal areas of Bangladesh are generally responsible for the household water collection [51]. They are also the primary users of water for the purposes of drinking, cooking food, washing, maintaining the livestock, and personal health and hygiene (washing and cleaning), etc. Only a few (<5%) households have their own ponds in their homestead for domestic washing and cleaning purposes, while most of the people do not have their own ponds. In the dry season, the ponds are dry, have almost no water, and it is muddy. Nonetheless, poor management of the open water sources (ponds, canals, pond sand filters, etc.), high salinity in the water and lack of water resources of appropriate quality are the main problem for the people living in the coastal areas. Women invest long hours carrying heavy pots of water, sometimes they need to wait in a queue to fetch the water because of the scarcity of freshwater (for drinking) sources. As shown in Table 2, Munda women regularly have to walk up to 5 (five) km while non-ethnic women walk up to 3 (three) km to the nearest water source, which is physically stressful and often results in chronic pain and related problems. In some cases, women and adolescent girls are also harassed by boys and men while on their journey to collect drinking water. Male members of a family only engage themselves in collecting water when the women in their family are ill, although in the rainy season they preserve rainwater from the roof. Excessive rainfall in the rainy season also triggers flooding of the natural water sources (e.g., the ponds), which declines the water quality by contaminating saline water in the ponds.

In comparison to gender and ethnicity, men from the ethnic community have no fresh water source available within the household except the rainwater harvesting (preserved/collected rainwater), while men from the non-ethnic community have available water sources such as ponds, pond sand water (PSF), a deep tube well, etc. Nevertheless, women in the ethnic community have less access to water resources compared to women from the non-ethnic community.

Table 2. Access to freshwater resources.

Gender	NON-ETHNIC Community	ETHNIC (MUNDA) Community
	Saline water intrusion affects availability of fresh water	
	Salinity increasing and fresh water sources decreasing in volume, impacting agriculture and fisheries	Salinity increasing which affects not just their livelihoods but also health condition (health and nutrition problems)
MEN	Few fresh water sources are available, but not enough for small scale irrigation for agriculture and vegetable production	No fresh water sources (tube well, pond sand filter, fresh water pond) available within the community for daily lives except rain water harvesting tank and ponds
	Ponds dry earlier, even long before the rainy season	
	Water availability for agricultural production is a major problem along with drinking water	Fresh water shortage for drinking and daily uses
	Men from the family usually do not carry water. Men carry water when women are ill or not present in the household	
	Women are responsible for collecting water and cooking food, washing, etc.	
	Comparatively have more access to water resources because of the community dominance (considering main and large community)	Comparatively less access to water resources due to ethnic isolation (small and isolated communities)
	Freshwater collection points are within the traditional community (large area)	Freshwater collection points are within the ethnic community (clustered in a small area)
	Women walk 1–3 km to collect drinking water	Women walk 2–5 km to collect drinking water
WOMEN	A few (5–7%) households in the community have improved water resources (tap water supply driven by solar water pump installed by NGOs)	No household has access to improved water systems
	Women usually spend up to 3 h daily collecting water	Women usually spend more than 3 h daily collecting water
	Use pond/river/canal water for washing purposes	
	Harvest rainwater, which they use in the next 2–4 months as drinking water	Harvest rainwater, which they use in the next 1–2 months as drinking water

4.3. Women Participation in Decision Making

Women's status in the family and community is an important social feature often measured through their participation and decision-making ability. Better status (social, economic, health, etc.) of women helps them to actively participate in economic activities, manage the household and reduce the vulnerability and risk of climate change and disasters. It also helps them with disaster preparedness, planning, coping, and adaptation to climate change. This study finds that women with better status even in the poor and uneducated households have better socio-cultural understanding and try to send their children to school for education. At the same time, we find that the women have limited engagement in the community forums, while men have greater involvement and decision-making power in community. Thus, men in traditional communities are likely to have more influence over planning and decision making from the family to the local governance promoting policies and programs that may not support women's rights and priorities or that of ethnic minorities. Our data shows that women (15%) who are employed and are an earning family member have a comparatively stronger voice within families and are often also interested in participating in the community level decision-making process. Yet, in most cases, we find women are less likely to participate in the community and institutional decision-making process. While most of the women in these communities have traditional knowledge that can inform adaptation efforts and climate change- and disaster-related information and communication. Obviously, both new and old information is important in the context of adaptation to climate change.

The analysis of the collected information from the interviewed women groups in the ethnic and non-ethnic communities demonstrates that women are under-represented in decision making, especially in terms of financial assets within the family and also in the community. Specifically, women's participation in planning and decision making for water management and disaster preparedness within a community, and even within a larger forum, is negligible (33%) in the case study communities.

Women, mainly from the non-ethnic community, report that there are also family disputes which badly affect their livelihoods since they do not have much negotiation power inside a family. There is almost no freedom for a woman (both in the ethnic and non-ethnic communities) to participate in social organizations (such as social welfare, cultural and religious institutions, etc.) and to contribute to a community at large without prior permission from a male member of a family, which has, on the other hand, reduced the expansion of women's capability.

In the ethnic minority group (Munda), women have more power to participate in the family level decision making process. In fact, a lot of ethnic households tend to adopt a female-led system where women eventually dominate family decision making due to a very passive role of male, who sometimes have fewer chances to find jobs and are prone to alcoholism. Yet, outside the family circles ethnic women still face the same problems as other women (non-ethnic) do: the social pressure for women to collect water in quite unfavorable conditions impacts the social status of women (because they are women and from the ethnic community). The decision-making power in ethnic households in general is complicated by the absence of any land and the predetermined lower social status of these communities. Thus, ethnic people rarely get any chance to enter any social organization and are heavily under-represented in the study areas. This is noticeable that they have no representation in the election of the local government. They have little participation in the school committee and other social and religious institutions where the majority of non-ethnic people participate. We find some exceptional cases in terms of participation in the NGOs (non-governmental organizations) activities, where ethnic and non-ethnic people have been provided similar opportunities to form committees and take part in the decision-making process within the study areas. Yet, ethnic minorities rarely show up (raise their voice) themselves in the committees when it comes to decision-making issues. One important issue noticed while discussing decision making is that women in the non-ethnic minority have a lack of confidence to make a decision on their own; rather, they depend on the male members in the family to come and make the decision in any family matters.

4.4. Freedom of Mobility and Migration

As climate change exacerbates the already precarious situation in coastal areas in Bangladesh [52–54], the question of whether it is possible to adapt successfully becomes vital. Migration is seen as one of the most promising adaptation options by outside observers [55–57]. Here, the study found the realistic migration opportunities (seasonal/temporary) from the point of view of the local people. As in the previous sections, genders and ethnic groups were differentiated to uncover cultural and social conditions that may inhibit this adaptation option. Given the perspectives discussed in Sections 4.1–4.3, the study further reflect on whether freedoms of choice in Sen's sense can be exercised at all.

Table 3 shows clearly that people of the Munda community in general have limited migration opportunities because of their language and culture. Typically, Munda men seasonally migrate in large groups for agricultural activities in other parts of the country and to some extent in construction works (brick kilns), because this gives them a degree of safety (as they are in groups). From the (migrated) group, they send one member from the group to their village to take money for all their families, and to bring news of them. There is a stark contrast here with the non-ethnic men, who have a much better social network, can migrate individually, and who have a much wider array of jobs open to them, as well as higher wages.

Table 3. Decision-making power of women in traditional and ethnic communities.

Gender	NON-ETHNIC Community	ETHNIC (MUNDA) Community
MEN	Final decision made by a man (if man is present)	It depends on the family: if women are educated and men are illiterate, then women make decisions
	Income- and expenditure-related decisions are made by a man in the family (if present)	Men and women jointly make financial decisions
	Men are the bread-earners in the family and dominate the decision-making process	Both men and women earn and make decision jointly
WOMEN	Have no/less income (fish fry collection, seasonal labor, etc.) and has less voice in any decision making	Own income source (mostly day labor). Often a woman is the bread-earner in the family
	Even women-headed household delegate decision to man in the family (e.g., an older son in the family)	Both men and women earn and make decision jointly but sometimes women dominate the decision-making process
	No own savings (except for women who have access to microcredit facilities)	
	Men of the family make investment decisions	Men and women both make investment decisions
	Women keep the cash/ income of the family	
	Women have less influence in household decisions regarding sale/purchase of belongings and assets	Women have more influence in household decisions regarding sale/purchase of belongings
	Women's opinions are less valued in the family and community	Women's opinions are highly valued in the family and but less in the community

Table 4 shows that the women (of both ethnic and non-ethnic communities) face many cultural prohibitions and lack access to information and services, which all impose restrictions on mobility. Indeed, women have comparatively little representation in any income-generating activities outside of their own homesteads, which is mostly linked to their limited or restricted mobility. There are social and cultural limitations for women of both groups, but particularly for non-ethnic women; employment outside their household is not widely socially acceptable. However, the tradition is changing and we find some poor and marginalized women, particularly among the Munda, working together with men outside of the home in both the agricultural and off-farm sector. These are often women heads of households who have been widowed or abandoned, who have no other option other than to go out and find work to support themselves and their children. Our study finds that, although some women are engaged in diversified employment activities, it is essentially men, and not women, who go for seasonal or temporary migration.

The diversity of livelihood options is vital for the local people in the study area since depending on one employment option is dangerous due to the uncertainty imposed by adverse climate change impacts. A choice to undertake e.g., a seasonal migration is driven by the need to diversify income sources. Temporary and permanent migration is a process shaped by a variety of pull and push factors, a discussion of which is outside the scope of this article. Here we focus on uncovering gender and culture-specific aspects that may hinder or inflate individual freedoms of choice from the perspective of the Sen's capability approach.

There are a number of characteristics that impact individual capability to migrate, as seen from Sen's perspective [26,58]. In particular, on the personal level the majority of the people in the ethnic community have low education levels and do not have the formal qualifications that are required for many occupations and income opportunities. In general, women—both in ethnic and traditional communities often have limited networking and training opportunities for enhancing knowledge in certain areas and to build their capacity. In the patriarchal and Muslim-dominated social system in Bangladesh, women often have limited networking and leadership scope in the society in general. Moreover, their freedom of choice is limited to the extent that they still do not have control over how to spend their earnings, if any, or even their personal mobility. Despite the societal changes in the

recent years many women are still not allowed to leave the house alone. This includes participating in forums and maintaining relationships with individuals and groups. It is obvious that with less access to social networks, and with social stigma associated with not only working outside the home, but even being outside the home, the opportunities for women's migration are extremely limited.

Table 4. Gender and ethnicity characteristics of mobility: invisible ceilings on freedoms.

		NON-ETHNIC Community	ETHNIC (MUNDA) Community
MEN	Education	Bangla (no problem in communication if travel within the country)	Ethnic language, limited to a small community, everyone cannot communicate well in Bangla language.
	Employment	i. No discrimination in wages ii. Diverse sources of income and varieties of work including self-employment iii. Usually, migration is only in agricultural off seasons	i. Discrimination in wages and labor distribution on the basis of ethnicity ii. Mostly sell their labor on a daily basis to seasonal agriculture and fisheries activities iii. Can migrate all year round
	Migration	Mostly migrate individually and sometimes seasonal migration often in groups (example: group migration for seasonal labor in brick kilns) Migrate usually for more than half a year and send money through mobile phone banking system	Always migrate in groups (10–20 people in a group). Usually, seasonal migration Send one man from the group to deliver money to families and get feedback on their family situation
	Agriculture	Have land tenure	No land ownership/leased land only
	Access to local governance systems and institutional services	Comparatively more services received because of the dominance and leadership (for example, VGD/vulnerable group feeding for the extreme poor) Good representation in local governmental institutions	Comparatively less services received because of less participation at the institutional level (for example, VGD/ vulnerable group feeding for the extreme poor) No representation in local governmental institutions (union councils, sub-districts, etc.)
	Network	Rich local network and social ties in neighboring cities, also across the entire country	Only local network and social ties with the same ethnic groups in other sub-districts
	Security	Free to mix with everyone and migrate individually	Socially suppressed, afraid to be alone, migrate within a large group
	Share of pursuing seasonal or permanent migration	Large and permanent	Small and seasonal
		NON-ETHNIC Community	ETHNIC (MUNDA) Community
WOMEN	Education	No language problem and schooling rate is higher than in ethnic women	Language problem, not familiar with Bangla. Schooling rate is lower than non-ethnic women
	Employment	i. Gender discrimination in wages and labor distribution ii. More sources of income and varieties of work than ethnic women, including self-employment	i. Ethnic and gender discrimination in wages and labor distribution ii. Mostly selling their labor on a daily basis to seasonal agriculture and fisheries activities
	Migration	Temporary migration to the cities as household workers and garments factories	Women migrate only in cases of full family permanent migration
	Agriculture	Their families have land tenure and women do homestead agriculture (home gardening)	Mostly live on leased and charity land (given by faith based organization) and have limited home-garden opportunities
	Access to institutional services	Have institutional access and leadership representation (in the local government institutions)	Limited and almost no institutional access and representation (in the local government institutions)
	Network	Rich local network and social ties in neighboring cities, also across the entire country	Only local network (within the community) and social ties with the same ethnic groups in other sub-districts (upazila)
	Security	Women feel more secure because of large community networks	Women feel less secure or insecure because of isolated community, socially suppressed

5. Conclusions and Recommendation

This study addresses the gap by assessing perceptions of climate change issues, freedom of choices, and adaptation options of various social groups differentiated by inter-

sectionality, gender and ethnicity, among the poorest southwest coastal communities in Bangladesh. This study has shown that there are significant differences considering gender and their ethnic identity. Women from both ethnic and non-ethnic communities are comparatively more vulnerable in the study areas of the southwest coastal sub-districts. They are living in different geo-physical settings and socio-economic conditions. They have a low level of literacy, less access to health systems, high unemployment, high rates of poverty, and experience significant negative impacts of climate change on their lives and livelihoods. Compared to men, women have less participation in decision making and less access to mobility and information. However, it is always important to have balanced representation of people at all levels of decision-making processes that guarantees better government and unique perspectives [59]. Mobility is also inversely correlated with vulnerability (Figure 1): lack of mobility makes people vulnerable and exposed to climate change impacts [1]. The result of this study shows that the vulnerability to climate change stresses may vary because of the gender and ethnicity of the individuals. The adaptive capacity is also an issue for these individuals since the ability to adapt depends on wealth, social status, and power (and networking) and wealth. Access to resources and opportunities and freedom in decision making in the context of CC adaptation at the family and community level requires information and communication at all levels, which is limited for women (in both ethnic and non-ethnic people) in the coastal region of Bangladesh.

More research is needed to understand how combined gender and ethnic differences may amplify the inability to develop a longer-term climate adaptation strategy mainly in the similar context within the country; this may shed light on the barriers to climate change adaptation [60] and break the positive feedback in trapped populations. Very often studies on climate change impacts assume that if conditions become unlivable, then climate-driven forced migration is to be expected. However, this study also reveals that there are layers of issues (gender and ethnic differences in decision making, freedom to have their own choice, etc.) which can prohibit planned relocation (migration) and leave the whole community trapped in unfavorable environments. Furthermore, better understanding of gender and ethnic barriers can provide underlying conditions such as which section of the population is actually able to undertake migration as an adaptation option.

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References

1. Intergovernmental Panel on Climate Change. In *Climate Change 2014—Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects: Volume 1, Global and Sectoral Aspects: Working Group II Contribution to the IPCC Fifth Assessment Report*; Cambridge University Press: Cambridge, UK, 2014.
2. Groupe D'experts Intergourvernemental sur l'éVolution du Climat. Working Group II. and Intergovernmental Panel on Climate Change. In *Climate Change 2007—Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Fourth Assessment Report of the IPCC*; Cambridge University Press: Cambridge, UK, 2007.

3. Pörtner, H.-O.; Roberts, D.; Tignor, M.; Poloczanska, E.; Mintenbeck, K.; Alegría, A.; Craig, M.; Langsdorf, S.; Löschke, S.; Möller, V.; et al. Cities, Settlements and Key Infrastructure. In *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*; IPCC: Geneva, Switzerland, 2022.

4. Singh, A.; Svensson, J.; Kalyanpur, A. The State of Sex-disaggregated Data for Assessing the Impact of Climate Change. *Procedia Environ. Sci.* **2010**, *1*, 395–404. [CrossRef]

5. Arora-Jonsson, S. Virtue and vulnerability: Discourses on women, gender and climate change. *Glob. Environ. Chang.* **2011**, *21*, 744–751. [CrossRef]

6. Alston, M. Gender mainstreaming and climate change. *Womens. Stud. Int. Forum* **2014**, *47*, 287–294. [CrossRef]

7. Dasgupta, S.; Kamal, F.A.; Khan, Z.H.; Choudhury, S.; Nishat, A. River salinity and climate change: Evidence from coastal Bangladesh. In *World Scientific Reference on Asia and the World Economy*; World Scientific: Singapore, 2015; pp. 205–242.

8. Pearse, R. Gender and climate change. *Wiley Interdiscip. Rev. Clim. Chang.* **2017**, *8*, e451. [CrossRef]

9. Cannon, T. Gender and climate hazards in Bangladesh. *Gend. Dev.* **2002**, *10*, 45–50. [CrossRef]

10. Skutsch, M.; Roehr, U.; Alber, G.; Rose, J.; van der Heul, R. Mainstreaming Gender into the Climate Change Regime. *COP 10 of UNFCCC at Buenos Aires*, 14 December 2004.

11. Aberman, N.L.; Ali, S.; Behrman, J.; Bryan, E.; Davis, P.; Donnelly, A.; Gathaara, V.; Koné, D.; Nganga, T.; Ngugi, J. *Climate Change Adaptation Assets and Group-Based Approaches: Gendered Perceptions from Bangladesh, Ethiopia, Mali, and Kenya*. 2015. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2564556 (accessed on 28 April 2022).

12. Khan, M.M. *Disaster and Gender in Coastal Bangladesh: Women's Changing Roles, Risk and Vulnerability*; Springer Nature: Berlin, Germany, 2022.

13. Briar, C. In search of gender-sensitive concepts and measures of poverty, inequality and well-being. *Soc. Policy J. N. Z.* **2000**, *14*, 17–29.

14. UNFCCC Secretariat. Dimensions and examples of the gender-differentiated impacts of climate change, the role of women as agents of change and opportunities for women. In *United Nations Framework Convention on Climate Change (UNFCCC)*; United Nations: New York, NY, USA, 2022.

15. Aguilar, L.; Araujo, A.; Quesada-Aguilar, A. Gender and climate change. IUCN (International Union for the Conservation of Nature) Fact Sheet. Available online: https://lib.icimod.org/record/13783/files/1337.pdf (accessed on 28 April 2022).

16. Akter, T. *Climate Change and Flow of Environmental Displacement in Bangladesh*; Centre for Research and Action on Development: Dhaka, Bangladesh, 2009.

17. Terry, G. *Climate Change and Gender Justice*; Practical Action Publishing: Rugby, UK, 2009.

18. Masika, R. *Gender, Development, and Climate Change*; Oxfam: Oxford, UK, 2002.

19. Shameem, M.I.; Momtaz, S.; Kiem, A.S. Local perceptions of and adaptation to climate variability and change: The case of shrimp farming communities in the coastal region of Bangladesh. *Clim. Chang.* **2015**, *133*, 253–266. [CrossRef]

20. Huq, H.; Easher, T.H. Coastal Water: Wisdom, Destruction, Conflicts and Contestation–A Case of Southwest Coastal Region of Bangladesh. In *Coastal Environments*; IntechOpen: London, UK, 2021; p. 21.

21. Hossain, M.S.; Dearing, J.A.; Rahman, M.M.; Salehin, M. Recent changes in ecosystem services and human well-being in the Bangladesh coastal zone. *Reg. Environ. Chang.* **2016**, *16*, 429–443. [CrossRef]

22. Kabir, J.; Cramb, R.; Alauddin, M.; Gaydon, D.S.; Roth, C.H. Farmers' perceptions and management of risk in rice/shrimp farming systems in South-West Coastal Bangladesh. *Land Use Policy* **2020**, *95*, 104577. [CrossRef]

23. Dasgupta, S.; Wheeler, D.; Ghosh, S. Fishing in Salty Waters: Poverty, Occupational Saline Exposure, and Women's Health in the Indian Sundarban. *J. Manag. Sustain.* **2021**, *12*, 1. [CrossRef]

24. Islam, M.M.; Sallu, S.; Hubacek, K.; Paavola, J. Vulnerability of fishery-based livelihoods to the impacts of climate variability and change:Insights from coastal Bangladesh. *Reg. Environ. Chang.* **2014**, *14*, 281–294. [CrossRef]

25. Luetz, J. Climate Change and Migration in Bangladesh: Empirically Derived Lessons and Opportunities for Policy Makers and Practitioners. In *Limits to Climate Change Adaptation*; Filho, W.L., Nalau, J., Eds.; Springer International Publishing: Cham, Switherland, 2018; pp. 59–105.

26. Assaduzzaman, M.; Filatova, T.; Coenen, F.; Lovett, J. Freedom of choice to migrate: Adaptation to climate change in Bangladesh. *Int. J. Sustainable Dev. World Ecol.* **2020**, *27*, 652–661. [CrossRef]

27. Evertsen, K.F.; van der Geest, K. Gender, environment and migration in Bangladesh. *Clim. Dev.* **2020**, *12*, 12–22. [CrossRef]

28. Kartiki, K. Climate change and migration: A case study from rural Bangladesh. *Gend. Dev.* **2011**, *19*, 23–28. [CrossRef]

29. Ahmed, I.; Ayeb-Karlsson, S.; van der Geest, K.; Huq, S.; Jordan, J.C. Climate change, environmental stress and loss of livelihoods can push people towards illegal activities: A case study from coastal Bangladesh. *Clim. Dev.* **2019**, *11*, 907–917. [CrossRef]

30. Islam, M.R.; Hasan, M. Climate-induced human displacement: A case study of Cyclone Aila in the south-west coastal region of Bangladesh. *Nat. Hazards* **2016**, *81*, 1051–1071. [CrossRef]

31. Mallick, B.; Siddiqui, T. Disaster-Induced Migration and Adaptation Discourse in Bangladesh. In *Environmental Change, Adaptation and Migration: Bringing in the Region*; Hillmann, F., Pahl, M., Rafflenbeul, B., Sterly, H., Eds.; Palgrave Macmillan: London, UK, 2015; pp. 164–185.

32. Ayeb-Karlsson, S.; van der Geest, K.; Ahmed, I.; Huq, S.; Warner, K. A people-centred perspective on climate change, environmental stress, and livelihood resilience in Bangladesh. *Sustain. Sci.* **2016**, *11*, 679–694. [CrossRef]

33. Tunstall, S.; Tapsell, S.; Green, C.; Floyd, P.; George, C. The health effects of flooding: Social research results from England and Wales. *J. Water Health* **2006**, *4*, 365–380. [CrossRef]

34. Spring, Ú.O. Gender and Disasters: Human, Gender and Environmental Security. Available online: http://collections.unu.edu/eserv/UNU:1875/pdf3915.pdf (accessed on 26 November 2022).

35. Hunter, L.M.; Luna, J.K.; Norton, R.M. The Environmental Dimensions of Migration Annu. *Rev. Sociol.* **2015**, *41*, 377–397.

36. Alkire, S. Measuring freedoms alongside wellbeing. In *Wellbeing in Developing Countries: From Theory to Research*; Gough, I., Ed.; Cambridge University Press: Cambridge, UK, 2007; pp. 93–108.

37. Sen, A. *Development as Freedom*; OUP Oxford: Oxford, UK, 2001.

38. Sen, A. *The Standard of Living: Lecture I, Concepts and Critiques*; Cambridge University Press: Cambridge, UK, 1987.

39. Robeyns, I. The Capability Approach: A theoretical survey. *J. Hum. Dev. Altern. Econ. Action* **2005**, *6*, 93–117. [CrossRef]

40. Biggeri, M.; Karkara, R. Transforming children's rights into real freedom: A dialogue between children's rights and the capability approach from a life cycle perspective. In *Children's Well-Being: Indicators and Research*; Springer: Dordrecht, The Netherlands, 2014; pp. 19–41.

41. Weckroth, M.; Ala-Mantila, S. Socioeconomic geography of climate change views in Europe. *Glob. Environ. Chang.* **2022**, *72*, 102453. [CrossRef]

42. Yohe, G.; Schlesinger, M. The economic geography of the impacts of climate change. *J. Econ. Geogr.* **2002**, *2*, 311–341. [CrossRef]

43. Markkanen, S.; Anger-Kraavi, A. Social impacts of climate change mitigation policies and their implications for inequality. *Clim. Policy* **2019**, *19*, 827–844. [CrossRef]

44. Roy, M.; Venema, H.D. Reducing risk and vulnerability to climate change in India: The capabilities approach. *Gend. Dev.* **2002**, *10*, 78–83. [CrossRef]

45. Khatun, T. *Gender-Related Development Index for 64 Districts of Bangladesh*; Centre for Policy Dialogue: Dhaka, Bangladesh, 2002.

46. Alam, M.Z.; Carpenter-Boggs, L.; Mitra, S.; Haque, M.; Halsey, J.; Rokonuzzaman, M.; Saha, B.; Moniruzzaman, M. Effect of Salinity Intrusion on Food Crops, Livestock, and Fish Species at Kalapara Coastal Belt in Bangladesh. *J. Food Qual.* **2017**, *2017*, 2045157. [CrossRef]

47. Sherin, V.R.; Durand, F.; Papa, F.; Islam, A.S.; Gopalakrishna, V.V.; Khaki, M.; Suneel, V. Recent salinity intrusion in the Bengal delta: Observations and possible causes. *Cont. Shelf Res.* **2020**, *202*, 104142. [CrossRef]

48. Chen, J.; Mueller, V. Coastal climate change, soil salinity and human migration in Bangladesh. *Nat. Clim. Chang.* **2018**, *8*, 981–985. [CrossRef]

49. Clarke, D.; Williams, S.; Jahiruddin, M.; Parks, K.; Salehin, M. Projections of on-farm salinity in coastal Bangladesh. *Environ. Sci. Process. Impacts* **2015**, *17*, 1127–1136. [CrossRef]

50. Afroz, T.; Alam, S. Sustainable shrimp farming in Bangladesh: A quest for an Integrated Coastal Zone Management. *Ocean Coast. Manag.* **2013**, *71*, 275–283. [CrossRef]

51. Mallick, B.; Roldan-Rojas, L.F. Social stratification in the drinking water scarcity context: Empirical evidence of coastal Bangladesh. *Am. J. Water Resour.* **2015**, *3*, 92–99. [CrossRef]

52. Kabir, R.; Khan, H.T.A.; Ball, E.; Caldwell, K. Climate Change Impact: The Experience of the Coastal Areas of Bangladesh Affected by Cyclones Sidr and Aila. *J. Environ. Public Health* **2016**, *2016*, 9654753. [CrossRef] [PubMed]

53. Alam, E.; Momtaz, S.; Bhuiyan, H.U.; Baby, S.N. Climate Change Impacts on the Coastal Zones of Bangladesh: Perspectives on Tropical Cyclones, Sea Level Rise, and Social Vulnerability. In *Bangladesh I: Climate Change Impacts, Mitigation and Adaptation in Developing Countries*; Islam, M.N., van Amstel, A., Eds.; Springer International Publishing: Cham, Switherland, 2018; pp. 145–166.

54. Ahmed, S.; Eklund, E. Climate change impacts in coastal bangladesh: Migration, gender and environmental injustice. *Asian Aff.* **2021**, *52*, 155–174. [CrossRef]

55. Gemenne, F.; Blocher, J. How can migration serve adaptation to climate change? Challenges to fleshing out a policy ideal. *Geogr. J.* **2017**, *183*, 336–347.

56. Hossain, B.; Shi, G.; Ajiang, C.; Sarker, M.N.I.; Sohel, M.S.; Sun, Z.; Yang, Q. Climate change induced human displacement in Bangladesh: Implications on the livelihood of displaced riverine island dwellers and their adaptation strategies. *Front. Psychol.* **2022**, *13*, 964648. [CrossRef] [PubMed]

57. Jha, C.K.; Gupta, V.; Chattopadhyay, U.; Sreeraman, B.A. Migration as adaptation strategy to cope with climate change. *Int. J. Clim. Chang. Strateg. Manag.* **2018**, *10*, 121–141. [CrossRef]

58. Eichsteller, M. Migration as a Capability: Discussing Sen's Capability Approach in the Context of International Migration. *Soc. Incl.* **2021**, *9*, 174–181. [CrossRef]

59. European Commission; Directorate-General for Employment; Industrial Relations; Social Affairs. *Women in Decision-making: Panorama of Activities in the Framework of the Third Medium-term Community Action Programme on Equal Opportunities for Women and Men (1991–95)*; Office for Official Publications of the European Communities: Luxembourg, 1997.

60. Mersha, A.A.; Van Laerhoven, F. A gender approach to understanding the differentiated impact of barriers to adaptation: Responses to climate change in rural Ethiopia. *Reg. Environ. Chang.* **2016**, *16*, 1701–1713. [CrossRef]