Local responses to climate-related non-economic losses and damages

A case study in Burigoalini and Gabura Unions, Southwest Bangladesh

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Working Paper
October 2022

Climate change; poverty

Keywords:
Loss and damage, Bangladesh, climate change adaptation, local communities, climate resilience

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International Centre for Climate Change and Development

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Acknowledgements

Saleemul Huq and various International Climate Change and Development (ICCCAD) colleagues greatly assisted in the planning, execution and analysis of this research. Numerous members of the Loss and Damage Collaboration gave their unique perspectives on the research, which greatly helped formulate the right questions. Ina Lehmann, assistant professor at Vrije Universiteit Amsterdam, gave comprehensive feedback during the entire research process. We are immensely grateful for the assistance of these individuals and organisations; without them this research would not have been possible.

Produced by IIED's Climate Change Group

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Published by IIED, October 2022

van Schie, D, Ranon, RJK, Mirza, AB and Anderson S (2022) Local responses to climate-related non-economic losses and damages: A case study in Burigoalini and Gabura Unions, Southwest Bangladesh. IIED, London.

http://pubs.iied.org/21161iied

ISBN 978-1-83759-003-2

Printed on recycled paper with vegetable-based inks.

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People in Burigoalini and Gabura Unions frequently face climate-related hazards. Adequate measures addressing these hazards are often missing, causing losses and damages. Non-economic losses and damages are items that are not commonly traded in markets (for example, biodiversity and culture). The non-economic losses and damages that people in both unions face were explored under ten categories, followed by an examination of local responses to these impacts. A set of conclusions and recommendations were drawn from the observations made during this study. Topics included are local capacity, gender inequality, and the valuation of non-economic losses and damages.

Contents

Summary

The populations of Burigoalini and Gabura Unions frequently face climate-related hazards; predominantly cyclones, floods, salinity intrusion, riverbank erosion and drought. Adequate adaptation measures are often missing, causing permanent and irreversible losses and damages. Climate change is associated with increases in the frequency and severity of these climate-related hazards, intensifying losses and damages.

Losses and damages can be economic, referring to items that are commonly traded in markets (for example, houses or employment) or non-economic: items that are not commonly traded in markets (such as biodiversity or cultural heritage). Few studies explicitly explore how non-economic losses and damages can be addressed. This is important as climate-vulnerable countries and marginalised people in those countries disproportionately depend on non-economic goods and services. Moreover, the intangibility of many non-economic losses and damages complicates how they are addressed. Therefore, this study has explored how to respond to non-economic losses and damages by examining local responses.

The research started with a literature review on the case study context and non-economic losses and damages. Following this, there were 16 key informant interviews (KIIs) and four focus group discussions (FGDs), to collect qualitative data from the population of Burigoalini and Gabura Union in the Khulna Division. Field notes were conducted throughout the complete field visit. The following ten categories of non-economic losses and damages were used to guide this research: human life, physical health, mental and emotional wellbeing, territory, culture and practices, Indigenous and local knowledge, ecosystem services and biodiversity, social fabric, education, and mobility. The non-economic losses and damages that people in Burigoalini and Gabura Unions face were explored under these categories, followed by an examination of local responses to these impacts.

A multitude of non-economic losses and damages were observed in all ten pre-selected categories, including the following examples:

- Increased exposure to saline water causing hair loss, damage and greasiness
- Increased anxiety due to the perpetual impacts of climate-related hazards
- Decreased ability to grow flowers and trees for religious purposes
- Decreased ability of people in disaster-prone areas to find a partner.

The local people's responses to the observed non-economic losses and damages included:

- Applying henna or shampoo to restore hair
- Increasing disaster preparedness to reduce anxiety
- Using (chemical) fertilisers to maintain the ability to grow flowers and trees
- Migrating to safer areas when preparing for an engagement, for the comfort of a potential wife-to-be.

Such responses as those we observed do not always adequately address the non-economic losses and damages incurred. Indeed, a lack of financial assets and services impede people's ability to respond per se, making it impossible to pay for specific responses such as home-schooling or the restoration of latrine facilities. Minimal services, such as institutions for healthcare or education, mean that the local population is unable to

seek assistance. The local population then has to cope with, rather than adapt to, non-economic losses and damages due to these constraints.

A set of additional conclusions can be drawn from the observations made during this study:

- Women in the research area face more, and more severe, non-economic losses and damages than men
- Gender inequalities in Bangladesh impede women's ability to respond
- The significant differences between unions and cultures observed in this study highlight the context-dependency of non-economic losses and damages.

These conclusions lead to various policy and research recommendations. First, external assistance in addressing non-economic losses and damages is urgently needed. Local populations should be supported by enhancing their financial situation, increasing access to social protection, improving public services and supporting people in current responses. Second, future research should further explore gender inequalities, and non-economic losses and damages in other geographical locations to better understand the extent of non-economic losses and damages and how to address them. Additionally, in both research and policy development, local women and men should be actively involved, to create a complete understanding of non-economic losses and damages and, in turn, to adequately address them.

Finally, this study emphasises that local populations and governments in climate-vulnerable regions should not bear the burden of the increasing impacts of climate-related disasters. Countries of the global North have had a significant role in increasing these climate change impacts. Therefore, they should take responsibility and financially contribute to addressing non-economic losses and damages.

1 Introduction

1.1 Background

The Intergovernmental Panel on Climate Change (IPCC) recently published the assessment report *Climate Change 2022: Impacts, Adaptation and Vulnerability,* which highlights permanent climate change impacts that are already occurring, or will occur, in the short- and long-term future (Anisimov et al., 2022; IPCC, 2022). Climate change impacts ensue because of insufficient mitigation and adaptation measures. Countries of the global North have failed to mitigate their greenhouse gas emissions; this intensifies the frequency and severity of climate-related disasters (Hickel, 2020; King and Harrington, 2018; Van Aalst, 2006). Countries in Africa, Asia and Latin America are disproportionally affected by these disasters and thus must adapt. But due to a lack of capacity, adequate adaptation is not always possible (Cappelli et al., 2021; King and Harrington, 2018; Warner and van der Geest, 2013). Consequently, permanent and irreversible impacts, such as losses of and damages to houses, agricultural land and lives occur. These impacts are categorised in this paper as **losses and damages** (Tschakert et al., 2019; Warner and van der Geest, 2013).

The topic of losses and damages is becoming increasingly prominent within the international climate policy arena, taking the stand next to mitigation and adaptation (Broberg and Romera, 2021; Calliari et al., 2019; Mechler et al., 2019). Most of the global conversations about losses and damages concern addressing those occurring through financial mechanisms (Mechler and Deubelli, 2021). However, there is much dissatisfaction with the progress of these discussions. Indeed, it has been argued that losses and damages are already occurring and, thus, vulnerable countries urgently need financial and technical support (Anisimov et al., 2022; Huq, 2021; Puig and Roberts, 2021). Nevertheless, it seems that even if a support mechanism can be established, a lack of evidence-based research means that knowledge on how to address losses and damages is missing (Schäfer et al., 2019; Warner and van der Geest, 2013).

Filling this knowledge gap is especially pertinent for non-economic losses and damages. First, most evidence-based research on losses and damages focuses on economic impacts. Second, the intangibility of these impacts makes them hard to value, and thus address (Andrei et al., 2014; McNamara et al., 2021; Serdeczny et al., 2016). Crucially, climate-vulnerable countries disproportionately depend on non-economic goods and services (Preston, 2017).

Some case studies do explicitly analyse non-economic losses and damages. For example, Andrei et al. (2014) explored six categories of non-economic losses and damages in coastal Bangladesh, Thomas and Benjamin (2019) analysed national-level responses to this issue in the Caribbean, and McNamara et al. (2021) identified eight categories of non-economic losses and damages in the Pacific Islands, inquiring into how different stakeholder groups would respond to these impacts. However, no case study explicitly analysed how local populations are already addressing non-economic losses and damages.

This study aims to fill this gap by analysing non-economic losses and damages and subsequent responses in Shyamnagar Upazila, an administrative region in coastal Bangladesh, which is frequently cited as one of the most vulnerable regions to climate change (Amin and Shammin, 2022; Huq and Ayers, 2008). This vulnerability stems from frequent climate-related hazards and historic development factors increasing exposure (Paprocki, 2021). The research area overlaps with the case study location chosen by Andrei et al. (2014), with their results providing a baseline for this study. Moreover, as this study examines the same non-

economic losses and damages in these similar research areas, it corroborates and expands on Andrei et al.'s findings. This study also emphasises gendered issues, as climate-related disasters often exacerbate existing inequalities, and gender inequality is prominent in rural Bangladesh (Pearse, 2017; Reggers, 2019).

1.2 Research objective

The following question will be addressed in this paper: **How are different people in Shyamnagar Upazila able to respond to the impacts of climate-driven non-economic losses and damages?**

This study aims to contribute to the knowledge base on non-economic losses and damages by providing a descriptive, thorough and analytical account of how climate-related disasters impact non-economic aspects of people's wellbeing in Shyamnagar Upazila. Moreover, it examines how these individuals and communities are able to respond to these impacts, deepening the understanding of how climate-related disasters affect local populations' wellbeing. This study, being the first one to examine local response to non-economic losses and damages, adds valuable information to the still-insufficient body of evidence-based research on non-economic losses and damages. More evidence-based research is needed because the individuals and communities in Shyamnagar Upazila, who are increasingly affected by climate-related impacts, are struggling to uphold their livelihoods as a result. The context-specific data and insights gained within this research are valuable for policymaking intended to address non-economic losses and damages in Shyamnagar Upazila. Moreover, the results can be generalised to some degree and are therefore relevant for other climate-vulnerable regions.

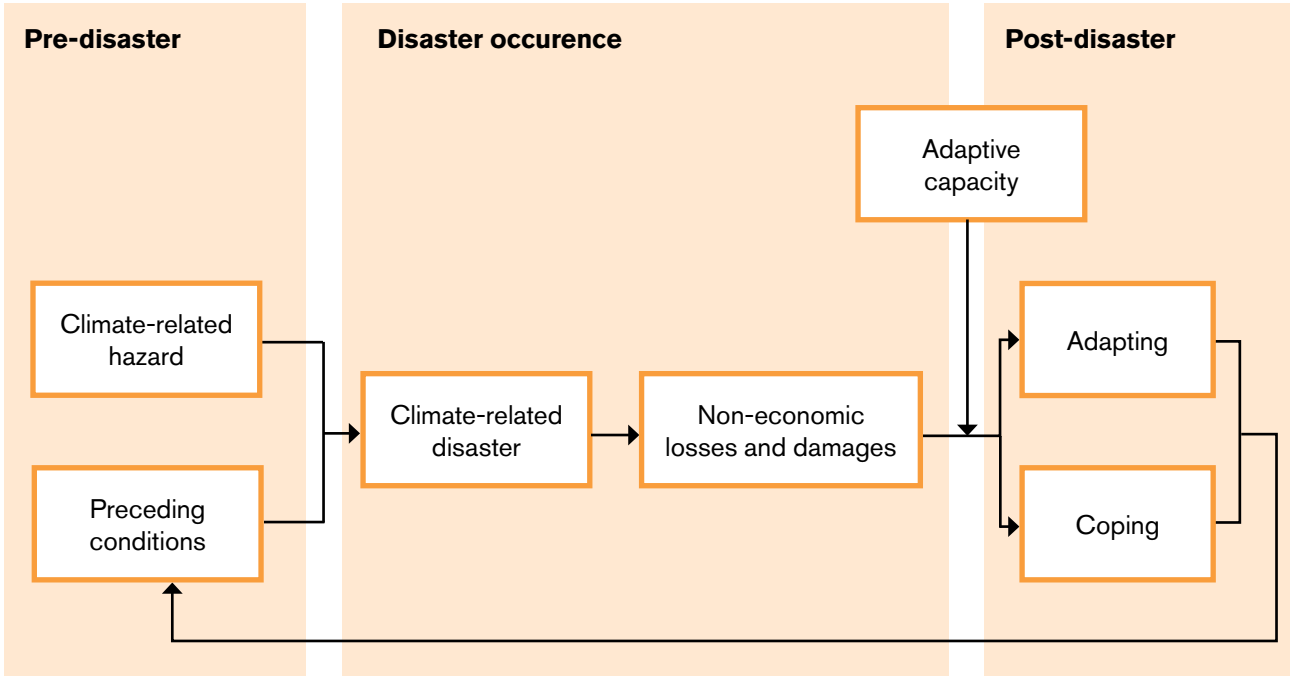
Chapter 2 defines the fundamental concept of this research, while Chapter 3 explains the research methodology and data gathering. Chapter 4 describes the pre-existing conditions and climate-related disasters in Shyamnagar Upazila and Chapter 5 outlines perceived non-economic losses and damages, and subsequent responses. Finally, Chapter 6 contains an analysis of the results, using selected key concepts, and provides recommendations.

2

Conceptual framework

This study follows the framework displayed in Figure 1, which outlines the connections among the main concepts used. It should be noted that this is not a holistic reflection of real-life situations, but a heavily simplified model. The framework consists of three stages of disaster management: pre-disaster, disaster occurrence and post-disaster (Vasilescu et al., 2008). The preceding conditions of the research area determine local populations' vulnerability to climate-related hazards: the sum of the conditions and hazards results in climate-related disasters (Cutter et al., 2008). In turn, when people cannot fully adapt to these disaster impacts, losses and damages occur (Warner and van der Geest, 2013). Losses and damages can be classified as economic or non-economic (United Nations Framework Convention on Climate Change (UNFCCC), 2013); this study focuses on the latter. The response to non-economic losses and damages depends on local populations' adaptive capacity and their ability to recover from and/or cope with disturbances (Monte et al., 2021). Responses can be labelled as adapting or coping (IPCC, 2012; Warner and van der Geest, 2013). Following on from this, the success of the responses determines how local populations can recover and then face future climate-related disasters (Cutter et al., 2008).

Figure 1: The conceptual framework followed in this research



2.1 Climate-related hazards and disasters

A **hazard** can be defined as "the possible action of an event with the potential to cause undesirable consequences to an individual, community, or system in each time and area" (Monte et al., 2021, p7) and represents the potential interaction between humans and natural events (Montz et al., 2017). Phenomena such as cyclones, floods or riverbank erosion are often referred to as natural hazards, with their impacts defined as natural disasters. However, this terminology has been challenged as it ignores anthropogenic influence within these processes. First, human-induced climate change amplifies the frequency and intensity of hazards (Van Aalst, 2006). Second, the hazard is only the point of departure; the exposure and vulnerability of people to hazards plays a significant role in the actual impact (Lavell, 1999; McClean, 2021). Therefore, the terminology used in this research refers to **climate-related hazards and disasters**, explicitly recognising anthropogenic influences on disasters.

2.2 Non-economic losses and damages

Losses and damages arise from climate-related disasters when people cannot adequately adapt to their impacts (Warner and van der Geest, 2013). This study defines losses and damages as the negative impacts of climate change that occur despite mitigation and adaptation efforts (Warner and van der Geest, 2013). This definition differs from descriptions by the UNFCCC, whose activities regarding losses and damages encompass averting, minimising and addressing them (UNFCCC, 2021). This study is based upon the belief that as losses and damages are already occurring, the only option is to address them; averting losses and damages equals mitigation, and minimising losses and damages equals adaptation. Therefore, the focus is on climate impacts that have already transpired.

Losses and damages can be economic and non-economic. Economic losses refer to "the loss of resources, goods and services that are commonly traded in markets" (UNFCCC, 2013, p3), such as the loss of food availability or shelter. Non-economic losses include "losses of items that are not commonly traded in markets" (UNFCCC, 2013, p3), such as loss of biodiversity or cultural heritage. This study focuses on the latter. Incommensurability and context-dependence are two prominent characteristics of non-economic losses and damages (Serdeczny et al., 2016). Incommensurability refers to the fact that no standard unit can measure non-economic items on the same scale, therefore complicating monetary assessments. Context-dependence refers to the fact that non-economic losses and damages emerge during specific human–environment interactions. Therefore, they differ in various environments (Serdeczny et al., 2016).

Several categorisations of non-economic losses and damages can be found in various studies on the topic. Table 1 compares categorisations from previous case studies and shows the prevalence of each category in previous research. First, the categories used by Andrei et al. (2014) have been selected as this report builds on their research. Second, categories used in at least three other studies have been added. Third, the category **mobility** has been added as the field research undertaken for this study has revealed this as a pertinent issue in the research area. Finally, the categories **biodiversity and ecosystem services** have been combined, as the responses for these categories in the study have mostly overlapped. The selected categories are listed and defined in Table 2. This list is not exhaustive; the high context-dependence of and lack of evidence-based research on non-economic losses and damages inevitably means there are experiences that are

Table 1: The categories of non-economic losses and damages impacts reported in various reports. Source: adapted from Serdeczny et al. (2016), enhanced with reports by Tschakert et al. (2019) and McNamara et al. (2021).

UNFCCC (2013)/ FANKHAUSER ET AL. (2014)	MORRISSEY AND OLIVER-SMITH (2013)	ANDREI ET AL. (2014)	TSCHAKERT ET AL. (2019)	MCNAMARA ET AL. (2021)
Loss of life	Loss of life		Human life	
Health	Adverse health impacts	Physical and psychological wellbeing	Physical health	Health and wellbeing
			Mental and emotional wellbeing	
Human mobility/ displacement			Human mobility	
Territory	Territory abandonment		Territory	
			Sense of place	
			Sovereignty	

UNFCCC (2013)/ FANKHAUSER ET AL. (2014)	MORRISSEY AND OLIVER-SMITH (2013)	ANDREI ET AL. (2014)	TSCHAKERT ET AL. (2019)	MCNAMARA ET AL. (2021)
Cultural heritage		Traditions/religion/ customs	Culture, lifestyle, traditions and heritage	Cultural sites and sacred places
Indigenous/local knowledge	Decline of Indigenous knowledge		Knowledge and ways of knowing	Indigenous and local knowledge
Biodiversity	Biodiversity loss	Biodiversity/species	Biodiversity and species	Biodiversity and ecosystem services
Ecosystem services		Ecosystem services	Ecosystem services	
	Destruction of cultural sites			
	Habitat destruction		Habitat	
	Loss of identity and ability to solve problems collectively		Identity	
			Ability to solve problems collectively	
	Loss of knowledge/ ways of thinking that are part of lost livelihood systems			
	Social cohesion, peacefully functioning society	Social bonds/ relations	Social fabric	
		Education		
				Connection to land and sea
				Life-sustaining tools
				Ways of being
				Future ways of being
			Dignity	
			Indirect economic benefits and opportunities	
			Order in the world	
			Productive land	
			Self-determination and influence	

Table 2: The definitions of the pre-selected categories of non-economic losses and damages

	CATEGORY	DEFINITION
1	Human life	"Being alive and living at least as long as the average life expectancy for a given region or population" (Tschakert et al., 2019, p64).
2	Physical health	"The contribution of physical health to overall human well-being" (Tschakert et al., 2019, p63).
3	Mental and emotional wellbeing	"A state of positive well-being contributing to mental health, life satisfaction, coping ability, and overall human well-being" (Tschakert et al., 2019, p63).
4	Territory	"The area of land under the jurisdiction of a state, or that belongs to a particular group of people" (Tschakert et al., 2019, p65).
5	Culture and practices	"Shared practices, narratives and customs that provide meaning and structure to people's everyday life" (Tschakert et al., 2019, p63).
6	Indigenous and local knowledge	"Knowledge that is unique to a particular cultural group or community. It often has strong links with the environment and is valuable as it is often spiritual, cultural and practical and contributes to social cohesion and identity" (Fankhauser et al., 2014, p27).
7	Ecosystem services and biodiversity	"The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (United Nations (UN), 1992, p3) and the benefits humans derive from ecosystems (Millennium Ecosystem Assessment (MEA), 2005). There are four types of services: provisioning, supporting, regulating and cultural. The last three services tend to be non-economic (Fankhauser et al., 2014).
8	Social fabric	"Social bonds and cohesion between individuals, families, and community members" (Tschakert et al., 2019, p63).
9	Education	"The knowledge and development resulting from the process of being educated" (Merriam-Webster, n.d.).
10	Mobility	"The freedom to remain or travel within one's territory" (Tschakert et al., 2019, p63).

2.3 Disaster response

Individuals and communities can respond to non-economic losses and damages to uphold or restore their livelihoods. Livelihoods are the "capabilities, assets, and activities required for a means of living" (Chambers and Conway, 1992, p6). Disaster literature encompasses various concepts concerning response to climate-related disasters. Most of these concepts have no universally accepted definition (Brown and Westaway, 2011; Monte et al., 2021). Therefore, this section outlines key concepts and endorses definitions and relationships from a broad range of sources, creating a framework to understand, analyse and discuss responses.

Adaptive capacity

Adaptive capacity can be defined as "the ability of an individual, community or system to have, develop, and become involved in coping and recovering from disturbances" (Monte et al., 2021). This means it has significant influence over responses to non-economic losses and damages. Cinner et al. (2018) have determined that adaptive capacity consists of the five domains listed in Table 3.

Table 3: Five domains of adaptive capacity, adapted and summarised from Cinner et al. (2018)

DOMAIN	DESCRIPTION
Assets	Individually or publicly owned financial, technological and service resources that people have access to
Flexibility	The diversity of potential response strategies available and the ability to switch between these strategies
Organisation	The ways in which society is organised to enable collective action, cooperation and knowledge sharing
Learning	The capacity to generate, absorb and process new information about climate change
Agency	The power and freedom to mobilise the abovementioned components of adaptive capacity

A critique of the concept of adaptive capacity is that it tends to ignore social vulnerabilities and inequalities due to factors like unequal resource distribution, asymmetries in access to information, and conflicts over power (Mayer, 2019; Sen, 2000). Therefore, when analysing non-economic losses and damages, it is essential to look at individuals within communities instead of taking a normative perspective: a community can be deemed resilient as a whole while minorities within the overall group are nonetheless vulnerable.

Adapting and coping

Responses to non-economic losses and damages can include coping and adapting, and as Warner and van der Geest (2013) state, adaptation, in the context of losses and damages, refers to longer-term responses to more gradual changes, while coping refers to short-term responses to the impacts of sudden events. The IPCC (2012) makes a similar observation, asserting that adapting focuses on learning and reinvention, while coping focuses on the moment, constraint and survival. This distinction is further developed in Table 4.

The IPCC (2012) also notes a discrepancy in how people perceive coping. Some scholars refer to coping as a way to engage local people and utilise Indigenous and local knowledge (Twigg, 2004). Others critique this idea, stating that it diverts attention from addressing structural problems (Davies, 1993) and leads to "a focus on 'surviving' instead of 'thriving'" (IPCC, 2012, p51).

Adger et al. state that "the success of an adaptation strategy or adaptation decision depends on how that action meets the objectives of adaptation, and how it affects the ability of others to meet their adaptation goals" (2005, p78). This means that a response is successful when it fully recovers a loss. Additionally, it is essential to look beyond a normative understanding of success when judging if an adaptation is successful, as an action for one individual or community may not be perceived as successful by another (Adger et al., 2005). Two important elements in the concept of climate adaptation are transformational adaptation and maladaptation. Transformational adaptations are responses that invoke a "qualitative shift in the fundamental attributes of natural and human systems to enable adaptation, often including structural change" (Kuhl et al., 2021, p452). These can be regarded as responses that successfully address non-economic losses and damages. On the other hand, maladaptation refers to interventions that make local communities more vulnerable to climate change and thus worsen their conditions (Schipper, 2020). Thus, these interventions should be minimised.

Table 4: Distinction between coping and adapting, adapted and summarised from IPCC (2012).

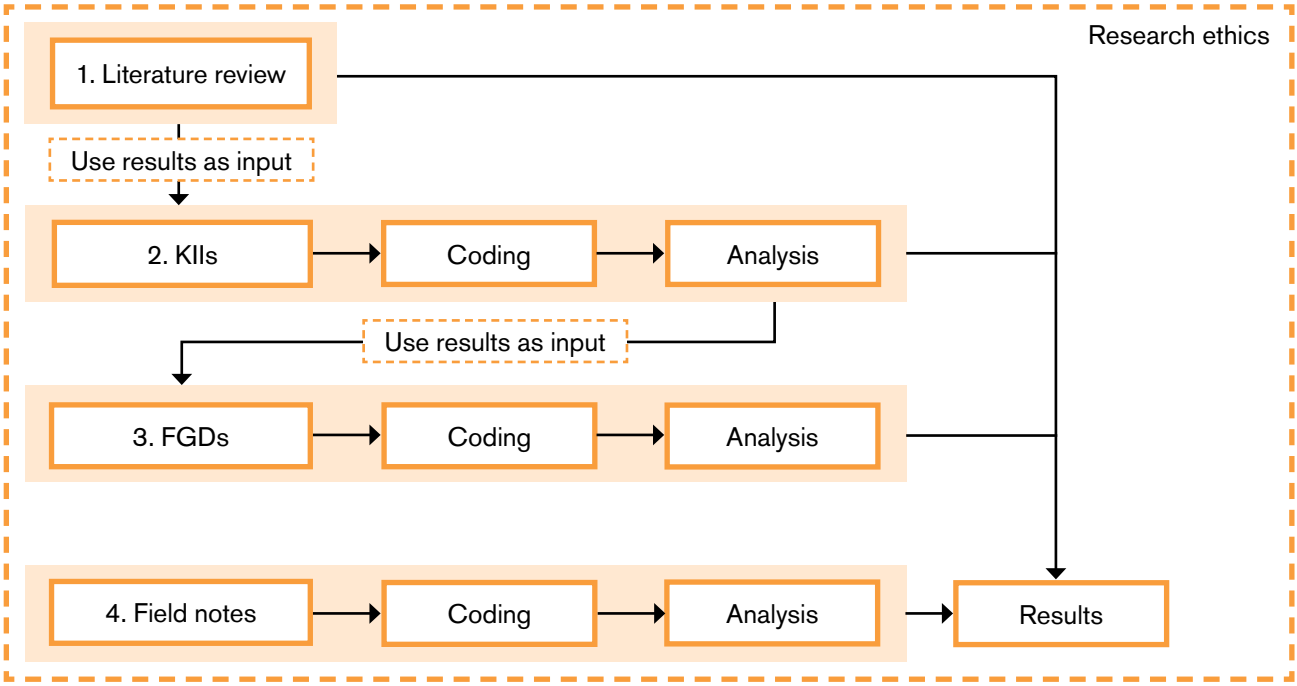
	COPING	ADAPTING
Exigency	Resources are taxed	No reference to resource limitations
Constraint	Actors are constrained by available knowledge, experience and assets	Actors are constrained by assumptions regarding future resource availability
Reactivity	Basic welfare and human security are protected	Change is proactively anticipated and addressed
Orientation	This refers to past events that shape current conditions	There is a focus on future conditions and strategies

3 Methodology

This study has utilised several qualitative data collection methods (Figure 2) to explore non-economic losses and damages and subsequent responses in the Burigoalini and Gabura Unions (the latter of which is the smallest rural administrative and local government unit in Bangladesh (Khan, n.d.)) in Shyamnagar Upazila, the Satkhira District, Southwest Bangladesh. These two unions were selected for the research due to their socioeconomic vulnerability and high susceptibility to climate-related hazards (Didar-Ui Islam et al., 2015). Three villages were selected per union to gather information from different geographical locations within each union itself. Differences in results between these villages were not compared. The village selection process was primarily motivated by the need to avoid research fatigue: to ensure that the participants would be motivated to participate and to avoid project bias.[1] We selected villages based on religions, as these can heavily differ per village and we wanted to ensure that Muslim, Hindu and Munda people (the latter of whom are an Indigenous group located in specific regions in India and Bangladesh) could be consulted.

Primary data was required due to the absence of secondary data on non-economic losses and damages in Shyamnagar Upazila. Using secondary data would have resulted in generalisations derived from studies in different unions (Ritchie and Lewis, 2003). Due in particular to the context-dependence of non-economic losses and damages, this would have been inaccurate.

Figure 2: Triangulation of methods



1 The term 'project bias' captures the phenomena of rural research becoming linked to networks of urban–rural contacts, resulting in a high volume of research being done in a select few areas (Chambers, 1983).

A literature review was conducted to understand the non-economic losses and damages in the research area. After this, key informant interviews (KIIs) and focus group discussions (FGDs) were conducted during visits to the selected locations. Field notes were taken during the visits. Exclusively qualitative methods were chosen because the rigidity of quantitative methods would not have allowed participants to freely voice their opinion, which was essential given the explorative nature of this study. The field research was conducted in May 2022.

3.1 Research ethics

A researcher's background affects how they construct thoughts, formulate questions and filter information, affecting the findings and conclusions of the study (Berger, 2015). The cultural gap between the lead author of this study, who was raised and educated in the Netherlands, and the participants was significant. Therefore, reflexivity and positionality were contemplated prior to conducting this study. Moreover, Bangladeshi researchers have been widely consulted throughout the research to ensure cultural sensitivity of the research design and execution.

Several measures were taken to minimise potential harm to participants, as research in disaster-prone areas can cause this when addressing sensitive topics and soliciting their time and energy (Mena and Hilhorst, 2021; Pacheco-Vega and Parizeau, 2018). First, participants were informed of the research topics, with researchers emphasising that they did not have to answer all questions. Before addressing sensitive topics, such as losses of lives or mental health, participants' comfort levels were re-checked. Second, all sessions were planned according to the participants' time preferences. Third, to ensure that the time spent by participants was worthwhile, a decision was taken for the research to be presented to policymakers and researchers who might be able to influence issues voiced by local communities.

Writing with, rather than about, participants can be practised to redress concerns about differences in representation and marginalisation (Sultana, 2007). This principle led the researchers to ask participants how they experienced the interview, if they wanted to add anything and also how they wanted to be represented within the study. These views were considered when composing the results, discussion and conclusion sections in order to adequately represent participants' voices within this study.

3.2 Literature review

For each key theme of the study, literature was consulted to gather information on how non-economic losses and damages may arise within the research area. This was summarised in an overview (Appendix 1), which served as the baseline understanding for constructing the KIIs. Additionally, findings from the literature were used to further validate the findings from the field research on losses and damages.

3.3 Key informant interviews

The structure of the interviews (Appendix 2) was threefold. Each KII started with a short questionnaire (Appendix 3) on the perceived climate-related hazards. One or two questions were asked to gather the impacts within each category of non-economic losses and damages, after which a follow-up question was asked to explore existing responses to the observed impacts (Appendix 4). The approach of the KIIs was deductive, as a predefined set of categories was used. It was also inductive, as the impacts and responses were freely explored (Morse, 2012). Multiple autochthonous researchers from Bangladesh reviewed all materials to ensure cultural fit.

The main parameters for participant selection were (1) religion, (2) occupation, (3) gender, (4) age, (5) residence and (6) the length of time they had been living in the village. Muslim, Hindu and Munda people were interviewed. More Muslim participants were selected due to the high prevalence of Islam in the research area (Bangladesh Bureau of Statistics (BBS), 2014) and women and men were equally split to ensure equality across those two genders. The ages of participants were spread out over age groups with an emphasis on older generations, as those people would have lived through more climate-related disasters. Participants were initially selected using convenience and snowball sampling techniques. Before every interview, their demographic fit was confirmed by verbally conducting a screening questionnaire (Appendix 5). A sample size of 16 individuals was picked due to the limited timeframe and the high saturation level of answers during the KIIs.

The participants' demographics can be found in Table 5. Three participants were contacted by phone after the field visit to further validate findings or gather information on missing data.

The KIIs were conducted with the assistance of an interpreter, who was briefed on the research objective, key concepts and research ethics. Consent was acquired verbally, as the literacy rate in the research area is low (BBS, 2014)

All KIIs were recorded and transcribed (Appendix 6). The transcriptions were coded using the codebook (Appendix 7), which consisted of theory-driven codes derived from the categories of non-economic losses and damages. A deductive coding method was applied, which categorised all data following this predefined set of codes (Chandra and Shang, 2019). Both the author of this research and a Bangladeshi researcher conducted the coding process to ensure validity and cultural sensitivity. The categorised data can be found in the coding table (Appendix 12).

Table 5: The demographics of interview participants

		BURIGOALINI UNION	GABURA UNION	TOTAL
Villages	1	Burigoalini	Gabura	n/a
	2	Datinakhali	Khalishabunia	
	3	Durgabini	9 No Shora	
Participants		8	8	16
Gender	Male	4	4	8
	Female	4	4	8
Age	18–25	0	1	1
	25–34	1	1	2
	35–44	3	2	5
	45–54	2	2	4
	55–65	1	1	2
	65+	1	1	2
Religion	Hindu	2	2	4
	Munda	2	2	4
	Muslim	4	4	8
Occupation	Day labourer	4	3	7
	Housewife	4	2	6
	Fisherman	1	3	4
	Teacher	1	1	2
	Social worker	1	1	2
	Other	3	3	6

3.4 Focus group discussions

The structure of the FGDs (Appendix 9) was similar to the KIIs. At the start of each FGD, participants were asked to rank the severity of the climate-related hazards observed during the KIIs, using cards displaying each hazard. This served both as an icebreaker and to determine the perceived threat of the climate-related hazards. Afterwards, the FGDs took an deductive approach by validating the results from the KIIs, and an inductive approach by expanding upon these results (Morse, 2012). An autochthonous researcher from Bangladesh reviewed all materials to ensure cultural fit.

The FGDs were split based on gender or religion (Table 6) to ensure a safe space and common ground for discussion (Hennink, 2007). Four sessions were organised, due to the limited timeframe of this study and to also ensure that there were separate sessions for each religion and gender. The selection criteria for participants were the same as with the KIIs. Participants were recruited with the assistance of local people who the researchers met during the field research. Therefore, the villages assessed were similar, as with the KIIs. The demographics of the participants can be found in Table 7.

The FGDs were documented with an audio recorder and the assistance of a notetaker. The interpreter moderated the sessions. The interpreter and notetaker were briefed on the research objective, key concepts and research ethics. Following local etiquette, refreshments and snacks were provided as a social gesture. Verbal consent was acquired before each FGD. The recordings and notes were summarised (Appendix 11) and coded using the same procedure that was applied for analysing the KIIs. The categorised codes can be found in the coding table (Appendix 12).

Table 6: The demographics of FGD sessions

	FGD 1	FGD2	FGD3	FGD4
Village	Burigoalini	Burigoalini	9 No Shora	Khalishabunia
Gender	Mix	Men	Women	Mix
Religion	Munda	Mix	Muslim	Hindu

Table 7: The demographics of FGD participants

		BURIGOALINI UNION		GABURA UNION		TOTAL
FGD		1	2	3	4	
Participants		11	7	13	11	42
Gender	Male	2	7	0	6	15
	Female	9	0	13	5	27
Age	18–24	3	0	4	0	7
	25–34	3	1	4	1	9
	35–44	2	2	1	4	9
	45–54	1	1	2	1	5
	54–65	1	2	2	3	8
	65+	1	1	0	2	4
Religion	Hindu	0	2	0	11	13
	Munda	11	0	0	0	11
	Muslim	0	5	13	0	18
Occupation	Housewife	4	0	8	4	16
	Day labourer	5	2	4	2	13
	Business owner	0	2	0	1	3
	Fisherman	0	2	0	1	3
	Farmer	0	0	0	2	2
	Student	2	0	0	0	2
	Other	0	1	1	1	3

3.5 Field notes

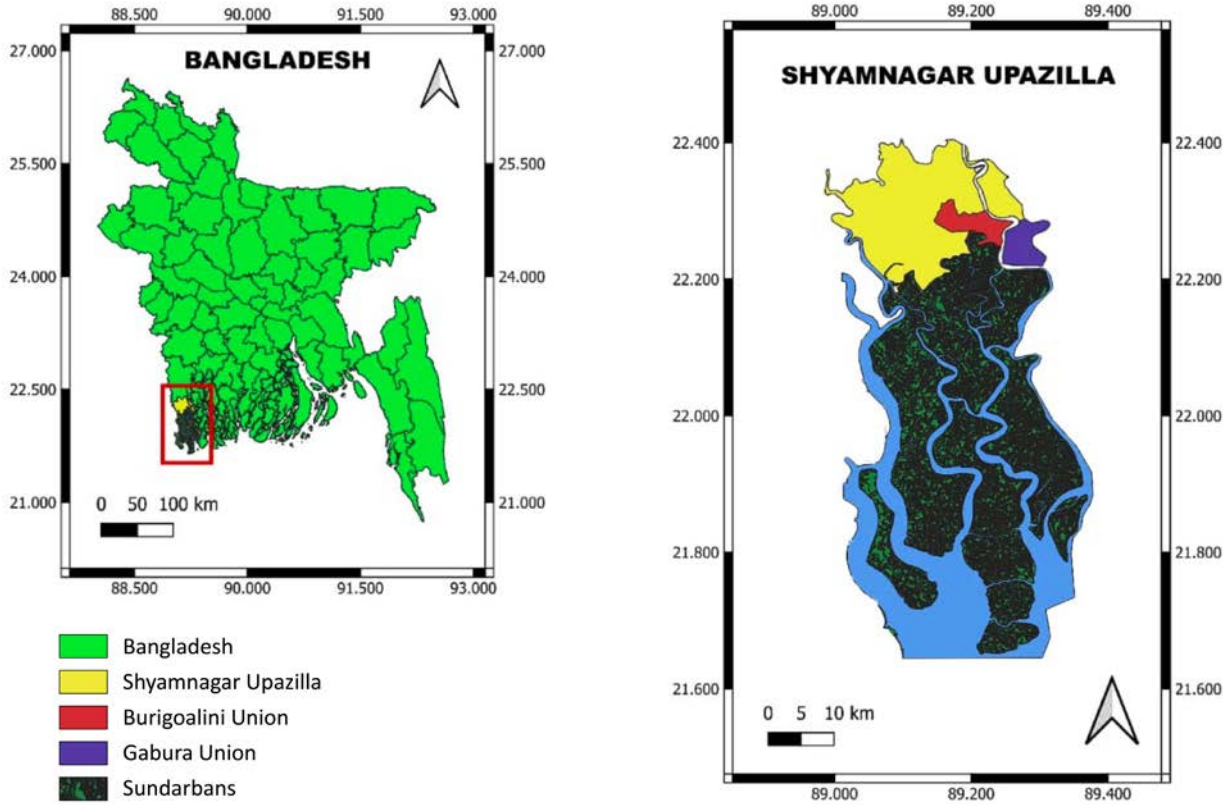
Field notes were made to document the data that was relevant to the study context and research objective. Key observations from what was seen and discussed with local people were categorised according to the predefined categories of non-economic losses and damages. Additionally, the categories natural, social, built environment and other were added to catalogue contextual information (Appendix 8). Consent was asked when sensitive data was to be acquired. Key takeaways were utilised as inputs for the KIIs or FGDs, or to further validate findings (Phillippi and Lauderdale, 2018).

4

Research area

Bangladesh is highly populated and highly susceptible to numerous climate-related hazards (Huq and Ayers, 2008; van Schendel, 2020). Major cyclones make landfall approximately every three years (Dasgupta et al., 2014), and 30 to 37% of the country is annually inundated (Brouwer et al., 2007; Huq and Ayers, 2008). The coastal region of Bangladesh is particularly susceptible to climate-related hazards (Huq and Ayers, 2008). The Burigoalini and Gabura Unions (Figure 3) are among the most affected in this region due to their high exposure to climate-related hazards and level of socioeconomic vulnerability, along with their deficient ability to adapt (Amin and Shammin, 2022; Didar-Ui Islam et al., 2015; Tajrin and Hossain, 2017). This chapter first outlines the preceding conditions of the research area, focusing on the natural, social and built environment, after which the climate-related hazards that affect the unions are depicted.

Figure 3: A map displaying the location of the Burigoalini and Gabura Unions within Bangladesh



4.1 Preceding conditions

This section shows the circumstances of the research area, looking at the social, natural and built environment. Table 8 shows various demographics of both unions from the latest community census conducted by the government of Bangladesh in 2011. Possible changes in these statistics must be expected due to changes in demographic conditions over time.

Natural environment

Both the Burigoalini and the Gabura union are north of the Sundarbans, the world's largest mangrove forest. Burigoalini Union has a river in the south, separating it from the Sundarbans, and a river on the west that separates it from Gabura Union, which is entirely surrounded by saltwater rivers. Land use has shifted from agriculture to crab and shrimp cultivation. The expansion of shrimp cultivation has taken place in a rapid and uncoordinated way (Photo 1), creating an adverse impact on land quality (Islam et al., 2012; Sarker et al., 2019; Siddiqui et al., 2020). This expansion is partly caused by the fact that shrimp cultivation has been promoted as an adaptation measure for farmers who cannot continue to cultivate rice due to increased soil and water salinity (Paprocki, 2021).

Social environment

Most people in the unions harvest fish or crab in the nearby rivers or work as day labourers on crab or shrimp farms (Didar-Ui Islam et al., 2015). The Sundarbans provide various ecosystem services to the populations of both unions, such as forest products or protection from hazards, as well as having a significant cultural role (Amin and Shammin, 2022; Didar-Ui Islam et al., 2015; Roy, 2018). The government has restricted the access to the Sundarbans for biodiversity protection, which limits people's availability to the forest's ecosystem services (Mozumder et al., 2018; Roy et al., 2012).

Both unions see a low literacy rate, with 39.4% in Burigoalini Union and 35.9% in Gabura Union (BBS, 2014). Most children aged between 6 and 14 attend school, with a larger share of girls doing so than boys (BBS, 2014). In rural areas in the country's south, gender inequality is especially prominent (Reggers, 2019). The sociocultural norm is that men are responsible for the livelihood and economic situation, and women for the household. Overall, women have less decision-making power than men (Reggers, 2019; Roy and Mathbor, 2021).

Regarding religion, Islam is the most prevalent religion in the unions overall (BBS, 2014), while Hinduism is more prevalent in Burigoalini than in Gabura Union (BBS, 2014). Both unions are home to the Munda people, a culturally rich ethnic community dispersed over India and Bangladesh (Gain, 2011; BBS, 2014), who are often considered lower caste Hindus but have distinguished social and religious structures (KII4; Roy, 2018).[2]

Built environment

One-storey houses are the most prevalent home in both unions. These are mainly constructed using tin, straw, wood, bamboo and mud (field notes (FN); Shaibur et al., 2017a; Siddiqui et al., 2020).[3] Brick houses offer better protection from climate-related hazards but are not affordable for most people in both unions (FGD3).[4] The main roads in Burigoalini Union are constructed with bricks. Most other roads are made of dirt, especially in Gabura Union. Many people do not have access to latrine facilities, and tube wells and ponds are the main sources of drinking water (BBS, 2014).

Embankments have been built on the riversides to protect the land from inundation and exercise greater control over water. This has caused a great number of biophysical complications, such as waterlogging and cutting the necessary flow for the irrigation of rice fields (Paprocki, 2021). Moreover, the embankments that the local population now greatly depend on are not properly maintained, causing occasional breaches (Nowreen et al., 2013; Paprocki, 2021).

4.2 Climate-related hazards

The various climate-related hazards affecting the research area were ranked on impact during the FGDs. This ranking, including a description of how the research area continues to be affected, can be found in Table 9. The impact of these hazards will intensify over time as climate change increases their frequency and intensity (Chakravorti, 2018; Dastagir, 2015; Hossain et al., 2021b; Knutson et al., 2010; Mahmuduzzaman et al., 2014; Mirza, 2011; Shahid, 2010). It should be noted that some climate-related hazards have significant social and/or economic influencing factors. One particular example here is salinity intrusion, which is intensified by the increase in shrimp cultivation (Paprocki, 2021). Additionally, human interventions, such as the construction of embankments, complicate attributing hazards, such as floods, to climate change (Lewis, 2011).

2 Transcriptions can be found in Appendix 6.
3 Field notes can be found in Appendix 8.
4 Summaries of the FGDs can be found in Appendix 11.

Photo 1: Shrimp cultivation in Gabura Union (Credit: Douwe van Schie)

Table 9: Climate-related hazards ranked in severity by participants

	OVERALL	DESCRIPTION
1	Cyclone	Tropical cyclones make landfall in Bangladesh every three years on average (Ministry of Economy and Finance (MoEF), 2008), making it the most vulnerable country to cyclones (United Nations Development Programme (UNDP), 2004). Cyclones Sidr (2007), Aila (2009) and Amphan (2020) were the last significant cyclones affecting the research area (Amin and Shammin, 2022; Hossain et al., 2021a).
2	Riverbank erosion	Riverbank erosion results in substantial loss of agricultural land and villages (MoEF, 2008; Sarker et al., 2021). The Burigoalini and Gabura unions are heavily affected by river erosion due to the many adjacent rivers (Sarker et al., 2019) (Photos 2 and 3).
3	Flooding	Southwest Bangladesh sees flash floods, rain floods, monsoon floods and coastal floods (Hossain et al, 2012; Malak et al., 2020). Inundation happens yearly; prolonged floods happen every few years (Sarker et al., 2019): the region faced devastating floods in 1988, 1998, 2004 and 2010 (Sarker et al., 2019).
4	Salinity intrusion	Salinity intrusion is increasingly impacting both unions, affecting the soil and waters (Mahmuduzzaman et al., 2014; Sarker et al., 2019). The soil and water salinity especially increases in inland areas during floods (Shaibur et al., 2017b). Additionally, the increase in shrimp farms is contributing to the further salination of the area.
5	Temperature increase	Rabbani et al. (2013) have observed both an increase in the maximum temperature and the number of days with temperatures above 32°C in recent decades.
6	Precipitation variability	Average rainfall increased to 18.6% in the Burigoalini and Gabura Unions between 1998 and 2007, with a jump in maximum average rainfall also seen. Rabbani et al. (2013) have pointed to a decrease in rainfall in the pre-monsoon season and an increase in days without rain in Shyamnagar Upazila.
7	Thunderstorms	Thunderstorms claim 260 lives per year in Bangladesh (Rahman et al., 2019), with rural populations significantly more vulnerable (Biswas et al., 2016).

Photo 2: Riverbank erosion in Burigoalini Union (Credit: Douwe van Schie)

Photo 3: Riverbank erosion in Gabura Union (Credit: Douwe van Schie)

5 Results

This chapter shows the responses to climate-driven non-economic losses and damages per category. These are summarised in Table 10. Losses have only been linked to particular climate-related hazards when participants explicitly stated the connection. Some overlap among responses was observed, as one response could be appropriate for several losses (such as acceptance or migration).

5.1 Human life

Many participants recalled a high death rate during cyclones, most notably during Aila in 2009. Fatalities during cyclone Aila were higher in Gabura than in Burigoalini Union. In Gabura Union, estimations ranged from 'at least 100' to 'several 100' deaths (KII9; KII12; KII15; FGD3). These estimations aligned with observations by Andrei et al. (2014), but differed from a report by the local government, which estimated 59 deaths in Shyamnagar Upazila (Tajrin and Hossain, 2017). Participants commonly stated that most fatalities were children and elderly people: one participant from Gabura Union noted that "after Aila, it was almost like there were no kids and no old people in this area" (FGD3). Responses concerning fatalities among women were mixed: some said that more women died, but others did not necessarily agree. However, several studies show that more women die during cyclones in Bangladesh, as it is considered unsafe for women to leave the house and they are socially isolated and thereby more vulnerable (Islam et al., 2021; Reggers, 2019). It is also the case that people die of strokes due to stress (FGD2; Sayeed et al., 2015) and sickness after floods due to waterborne diseases (KII9; KII10; Yusof et al., 1991).

In response to these fatalities, the community supports families by arranging funerals and cultural traditions (KII1; KII3; KII5; KII9). When areas are flooded, people relocate bodies to dry areas, where they can be buried (KII10; KII13; FGD2).

5.2 Physical health

Several participants and studies confirmed that waterborne diseases (for example, diarrhoea and respiratory infections), skin diseases (for example, sensitised areas and infections), and high blood pressure (leading to strokes and headaches) increased due to climate-related hazards (Alam and Collins, 2010; Rabbani et al., 2013; Rakib et al., 2019). Moreover, participants stated that children, women and the elderly appear more susceptible to diseases (KII3; KII1; KII15). People also reported using medicine (KII5; KII10) or herbal treatments (KII3; KII4; KII9; KII14; Alam and Collins, 2010) for initial care. Such treatments are typically applied by the person themselves or with the assistance of a *Kobiraj*, a herbal practitioner who prescribes treatments for diseases or future prosperity. Herbal therapy consists, for instance, of a skin-disease-preventing cream made from specific trees (KII4; KII13; KII14). Alternatively, people seek assistance from the village doctor[5] (KII2; KII9; Abedin et al., 2019); if their local doctor cannot help, people go to doctors in the health service. Not all villages in the research area have a village doctor available (FGD4). In addition, doctors are costly for local people and not widely available in rural Bangladesh (KII9; KII10; KII11; FGD3; Haque et al., 2019), as seen in Gabura Union (KII1; KII9; KII10; KII14). People also take steps to prevent diseases, storing medicine and freshwater in anticipation of hazards (KII5; KII10; KII13; Malak et al., 2020; Mallick et al., 2011).

5 "Informal healthcare providers and or drug vendors practicing allopathic medicine" (Mahmood et al., 2010, p3).

Table 10: Summary of the most prevalent non-economic losses and damages, and responses observed during the field research

	CATEGORY	NON-ECONOMIC LOSSES AND DAMAGES	RESPONSE
1	Human life	Death due to climate-related hazards	Transporting bodies to other locations for burial
			Supporting families by arranging funerals
		Death due to increased sickness	
2	Physical health	Increased diseases	Applying herbal treatment
			Going to the (village) doctor
			Storing medicine and freshwater
		Hair loss	Using henna
			Shaving hair
			Increasing shampoo usage
			Accepting
3	Mental and emotional wellbeing	Increased fears, stress, and anxiety	Praying to (the) God(s)
			Increasing disaster preparedness
			Migrating
			Accepting
		Pigmentation increases	Keeping girls inside more
			Arranging for girls to be married earlier
		Decreased toilet availability	Creating makeshift toilets
4	Territory	Decreased place attachment	Migration
			Increasing protection
5	Culture and practices	Decreased ability to grow flowers, trees and plants (for religious purposes)	Limiting crop growth to the monsoon season
			Growing vegetables in tubs
			Increasing fertiliser usage
			Buying goods at the market
		Decreased ability to keep livestock (for religious purposes)	
			Keeping only resilient livestock
		Decreased ability to exercise religion	Praying at home
		Complications in finding a partner	Migrating during the marriage process
			Marrying someone from a lower-income family
		Decrease in celebrating festivals	Celebrating on a smaller scale
6	Indigenous and local knowledge	Decreased ability to employ agricultural knowledge	Telling stories to the new generation
			Growing saline-resistant rice varieties
7	Ecosystem services and biodiversity	Decreased soil quality	Increasing fertiliser usage
		Decreased biodiversity	Replanting trees
			Protecting wild-growing trees
			Cutting down fewer trees
8	Social fabric	Increase in conflicts	Resolving conflicts
		Decrease in social cohesion	Trying to still invite people
		Decrease in hospitability	

	CATEGORY	NON-ECONOMIC LOSSES AND DAMAGES	RESPONSE
9	Education	School being halted	Home-schooling
		School becoming inaccessible	
			Going to school by boat
10	Mobility	Flooded infrastructure	Travelling by boat
		Flooded homes	Staying on the embankment, cyclone shelter, or boats
			Temporarily migrating
		Muddy roads	Putting bricks or wooden material on the ground

Women face gynaecological diseases due to increased exposure to saline water (KII10; KII14; Begum, 2017; Mondal, 2014) through activities such as having to wash sanitary products in it, and this causes discomfort and infections (KII10; Rahman, 2010). Additionally, women tend not to express their concerns on these issues due to the stigma surrounding gynaecological problems (KII10). Furthermore, female doctors are not widely available: for example, there are none in Gabura Union. For these reasons, gynaecological diseases go largely untreated (KII10; KII14; FGD3).

Another issue is that increased exposure to saline water causes hair loss, damage or greasiness (FGD3; FGD4; Jabed et al., 2020). In response, people use henna, shave their heads, and introduce or increase shampoo usage (FGD3; FGD4; Chowdhury et al., 2010). People also tend to accept these changes; as a participant from the Gabura Union noted they "always go through economic trouble; no time to think about hair" (FGD3).

5.3 Mental and emotional wellbeing

During the fieldwork in May 2022, the anticipation of Cyclone Ashani caused significant anxiety among inhabitants of the research area (FN). Multiple participants mentioned fears of losing people, along with anticipating issues connected to livestock, houses, climate-related hazards, their economic situation and resources. One family in Gabura Union had to sell their child after Aila to avoid starvation as the storm significantly impacted their economic situation (FGD3; FGD4). Most participants noted that women face high stress levels due to their household responsibilities (Hayward and Ayeb-Karlsson, 2021; Nahar et al., 2014). Participants also reported facing more stress during pregnancy (KII15; FGD3). Additionally, women living in these areas are also at greater risk of developing depression due to physical injuries and absence from work (Mamun et al., 2019). Another impact affecting women in the area is toilet availability, especially in Gabura Union, where many toilets are commonly located on the riverside (KII10; KII15; FGD1; FGD3). Toilets are destroyed due to natural hazards or are unavailable during high tide, creating discomfort, particularly among girls. In response, the wider community construct makeshift toilets using palm leaves or clothes (Photo 4) (FGD3).

When considering the men in the areas studied, it is clear that they focus more on work than on the household, as they are responsible for its economic wellbeing (Reggers, 2019). Some leave for migratory work for extended periods (KII4; FGD2). Meanwhile, men are said to be less expressive about mental health issues (FGD2). This makes it difficult to determine if the amount of stress per gender differs significantly.

Floods can force people to live on embankment roads (Photo 5) for several months. These are human-made ridges that often consist of earth that is built to contain flood water. Having to live on these structures leads increases in stress (KII15; FGD3; FGD4). Meanwhile, women specifically face harassment and having to be around unfamiliar men (FGD3). This limited privacy while living on the embankment (FGD4) causes extra stress for those women when the exposure leads them to also suffer from theft, and physical, sexual and emotional violence (Rahman et al, 2019).

In response to these stressful circumstances, most participants reported turning to religion and prayer. In keeping with this, a participant in Gabura Union said that "there is nothing to do but pray to God" (KII11). Another way people in the areas reduce stress is disaster preparedness: getting new information, ensuring dry food and freshwater availability, and fortifying houses (KII5; KII13; FGD3; FGD4; Mallick et al., 2011; Malak et al., 2020). Preparedness as a method to reduce anxiety is more widely recognised within disaster literature (Grant, 2018), but many participants reported that stress had caused others to relocate (KII15; FGD1; Moniruzzaman et al., 2018), suggesting that preparation is not always adequate for relieving stress.

Photo 4: A makeshift toilet in Gabura Union (Credit: Douwe van Schie)

Photo 5: An embankment road in Gabura Union (Credit: Douwe van Schie)

People in both unions mentioned an increase in skin pigmentation due to the increased salination (KII8; KII10; KII12; KII14; FGD1). This phenomenon was also observed by Andrei et al. (2014). Colourism, the practice of favouring lighter skin over darker skin, is common in Bangladeshi society (Jensen, 2020). This can complicate marriage arrangements for girls; some participants explained during KIIs that they will be perceived as less attractive, according to the convention described. This state of affairs can result in earlier marriages, as skin pigmentation increases over the years (KII10; Andrei et al, 2014), partly due to increasing salinisation levels over time. Additionally, girls can be kept inside to preserve their skin tone (KII8; KII10; FGD3).

Some participants indicated that stress levels gradually decreased as they got used to the climate-related hazards (KII2; KII3; FGD2). But this would not have accounted for long-term health impacts as a result because seeking psychological care is complicated in rural Bangladesh as mental health issues are not widely recognised (Karim and Shaikh, 2021; Nahar et al., 2014; Hasan et al., 2020).

5.4 Territory

Many of those participants who relocated did so with dismay (KII13; Moniruzzaman et al., 2018) and a number, overall, showed a strong attachment to place and stated that where they live is their ancestorial land and where their families have lived (KII4; KII9; KII16; FGD4). A strong place attachment has more commonly been found in other studies in coastal Bangladesh (Lu et al., 2018), with indications that older people especially do not want to relocate (KII11). In contrast, many participants in this study stated that, despite their strong place attachment, the frequent climate-related disasters made them decide to relocate. However, a lack of resources made relocation impossible, rendering them involuntary non-migrants. Moreover, relocation is not always successful; it was noted that some women return after relocating due to harassment in urban areas (FGD3). Multiple participants stated that place attachment could be increased with improved protection as their livelihoods would be less disrupted by climate-related disasters (KII16; FGD1; FGD3; FGD4). Several instances of people improving the mangrove forest and reinforcing the embankment for increased security were documented (KII6; KII7; FGD4; FN). For example, in the wake of Cyclone Ashani, people in Gabura Union fortified the embankment with mud (Photo 6). However, the people in these areas do not have the resources to do this on a larger scale (KII7; FGD1; FGD2; FGD3).

Photo 6: A fortified embankment road in Gabura Union (Credit: Douwe van Schie)

5.5 Culture and practices

Most participants mentioned that increasing climate-related hazards, specifically salinity intrusion and drought, complicate the growth of vegetables, flowers, (fruit) trees and freshwater fish (Shaibur et al., 2017b). This loss has economic and non-economic consequences. The loss of the outcomes of the growing process is primarily economic but could also hold non-economic significance, as the harvest can have cultural or religious value (for example, growing holy flowers (KII7; FGD4). Moreover, the loss of the ability to grow or keep crops and livestock is non-economic. This study therefore only focuses on these aspects.

In response to the growing limitations, people now only grow certain species during the monsoon season (June to mid-October) due to the high amount of freshwater availability (KII1; KII10; FGD1; FGD4; Ahmed and Kim, 2003). Other responses include bringing soil from other places, growing vegetables in containers (KII5; FGD3) and using more fertiliser to improve the ability to grow crops (FGD3; Islam et al., 2019). One local man who was consulted informally on the street during our research period said he listens to a regional radio programme that provides tips on how to grow vegetables and fruit trees in adverse conditions and then relays this information to others (FN).

Keeping livestock is increasingly complicated due to adverse conditions such as decreasing grassland and increasing salinity (KII7; FGD3; Amin and Shammin, 2022). Veterinarians are not widely accessible, and losing an animal has significant economic impacts (KII13; FGD3). Thus, people generally keep fewer animals, especially cows, or raise livestock such as goats that are able to eat a broader range of forage (FGD1; FGD3).

For the same reason, cows — sacred to Hinduism — are rarely raised; this causes a decrease in cow-related rituals (KII7; KII13; FGD4; Andrei et al. 2014). Additionally, some participants reported using cow dung as compost and cooking fuel (FGD1; Shaibur et al., 2021). The practice of Puja — a Hindu ritual that involves offering flowers, light, fruit and water, and that can help reduce anxiety (Garai, 2017) — is also impacted due to complications concerning growing flowers and fruit trees (KII7; FGD4). In response, people either perform fewer religious practices or buy the goods to do so (KII7; FGD1, FGD4; Andrei et al., 2014).

Rats, snails and frogs from agricultural fields are cultural foods for the Munda people (KII4; FGD1). But, due to decreased agricultural land in both unions, they travel to other places to collect them (KII4; FGD1). The Munda people also sacrifice hens but, as these cannot be raised anymore due to the adverse conditions in the area, they now buy them at the market. However, these are not always the correct colour for the religious/cultural practices (FGD1).

For Muslims, inaccessible roads can prevent men from travelling for prayer and children from attending Quran education at the mosque (KII3; KII10; FGD3). In response, men pray at home and children take a break from Quran education (KII3; KII10). Additionally, during *Eid al-Adha*, the festival of sacrifice, people cannot always sacrifice cows due to economic problems (KII3; KII10).

Participants also reported that families are less likely to let their daughter marry someone from a disaster-prone area (KII10; FGD2; FGD4; FN). A participant from Burigoalini Union noted "how could I give my daughter to someone in Gabura Union? She could stay at the embankment road for three months" (FGD2). In response, men in Gabura Union migrate during the marriage process or marry someone from a lower-income family (KII10; FN).

Finally, many participants mentioned that people celebrate religious festivals less often due to the conditions experienced (KII10; KII13; FGD4; Andrei et al., 2014). For example, one participant stated that a particular festival disappeared as the original place for it to be held was unavailable due to riverbank erosion (KII13). Meanwhile, another participant indicated that they still manage to celebrate festivals, but on a smaller scale (KII10).

5.6 Indigenous and local knowledge

The disappearance of rice cultivation significantly limits people's ability to apply their agricultural knowledge (FGD3). The rapid decrease in agricultural land means they cannot do what they are able to do and are used to doing. Thus, multiple participants mentioned that the younger generation no longer knows what agriculture is (KII16; FGD2). Additionally, there were reports that they have lost the ability to apply their knowledge of timber harvesting due to governmental restrictions on access to the Sundarbans (FGD4; FN). Respondents reported that it is impossible to bring back agriculture due to the increased soil salinity (KII7; KII16; FGD3). Some participants said that, in response to this, they tell stories about agriculture to the new generation (KII16; FGD4). A participant in Gabura Union mentioned that "every year our area gets flooded several times. We cannot grow crops here. Talking about agriculture to the new generation is becoming [a] telling story" (KII16). Additionally, it was shared that some men still employ agricultural knowledge as migratory workers, working in agricultural fields in different unions or Upazilas (KII3; FGD1). Finally, some cases of farmers trying to grow saline-resilient rice varieties in Burigoalini Union were also noted (KII2, KII3).

5.7 Ecosystem services and biodiversity

The previous subsections have described how soil quality is decreasing. People respond to this situation by using biological and chemical fertilisers (FGD1; FGD3; Islam et al., 2019).

Regarding vegetation, multiple participants noted a decrease in most types of vegetation (Prodhan et al., 2019; Saha, 2015). In Gabura Union, for example, some tree species completely disappeared after Aila (KII11; KII16). Additionally, the health of the monsoon forests is decreasing (FGD4; Amin and Shammin, 2022; Dasgupta et al., 2016). These trees protect people from climate-related hazards such as flooding, riverbank erosion, cyclones and thunder (KII9; KII12; KII14; FGD3; Saha, 2015). A participant from Gabura Union remarked: "After Aila, there were no trees here. Whatever you are looking at, we regrew them" (KII11). Indeed, it was clear during interviews that community members actively enhance tree growth, through activities such as planting seeds found on the riverbank (Photo 7) or buying seeds or saplings at the market (KII7; KII10; KII12; KII14). Additionally, community members protect both planted and wild-growing trees from animals with nets (Photo 8) (KII9; FGD1) and cut down fewer trees, as they have become increasingly aware of their protective qualities (KII3; KII12; KII13; FGD2).

Multiple participants report decreased populations of fish, crabs, insects, birds, frogs and snails (Akbar et al., 2017; Andrei et al., 2014). To bring back the birds, some people planted trees or stopped cutting them down (KII13; FGD2). However, no widespread responses by the local population were noted.

5.8 Social fabric

Participants shared that social bonds increase during and post-disaster, at both the community and inter-community level, as people repair houses (KII3), share food and water (KII3; KII13), work for free (KII3), and provide shelter (KII1; KII3; KII13; Alam and Collins, 2010; Chowdhury, 2011). Conversely, many participants spoke about a decrease in social bonds, especially in Gabura Union, where more widespread poverty due to climate-related hazards is making people more "individual" and "heartless" (KII9; KII11). There were also reports of the following:

- People being busier with work and having less time to socialise (FGD3, FGD4)
- Hospitality decreasing due to resource constraints (KII8; KII11; FGD3; Andrei et al., 2014)
- Communities becoming separated due to migration away (KII4; KII5; FGD3; Kartiki, 2011)

Photo 7: A mangrove tree seed found on the riverbank (Credit: Douwe van Schie)

Photo 8: Nets put up by local people to protect wild-growing trees from livestock in Gabura Union (Credit: Douwe van Schie)

- Conflicts increasing (KII11; FGD3; FGD4), and
- Crop yield decreasing, making it harder for households to share vegetables (KII11; FGD3; FGD4).

A participant from Gabura Union recalled the following proverb to describe the situation: "When poverty comes in at the door, love flies out of the window" (FGD4). Many stated that the leading cause of such complications are the economic struggles that occur due to climate-related disasters (KII9; KII13; FGD3; FGD4). However, participants also mentioned that they still try to resolve conflicts (KII11) and invite each other over to their respective dwellings (KII8; FGD3). No other responses to decreasing social fabric were documented.

5.9 Education

Most participants mentioned that schools are frequently halted or made inaccessible due to climate-related disasters, sometimes for months (KII4). This is in line with the findings from studies by Andrei et al. (2014) and Parvin et al. (2022). The latter study indicates that classes were stopped for 268 days on average after cyclone Aila. A common response to such an issue is home-schooling by parents or local teachers, but this is frequently ineffective or impossible (KII5; KII10; FGD1; FGD3; Akhter et al., 2015), and often not prioritised during disaster times (FGD1; FGD4). A female participant in Burigoalini Union mentioned that "when there is a flood, we cannot move, and cook on the bed. There is no space to think about education" (FGD1). Moreover, home-schooling is said to only be effective with the assistance of a local teacher (KII2; KII5) or an educated parent (FGD1).

Meanwhile, some students from Gabura Union have to cross the river by boat to receive education (KII10), which is impossible during storms (KII10; KII12). If roads are inaccessible, students can go to school by boat (FGD4; Akhter et al., 2015).

5.10 Mobility

Floods, which are most prevalent in Gabura Union, make it impossible for people to stay in their houses. A participant in Gabura Union noted that they "face floods two to three times a year. It takes more than one to two months to overcome waterlogging. During that time, we stay on the embankment. During Aila, it took more than two years" (KII15). In addition to the embankment road, people stay at cyclone shelters and boats or temporarily migrate (KII15; FGD1; FGD3; FN; Parvin et al., 2019).

Photo 9: Muddy roads after moderate rainfall in Burigoalini Union (Credit: Douwe van Schie)

During the flooding, they cannot move freely due to the high density of people and inundated roads (KII5; KII7; FGD3; FGD4). Therefore, people travel by water and support each other, as some do not have access to a boat (KII7; FGD3; FGD4).

A significant share of roads in the research area are unpaved. Thus, when it rains, they become muddy and inaccessible for humans — especially the elderly — and vehicles (Photo 9) (KII7; KII10; KII15; FGD3; FGD4; Andrei et al., 2014). During such a time, accessibility to services such as schools, hospitals or markets decreases (KII11; KII15; FGD4). People use bricks and wooden materials to cover muddy roads near their houses (KII7; FGD3; FGD4). In keeping with this, our field notes revealed one instance of a wealthier man in Burigoalini Union constructing a brick road, but this was stated by participants to usually be too expensive (FN).

Other stated mobility-related losses were an inability to cross the river during storms (KII10; KII12) and keeping girls inside to prevent skin darkening (KII8; KII10; FGD3). One known mobility-related loss that was noted by the participants in this study was women being less mobile during disasters (KII11; KII16; Ahmed and Eklund, 2021) due to wearing saris.[6] However, participants did not describe any possible ways of working round this at the time of the study.

6 This is a traditional garment frequently worn by women in the Indian subcontinent, often consisting of unstitched fabric draped around the shoulders and waist.

6 Discussion

The results are discussed in this section in relation to the conceptual framework, with recognition of the limitations of the study. This is followed by policy and research recommendations.

6.1 Analysis of the responses

The adaptive capacity of local populations will be discussed to determine their ability to respond to non-economic losses and damages. Adapting and coping will be considered to analyse the characteristics of the responses. These will be examined from a gender perspective, as women face more climate impacts and also have a lower capacity to address the losses and damages they suffer. The valuation of non-economic losses and damages will be discussed in relation to how they could be addressed in the future. This will be followed by an examination of the context-dependence.

Adaptive capacity

Adaptive capacity can be examined by following the five domains of adaptive capacity (Table 4) by Cinner et al. (2018), to analyse people's ability to respond. Multiple participants in this study stated that they cannot address non-economic losses and damages due to a lack of assets (KII1, KII10, KII16, FGD3). Their financial assets are scarce and may be needed elsewhere, as climate-related disasters frequently impact their basic wellbeing (FGD1). For example, paying for home-schooling or the restoration of latrine facilities is not prioritised when food availability and shelter are threatened. Second, service assets such as doctors, psychologists or education are not widely available in the research area (Haque et al., 2019; Islam and Biswas, 2014; Karim and Shaikh, 2021; Nahar et al., 2014; Hasan et al., 2020). The lack of these public services limits some individuals' ability to receive support and, thus, maintain their livelihoods. Moreover, this gap in provision/access impedes people's abilities to effectively participate in economic activities (Sen, 2000). For example, a lack of education reduces people's ability to work.

The other domains of adaptive capacity also face limitations. A decreased social fabric, primarily caused by a lack of financial assets (KII9; KII10; FGD3; FGD4; Andrei et al., 2014), limits communities' ability to **organise** responses to non-economic losses and damages. Some community-based efforts were observed by participants in this study, particularly during and after climate-related disasters (KII1; KII3; KII13), but most responses were on the individual or household level. Limited capacity also prevented participants from **learning**. For example, many people in the area accept that they cannot employ their agricultural knowledge as rice cultivation has largely disappeared. However, participants revealed there have been some efforts to grow saline-resistant rice varieties in Burigoalini Union (KII2; KII3). Moreover, several other adaptations to this loss can be found in the literature (Islam et al., 2019).

Conversely, positive examples of **learning** were also observed. For example, as discussed in Section 5.7, the local population has been cutting trees down less as they have become increasingly aware of their protective qualities (KII3; KII13; FGD2). **Flexibility** is limited as many of the non-economic losses and damages lead to the same response multiple times (such as going to the doctor or hospital). Moreover, not all adaptation strategies are available to everyone due to limited financial assets. For example, keeping girls inside to protect them from the impacts of salinity is only possible if the family has financial security, because this means the girl cannot work (KII10). It is also the case that local populations are often forced to endure non-economic losses and damages as their livelihoods are greatly threatened, limiting their **agency**. For example, severe flooding forces individuals and communities to live on the embankment and find alternative modes of transport (KII7; FDG3; FDG4).

Adapting and coping

This section analyses how people respond to non-economic losses and damages, using the distinction made by the IPCC (2012) (see Table 5). First, many responses actively tax people's financial assets (IPCC, 2012). People buy products related to religious rituals that they previously grew themselves and buy shampoo to address damaged hair (KII7; FGD1; FGD4). This further depreciates their resources. Second, people face constraints when responding to non-economic losses and damages due to a lack of financial and service assets (KII4; FGD3; IPCC, 2012). Not everyone can afford to buy goods in response to non-economic losses and damages, and services such as healthcare are not widely available. Third, people have less capacity to proactively prepare for climate-related disasters as they have to address issues concerning basic wellbeing (IPCC, 2012). Fourth, most responses focus on past events that shape current conditions (IPCC, 2012) — for example, restoring tree cover that was destroyed during previous cyclones (KII1; KII4; KII14; KII16) and repairing destroyed latrine facilities (KII10; KII15; FGD1; FGD3). In turn, a degree of acceptance of the inevitability of losses and damages has been observed (KII2; FDG3), with people adjusting their desires and expectations to what they see as feasible (Sen, 2000).

The aforementioned points show that local populations in the research area are coping with non-economic losses and damages, not adapting. They cannot respond adequately to these impacts, which affects their circumstances and, thus, leaves them more vulnerable to imminent climate-related disasters.

That coping responses are the most prevalent does not mean that insightful, structural responses have not been found. For example, replanting mangrove forests, constructing roads and improving the embankment are adequate adaptations. But some responses cause further harm while addressing impacts, and thus are examples of maladaptation. For example, increased chemical fertiliser usage enhances plant growth, but this may depreciate soil quality (Savcı, 2012). Another such example is that girls are kept inside more or marry earlier due to increased risk of skin darkening, disease and infections (KII8, KII10; Andrei et al., 2014), and this in itself affects their mental wellbeing (Akter et al., 2022).

People, natural objects and other items can hold inherent value that cannot be restored when lost; they are irreplaceable and the loss is permanent. For example, bringing back a lost family member or sacred tree is impossible. People are forced to cope as proper/adequate adaptation is impossible. Individuals and communities can work through these losses by grieving, remembering or holding a memorial, but they can never be fully restored.

Gender inequalities

Women in the research area face more non-economic losses and damages than men. Moreover, their access to financial assets is restricted due to cultural and social norms, and they have little freedom to leave and act outside the household (Reggers, 2019; Roy and Mathbor, 2021). Thus, they have even less capacity to respond to the higher level of impacts they face.

Additional gendered non-economic losses and damages mainly occur within the mental and physical health domains. Impacts within these domains generally see insufficient responses, partly because services addressing mental and physical issues are lacking (KII9; KII10; KII11; FGD3). The lack of public services (mainly education institutions, clinics and hospitals) is even more apparent for women requiring services from other women. For example, women doctors are not commonly found in the research area (FGD3) and women are already reluctant to seek support due to the taboos associated with gynaecological issues (Ross et al., 2002).

Valuation

The intangibility of the observed non-economic losses and damages complicates monetary valuation, compounding the difficulties in addressing these losses and damages through financial mechanisms. However, the responses to non-economic losses and damages often involve financial assets. For example, there is a relatively high cost to home-schooling, and previously homegrown products are now bought in markets (FGD1; FGD3; FDG4). As these responses can be valued in monetary terms, non-economic losses and damages can be partly addressed by covering these costs. However, this approach is problematic, as economic responses do not always cover the full extent of non-economic losses. For example, while the loss of the ability to cultivate ritual-related goods can be addressed, as mentioned, by buying them in markets (FGD1; FGD2; FGD4), compensating the monetary value of these items will not recover the emotional and cultural values attached to the cultivation process. Also, the organisational aspects of a funeral and remembrance can be economically valued, but the loss of a family member encompasses far more than this. When casualties of climate disasters become disabled, there are multiple recurrent costs to the household and psychological costs to the person who is disabled themselves. Moreover, not all responses include economic aspects. For example, praying or resolving conflicts are based in intangible values.

Context-dependency

Even though the two unions are geographically close, Gabura Union experiences more severe climate-related impacts than Burigoalini Union. Gabura Union is more exposed to climate-related hazards, and the local population's adaptive ability is relatively low (Didar-Ui Islam et al., 2015). Therefore, the people there are forced to respond to more severe non-economic losses and damages with fewer means. The results of this study validate this observation, as our field research in Gabura Union yielded more data regarding losses and damages, but there were few significant differences in responses. Hence, despite the close geographical location, the situations between unions are considerably different.

Also, most results were observed within the category of 'Culture and practices'. It could be assumed that results within this category would be different across regions as cultures differ around the globe, and different results were indeed observed for each of the three religions in the locations studied. Muslim people noted losses and responses regarding the accessibility of the mosque, and people within all religions faced different losses and responses concerning the inability to fully perform rituals (KII3; KII4; KII7; KII10; KII13; FGD1; FGD4).

6.2 Limitations

This study has had several limitations, both in the research design and scope. These limitations are outlined below and addressed in the recommendations.

Design

Both the lead author and the interpreter who accompanied the field element of this research are men. This limited the extent to which women-related impacts could be explored, especially as topics such as gynaecological disease or mental health can be regarded as taboos in rural Bangladesh (FN; KII10; Ross et al., 2002). The study intended to address this by working with a female interpreter, but this was discouraged by people consulted, due to cultural dynamics (such as it not always being accepted for a Western man to travel to the field alone with a Bangladeshi woman). Therefore, to acquire this gendered information, the research team actively sought women who were comfortable discussing women-related impacts with the researchers.

This study used a partly deductive approach by utilising a predefined set of categories of non-economic losses and damages. However, not all categories identified in the literature were used. Therefore, potential non-economic losses and damages outside the selected categories for the study may have been overlooked. A certain level of flexibility in these categories was upheld during the field research, to partly address this issue. For example, during the KIIs, it became apparent that frequent flooding severely limited people's mobility. Thus, this category was added in the local inquiry phase of the research.

This research did not delve into the influence of the preceding colonial and political development history. But these factors actively shaped the socioeconomic conditions and hence the vulnerability of people affected by climate-related hazards (Carthy, 2022; Paprocki, 2021). Looking at this would have deepened the understanding of the political economy and thus enhanced the ability to give context-sensitive recommendations. Therefore, this aspect should be included in future research in areas where people are impacted by climate-related hazards.

Scope

The authors have identified four significant limits in the scope of this study. First, the needs of individuals and communities to address non-economic losses and damages were not explicitly scrutinised. Therefore, there is no explicit community-driven data on how to address the impacts. Second, the valuation of the values of losses was not elaborated in the study, when such data might be crucial for the creation of a financial mechanism addressing losses and damages. Third, the study did not assess the efficacy of responses and therefore there can be no judgement on which responses should be applied at a broader scope. To conclude this point, it should be noted that individuals who decided to relocate have not been considered in this analysis, though they, presumably, have a unique perspective on the research topics and have experienced losses not yet observed within this study.

6.3 Recommendations

Individuals and communities put substantial effort into coping with the adverse circumstances of climate-related losses and damages. While this should be acknowledged and applauded, local populations should not entirely carry the burden of climate-related disasters they have not caused. Recognising and celebrating community-led initiatives must not distract from the urgent need to address non-economic losses and damages in the research area. Thus, this section will suggest various policy- and research-related actions for addressing non-economic losses and damages to support and compensate local populations.

Policy

Measures assisting local populations in addressing non-economic losses and damages are urgently needed, as people's coping methods are no substitute for proper adaptations. Therefore, the complex and slow-moving debate of monetary valuation of non-economic losses and damages should be avoided when implementing new measures.

- Local populations should be financially assisted so they can secure basic wellbeing and therefore have more capacity to focus on non-economic aspects of their livelihoods (Alam et al., 2017).
- Basic wellbeing should be ensured by increasing local populations' protection and peace, as perpetual climate-related disasters significantly impact their livelihoods (Didar-Ul Islam et al., 2015). During the fieldwork for this study in May 2022, participants from multiple villages in Burigoalini Union stated how the improvement of the embankment is their foremost priority to avoid the regular devastating floods. For instance, in July 2022, a part of the embankment protecting Burigoalini Union collapsed, flooding homes and leaving people waterlogged.
- Capacity can be increased by improving public services to make physical and mental health services more accessible (Cinner et al., 2018).
- Non-economic losses and damages can also be addressed by improving the efficacy and scope of responses that individuals and communities have already developed, such as supplying biological fertilisers to address soil quality and rebuilding latrine facilities.
- Salinity intrusion is the cause of many non-economic losses and damages. Therefore, the promotion of shrimp cultivation as an adaptation method should be actively discouraged.
- Measures that involve, but simplify, the monetary valuation of non-economic losses and damages in financially compensating the costs people face by responding to non-economic losses and damages should be used. While it is strongly emphasised that this compensation is inadequate, as this will not (sufficiently) address all non-economic losses and damages, it could serve as a stepping stone to an all-encompassing financial mechanism for addressing non-economic losses and damages.

Gender inequalities should be addressed when increasing the adaptive capacity of local communities. When financially supporting households, this process should consider that women might not be able to access vital assets (Reggers, 2019). When improving service assets, sufficient female service providers should be employed to create an enabling environment where women are comfortable disclosing sensitive issues, mainly regarding their mental and physical health. Furthermore, women should be involved in all prior consultations and policymaking steps to guarantee that all policies adequately address their needs, as men might not be fully aware of certain issues.

The importance of context-dependency means that addressing non-economic losses and damages cannot be done without adequately involving local communities within policymaking. Moreover, it has previously been stated in this paper that local populations should not bear the costs of the increasing climate-related impacts. However, these should also not fall on the national governments of vulnerable countries, as they can be shared among private sectors. Most Western countries have overshot their fair share of greenhouse gas emissions (Hickel, 2020), which plays a significant role in intensifying the severity and frequency of climate-related disasters around the globe (Van Aalst, 2006). Therefore, they should be held accountable for addressing the resulting non-economic losses and damages.

Research

The results of this study are not generalisable per se, due to the high context-dependency of non-economic losses and damages (Serdeczny et al., 2016). Therefore, the concept of non-economic losses and damages cannot be exhaustively understood or addressed without researching a great diversity of environments. Thus, future studies should be conducted across a range of climate-vulnerable regions. For example, to the knowledge of the authors, very few case studies that explicitly focus on non-economic losses and damages have been identified in Africa, with no case studies found in South America. It is advised that these studies do not follow a predefined list of non-economic losses and damages, but instead use a locally led approach to categorise non-economic losses and damages, so that context-specific impacts can extensively be explored.

Gender-specific data suggests that gender inequalities within non-economic losses and damages might also be present in other regions. Therefore, future research on this topic should always include a gendered perspective in order to go beyond a normative understanding of the concept. Furthermore, this study should be expanded on with additional research that has a specific focus on gender equality, to enhance the understanding of the gendered aspect of non-economic losses and damages in the research area. A predominantly female research team should conduct this study to ensure that women are comfortable raising the issues they deem important.

Future research on non-economic losses and damages could also include climate migrants, as their choice to move away indicates that their perspectives on the matter differ from those who stayed.

In conclusion, this study has identified many formerly unknown non-economic losses and damages and, for the first time, explored what local responses to these impacts can look like. However, the many still-existing research gaps concerning this theme call for extensive follow-up research. More work is especially needed in order to close the knowledge gap on how to compensate for non-economic losses and damages. Such studies could explore how responses can partially determine what monetary compensation is appropriate. However, this should be done with the understanding that financial compensation has considerable limitations. Additionally, future research could include needs assessments, to gather community-based information on how best to address non-economic losses and damages.

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Appendices

Appendix 1. Literature review

	CATEGORY	MANIFESTATION	LOCATION	SOURCE
1	Human life	Natural hazards cause an increase in suicidal behaviour	Bangladesh	Hossain et al., 2021a; Mamun et al., 2021
		According to the Shyamnagar Upazila parishad: 59 deaths in the Upazila, 28 in Gabura, and 15 in Munshiganj, Ishwaripur and Burigoalini Unions	Shyamnagar Upazila	Tajrin and Hossain, 2017
		In one village in Gabura Union: 65 deaths. In another: more than 100	Gabura Union	Andrei et al., 2014
		Infant death due to high sodium intake caused by salinity intrusion	Coastal zone of Bangladesh	Shammi et al., 2019
		Death from illnesses such as diarrhoea and dysentery caused by floods	Bangladesh	Yusof et al., 1991
2	Physical health	Cyclone-related injuries are hearing loss, broken bones and loss of limbs, along with an upsurge in infections and diseases	Shyamnagar and Koira Upazila	Andrei et al., 2014
		Financial pressure leads families to marry girls earlier. This can lead to pregnancies at a younger age, which can cause illnesses for the mother.		
		Darker skin due to increased salinity, resulting in financial impact on families when daughters marry		
		Increase in vector-borne, skin and gynaecological diseases	Gabura Union	(Mondal, 2014)
		Diseases include problems with blood pressure, cardiovascular disease, kidney, disease and frequent diarrhoea	Gabura and Burigoalini Union	(Rakib et al., 2019)
3	Mental and emotional wellbeing	Chronic environmental stress leading people to decide not to invest in assets such as livestock	Shyamnagar and Koira Upazila	(Andrei et al., 2014)
		Fear of cyclones, migration, remaining, being robbed, losing land, buying market produce with pesticides, declining health, not being able to pay tuition, losing cultural traditions and embankments breaking		
		Women suffer psychological stress due to limited access to services, household responsibilities, sexual harassment and widowhood	Bangladesh	Nahar et al. (2014)
		Socioeconomic status is associated with higher levels of post-disaster stress	Bangladesh	
		Limitations of mental health professionals and inadequate knowledge leads to delay in psychosocial management and rehabilitation	Two coastal districts in Bangladesh	(Choudhury et al., 2006).
4	Territory	People have a strong desire to stay within their communities, attributing this to abundant resources, employment opportunities and income sources, strong kinship support, emotional place attachment and enduring river culture	Bangladesh	(Lu et al., 2018; Mallick, 2019; Paul et al., 2020).

	CATEGORY	MANIFESTATION	LOCATION	SOURCE
5	Culture and practices	Extraction of natural resources, poor governance and climate change threatens the complex relationship between nature and culture	Coastal zone of Bangladesh	(Rashid and Hasan, 2020).
		Loss of cattle due to natural hazards affects everyday customs related to cow products within a Hindu village	Shyamnagar and Koira Upazila	(Andrei et al., 2014)
		Conversion from rice farming to shrimp and fish cultivation increases women's involvement in the production process, reducing their time for preparing cultural activities or working on social bonds	Shyamnagar and Koira Upazila	
6	Indigenous and local knowledge	Much Indigenous knowledge has never been documented, with it being forgotten as it is replaced by modern education and technology	Bangladesh	(Sillitoe, 2000)
		Environmental change and degradation cause loss of Indigenous knowledge		
7	Ecosystem services and biodiversity	Water quality is deteriorating and improving	Southwest Coastal zone of Bangladesh	(Hossain et al., 2016)
		Local climate is deteriorating		
		Natural hazard protection is deteriorating		
		Erosion protection is deteriorating		
		Maintenance of biodiversity is deteriorating or stable		
		Recreational services are improving		
		There has been a high increase in tourism	Sundarbans	(Uddin et al., 2013)
		Other cultural services are traditional and spiritual festivities, World Heritage status, education and research, and tradition of livelihoods		
		Biodiversity is in decline; for example, native and migratory birds and bigger carnivorous animals	Shyamnagar Upazila	(Akbar et al., 2017; Siddiqui et al., 2020)
		Loss of fish species, especially freshwater species	Shyamnagar and Koira Upazila	(Andrei et al., 2014)
		Loss of forest species such as deer, foxes, birds, wild cats, reptiles and tigers		
8	Social fabric	Food and financial insecurity have made people unable to accept family members, friends and neighbours into their homes	Shyamnagar and Koira Upazila	(Andrei et al., 2014)
		There has been a decrease in hospitality due to the amount of work; people do not have time to act in a hospitable fashion		
		Social ties in communities have worsened due to extreme poverty	Shyamnagar Upazila	(Andrei et al., 2014)
		There is increased cooperation within communities after cyclones	Coastal zone	(Alam and Collins, 2010)
		There is a positive relationship between social cohesion and disaster recovery	Bangladesh	(Chowdhury, 2011; Akter, 2020).

	CATEGORY	MANIFESTATION	LOCATION	SOURCE
9	Education	After cyclone Aila, 40–60% of primary schools have faced severe damage to their buildings, infrastructure, roads, furniture and materials	Ishwaripur, Atulia, Padma Pakur, and Gabura Unions	(Parvin et al., 2022)
		After cyclone Aila, classes were stopped for 268 days on average, and more than 20% of students dropped out of school, typically for economic reasons	Gabura Union	
		After cyclone Aila, 75 students from nine schools dropped out (more than 20% of total students)	Gabura Union	
		Three villages indicate they lost more than one year of education; one village lost 0–6 months of education	Shyamnagar Upazila	(Andrei et al., 2014)
		There is concern that children have fallen behind compared to other villages	Shyamnagar and Koira Upazila	
		Knowledge and understanding regarding disasters among students have increased after Cyclone Aila	Shyamnagar Upazila	(Parvin et al., 2022)
10	Mobility	After cyclone Aila, 69% of people take shelter on higher-level open space (roads and embankment); 2% take shelter on boats	Gabura Union	(Parvin et al., 2019)

Appendix 2. KIIs: guide

	COMPONENT	
Introduction	Welcome and thank participant for their participation	
	Introduction of researcher and interpreter	
	Explain the general purpose of the research	
	Reinforce why participants were chosen and importance of their contribution	
	Outline how the information will be used and by whom	
	Explanation of the structure of the discussion (10 categories) and expected duration	
	Explain the purpose of recording and taking notes, and seek permission	
	Ask if it is clear what the interview structure is and how their information will be used	
	Ask if there are additional questions and if participants feel comfortable to start the interview	
Demographics	Fill in questionnaire (Appendix 2)	
Natural hazards		
Non-economic losses and damages	Introduction of non-economic losses and damages	
	Per category	Introduction of categories of non-economic losses and damages
		One to two questions about how natural hazards have impacted (Appendix 3)
		If there is no result, ask about examples from the literature (Appendix 3)
		Follow-up question regarding response or action per category (Appendix 3)
	Ask if there is any other information the participant would like to give	
Closing	Ask about the participant's experience of the interview	
	Thank the participant for participation	
	Check if they agree that this information can be used within the research	
	Emphasise they can withdraw participation until publishing	
	Discuss representation with the participant	

Source: adapted from Hennink, 2007

Appendix 3. KIIs: questionnaire

English

Gender: ☐ Male ☐ Female ☐ Other _____

Age: _____ years

Occupation(s) / role(s): _____

Village: _____

How long have you lived in this village? _____ years

These weather-related processes and climatic events affect our village:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Cyclones	☐	☐	☐	☐	☐
Soil and water salinity	☐	☐	☐	☐	☐
Change in rainfall	☐	☐	☐	☐	☐
Flooding	☐	☐	☐	☐	☐
Temperature increase	☐	☐	☐	☐	☐
Riverbank erosion	☐	☐	☐	☐	☐
Other					
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

Bengali

লঙ্গি ☐ **পুরুষ** ☐ **মহলিা** ☐ **অন্যান্য** _____

বয়স: _____ বছর

পশো/ _____

গ্রাম: _____

আপনকিত বছর ধরে এই গ্রামে থাকনে? _____ বছর

এই আবহাওয়া-জনতি দুর্যোগগুলো আমাদরে গ্রামরে ক্ষতকিরে:

	দৃঢ়ভাবে অসম্মত	অসম্মত	নরিপক্ষে	একমত	দৃঢ়ভাবে একমত
ঘূর্ণঝিড়	☐	☐	☐	☐	☐
মাটি এবং জলরে লবণাক্ততা	☐	☐	☐	☐	☐
বৃষ্টপিাতরে পরবির্তন	☐	☐	☐	☐	☐
বন্যা	☐	☐	☐	☐	☐
তাপমাত্রা বৃদ্ধি	☐	☐	☐	☐	☐
নদী ভাঙন	☐	☐	☐	☐	☐
অন্যান্য					
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

Appendix 4. KIIs: questions

	CATEGORY	EXPLORATIVE QUESTION(S)	EXAMPLES / PROBES
1	Ecosystem services and biodiversity	Could you describe how vegetation and wildlife surrounding <village name> has changed in the past 5/10/20* years? **Response to example:** has the community taken action to address this?	▪ Decrease in freshwater fish ▪ Decrease in bird species ▪ Decrease in tree coverage
		Could you describe how the benefits the community derives from nature have changed in the past 5/10/20* years? **Response to example:** has the community taken action to address this?	▪ Decrease in water quality ▪ Decrease in protection from hazards ▪ Decrease in fish catch
2	Culture and practices	Could you describe how this change in nature changed the customs and practices within the community over the last 5/10/20* years? What religious practices have changed over the last 5/10/20* years? **Response to example:** has the community taken action to address this?	▪ Women more prominent in rice-harvest, therefore less focus on community building ▪ Decrease in religious festivals ▪ Decrease in rice harvest-related traditions
3	Social fabric	Could you describe how the impacts of weather-related events and climatic events affected the bonds between people in the community? **Response to example:** has the community taken action to address this?	▪ Increase due to helping each other ▪ Decrease due to water conflict ▪ Decrease due to economic strain
4	Indigenous and local knowledge	Could you describe how the community uses traditional knowledge now compared to in the past? How has this change occurred? **Response to example:** has the community taken action to address this?	▪ Loss of knowledge due to changing environment ▪ Traditional crop varieties disappearing due to increased salinity
5	Physical health	Could you describe how weather-related processes and climatic events affect the physical health of people in the village? **Response to example:** has the community taken action to address this?	▪ Infections and (waterborne) diseases ▪ Skin ailments ▪ Physical disability ▪ Malnutrition
6	Human life	Could you describe how weather-related processes and climatic events have caused deaths of people in the village? After cyclone Aila, has the community cared for those who lost family members? After cyclone Aila, did the community get together to remember those lost?	▪ Death due to extreme weather events ▪ Death due to food or water shortage ▪ Suicide due to psychological impact
7	Mental and emotional wellbeing	Could you describe how weather-related processes and climatic events affected the mental wellbeing of people in the village? **Response to example:** has the community taken action to address this?	▪ Fear of another cyclone ▪ Fear of migration ▪ Fear of losing cattle ▪ Fear of economic situation

	CATEGORY	EXPLORATIVE QUESTION(S)	EXAMPLES / PROBES
8	Education	Could you describe how weather-related processes and climatic events have affected education of children and students in the village? **Response to example:** has the community taken action to address this?	▪ Loss of education due to destruction of buildings, roads and bridges ▪ Loss of education due to economic constraints
9	Territory	Could you describe how weather-related processes and climatic events have affected the community's attachment to the village? **Response to example:** has the community taken action to address this?	▪ Loss of sense of place ▪ Loss of sovereignty
10	Mobility	Could you describe how weather-related processes and climatic events have affected the community's mobility in and surrounding the village? **Response to example:** has the community taken action to address this?	▪ Inaccessible roads ▪ Flooding makes areas inaccessible

*Timespan depends on age of interviewee

Appendix 5. Semi-structured interviews: screening questionnaire

This was conducted verbally

Hi,

We are conducting interviews as a part of a research project on losses from weather processes and climate-related events in Shyamnagar Upazila. This is for research connected to a Dutch university. Would you have some minutes to answer a few questions regarding this?

- Gender
- Age
- Occupation(s)/role(s)
- Village
- Years lived in the village
- Religion

That is all I have to ask for now. Would you have time tomorrow or the day after for a 30-to-60-minute interview with me about losses from weather processes and climate-related events? This can be at any time or location that you desire. Topics include loss of nature, mental wellbeing, cultural heritage and loss of lives. All of this will be confidential, and no knowledge is needed. We are very curious to hear your experiences and opinions about these matters.

Source: adapted from Hennink, 2007

Appendix 6. KIIs: transcriptions

Specific information from the transcriptions can be made available upon further request.

Appendix 7. Codebook

Theory-driven codes: 11 categories of non-economic losses and damages (*LD = Loss and Damage, RES = response)

	CATEGORY	DEFINITION	CODE*	EXAMPLE
1	Human life	"Being alive and living at least as long as the average life expectancy for a given region or population" (Tschakert et al., 2019, p64)	LD_HLI	▪ Death due to extreme weather events ▪ Death due to food or water shortage ▪ Suicide due to psychological impact
			RES_HLI	▪ Grieving ▪ Hosting a funeral
2	Physical health	"The contribution of physical health to overall human well-being" (Tschakert et al., 2019, p63)	LD_PHY	▪ Infections and diseases ▪ Skin ailments ▪ Physical disability
			RES_PHY	▪ Herbal treatments ▪ Doctor
3	Mental and emotional wellbeing	"A state of positive well-being contributing to mental health, life satisfaction, coping ability, and overall human well-being" (Tschakert et al., 2019, p63)	LD_MEW	▪ Fear of another cyclone ▪ Fear of migration ▪ Fear of losing cattle ▪ Fear of economic situation
			RES_MEW	▪ Praying
4	Territory	"The area of land under the jurisdiction of a state, or that belongs to a particular group of people" (Tschakert et al., 2019, p65)	LD_TER	▪ Loss of sense of place ▪ Loss of sovereignty
			RES_TER	▪ Increase protection to increase land attachment
5	Culture and practices	"Shared practices, narratives and customs that provide meaning and structure to people's everyday life" (Tschakert et al., 2019, p63)	LD_CUL	▪ Decrease in religious festivals ▪ Decrease in vegetable gardens ▪ Decrease in rice harvest-related traditions
			RES_CUL	▪ Floating gardens ▪ Buy goods from other areas
6	Indigenous and local knowledge	"Knowledge that is unique to a particular cultural group or community. It often has strong links with the environment and is valuable as it is often spiritual, cultural and practical and contributes to social cohesion and identity" (Fankhauser et al., 2014, p27)	LD_ILK	▪ Decrease in/loss of knowledge due to changing environment
			RES_ILK	▪ Documenting knowledge

7	Ecosystem services and biodiversity	These are benefits humans derive from ecosystems (MEA, 2005). There are four types of services: provisioning, supporting, regulating, and cultural. The last three services tend to be non-economic (Fankhauser et al., 2014)	LD_ECO	▪ Decrease in water quality ▪ Decrease in protection from hazards ▪ Decrease in fish catch
			RES_ECO	▪ Replant mangroves for increased protection ▪ Desalinise soil
		"The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (United Nations, 1992, p3)	LD_BIO	▪ Decrease in freshwater fish ▪ Decrease in bird species ▪ Decrease in tree coverage
			RES_BIO	▪ Using fishing net with bigger holes ▪ Replanting trees
8	Social fabric	"Social bonds and cohesion between individuals, families, and community members" (Tschakert et al., 2019, p63)	LD_SOC	▪ Increase due to helping each other ▪ Decrease due to water conflict ▪ Decrease due to economic strain
			RES_SOC	▪ Resolve conflicts ▪ Showing hospitality
9	Education	"The knowledge and development resulting from the process of being educated" (Merriam-Webster, n.d.)	LD_EDU	▪ Loss of education due to destruction of facilities ▪ Loss of education due to economic constraints
			RES_EDU	▪ Home education
10	Mobility	"The freedom to remain or travel within one's territory" (Tschakert et al., 2019, p63)	LD_MOB	▪ Loss of mobility due to muddy roads ▪ Loss of mobility due to flooding
			RES_MOB	▪ Transport by boat

Appendix 8. Field notes

Categories of non-economic losses and damages

	CATEGORY	OBSERVATION
1	Human life	
2	Physical health	Salinity causes loss of hair. People use henna in response.
		Girls use cloth material during their period. They have to wash these cloths with saline water due to increased salinity levels. This causes pain, discomfort and medical issues.
3	Mental and emotional wellbeing	Men in Gabura Union are struggling to find a wife. They often marry someone from a lower-income household.
		A group of men in a village in Gabura Union have confirmed the story of selling a child that was observed during a FGD.
4	Territory	A significant amount of land is lost due to riverbank erosion, especially in Gabura Union.
5	Culture and practices	A man shares that he tried to grow vegetables on his roof. However, it did not work due to the dry weather.
		People mainly keep goats, as they can eat various kinds of foods found in the research area. Cows are rarely spotted.
6	Indigenous and local knowledge	
7	Ecosystem services and biodiversity	Community members grow trees for cyclone protection. They prefer small trees, as big trees can fall on their houses during strong winds. They only plant smaller species close to their homes. If a tree grows too big, they cut it down to reinforce their house.
		To replant mangroves, people dig a hole, put in the seed and create a bamboo fence for protection. Seeds are commonly collected from the riverside.
		A community-planted mangrove forest significantly protects Datinakhali, a village in Burigoalini Union.
		The local government encourages people to protect mangrove trees.
		A man in Gabura Union has a tree nursery; after Aila he gave more than 1,000 seedlings away to others. He plants trees all over his property. To battle the adverse conditions, he listens to a radio station in Khulna for tips.
		Shrimp farms are said to cause a decline of biodiversity. These shrimp farms are found in both unions, but especially in Gabura Union.
		A forest on the riverside in Gabura Union has grown considerable due to community effort.
		Local people report that mangrove trees are dying, noting that the forest cover is getting less and less.
		People wash themselves using chemical shampoos in ponds.
8	Social fabric	
9	Education	The local government has built cyclone shelters that also serve as primary schools in both unions.

10	Mobility	The rivers surrounding Gabura Union get rough during strong winds, making them inaccessible during storms.
		The roads are difficult to walk on after rainfall. This is especially pertinent regarding Gabura Union. The embankment roads in Burigoalini are paved, but participants report that "when you go deeper into the villages, you encounter dirt roads".
		During and after rainfall, motorised transport is impossible on dirt roads. In Gabura Union, this makes it difficult to go from one side of the union to the other. The researchers used a motorbike, which is the preferred mode of transport for muddy roads, but still had to walk considerable distances.
		As a response to muddy roads, people put bricks and wooden material on their property. Bricks are costly.
		A man in Datinakhali, Burigoalini Union states that he constructed a brick road himself. This man is reported to be wealthier, and thus has more funds for such a project than regular people.
		When the embankment breaks, the area floods. In response, people travel by boat. They have to accept the flooding situation until the embankment is fixed.
		After flooding, people live on boats as there is insufficient space in the cyclone shelter. Living on a boat is not safe. There is reportedly one cyclone shelter for 5,000 people in Gabura Union.

Contextual data

	CATEGORY	DEFINITION
1	Social environment	The price of soybean oil, which is used for cooking, has doubled in the last two months.
		Shrimp farming needs considerably fewer people than rice cultivation, thus employment has decreased over the last decade.
		Men often do migratory work in brickfields for a few months at a time as employment is scarce in the research area.
		Mainly women fish on the riverside, exposing them to saline water.
		Hindu communities practice Puja, sacrificing flowers and fruits, singing, dancing and playing traditional instruments.
		Women are barely seen on the streets, which are predominantly filled with men from approximately 10 to 70 years old.
2	Natural environment	
3	Built environment	A great number of toilets in Gabura Union are found at the riverside. Almost all of these toilets are damaged.
		Houses are mainly built using tin, wood and bamboo. Brick houses are rarely found. Some people have constructed brick houses with the support of NGOs.
4	Other	There are dolphin rescue, tiger rescue and cyclone response teams in the research area. These are organised by nongovernmental organisations.
		The government has put restrictions on access to the Sundarbans. There are no pre-determined days that people can enter the forest. Sometimes it closes for six months a year. During these times, they cannot fish or harvest wood. People have received rice as compensation, but the selection process is reportedly prone to corruption. This significantly impacts the local population as they are highly dependent on the forest. Additionally, there is very little alternative income.
		Not all women are comfortable talking about gynaecological issues.

Appendix 9. FGDs: guide

	COMPONENT
Introduction	Welcome and thank participant for their participation
	Introduction of researcher, interpreter and note taker
	Explain the general purpose of the research
	Reinforce why participants were chosen and importance of their contribution
	Outline how the information will be used and by whom
	Explain the structure of the discussion (10 categories) and expected duration
	Explain the purpose of recording and taking notes, and seek permission
	Ask if it is clear what the interview structure is and how their information will be used
	Ask if there are additional questions and if participants feel comfortable to start
Natural hazards	Rate the eight natural hazards using cards (Appendix 11)
Non-economic losses and damages per category	Talk about losses and damages related to the topic
	Ask for confirmation and if we missed information
	Talk about responses related to losses and damages
	Ask for confirmation and if we missed information
Closing	Ask if there is any other information they would like to give
	Ask about the participants experiences of the FGD
	Thank participants for participation
	Check if they agree that this information can be used within the research
	Discuss representation with the participants

Source: adapted from Hennink, 2007

Appendix 10. FGDs: structure

1. Ecosystem services and biodiversity

LOSSES	RESPONSES
Vegetation, decrease in: ▪ Fruit trees ▪ Vegetables ▪ Grassland ▪ Mangrove trees	▪ People plant fruit trees in their yard, buying seedlings with their own money. The success rate is low ▪ People plant other trees for protection, planting seeds in the ground ▪ Trees are protected from goats and cows, with nets
Animals, decrease in: ▪ Birds ▪ Freshwater fish ▪ Tigers ▪ Deer ▪ Insects ▪ Crabs ▪ Cows ▪ Goats	▪ People try to bring animals back, but face adversities: cows have nothing to graze on, and fishponds do not work due to flooding ▪ Trees are planted to bring back the birds

2. Education

LOSSES	RESPONSE
During floods and disasters, school is halted for two to three months	▪ Parents or children themselves study at home, but this is not always effective ▪ Tuition takes place at home, from local teachers

3. Mobility

LOSSES	RESPONSE
▪ During floods/cyclones, people get stuck in their house or cyclone shelter ▪ The roads get muddy and are hard to walk on ▪ Some people live on the embankment for months at a time ▪ The mobility of women is especially limited, as with a sari they cannot run	▪ During floods, boats are used for transport ▪ Most people have boats; those who do not have boats get help from others ▪ For muddy roads, people put down bricks; however, this is not done everywhere, as bricks are expensive

4. Social fabric

LOSSES	RESPONSE
Positive: ▪ Let people take shelter ▪ Repair houses ▪ Look after family of migrant workers ▪ Support via work for free ▪ Support with food ▪ Support with fresh water ▪ Inter-community support	Not relevant
Negative: ▪ Families and communities get separated during relocation/migration ▪ Ability to be hospitable to friends and relatives is less due to economic constraints ▪ Loss of attachment among people ▪ No sharing of vegetables ▪ Increase in conflicts	**Not much response, but:** ▪ If there is a conflict, other community members help out ▪ Inviting people to maintain a relationship

5. Mental and emotional wellbeing

LOSSES	RESPONSE
Fear for: ▪ Losing house ▪ Another cyclone ▪ Safety of children ▪ Next generation ▪ Existence and resources ▪ Losing livestock ▪ Lack of mobility Women have more fear. Causes are: ▪ They have more responsibilities: looking after house, children and domestic animals ▪ Men are more brave and express fear less Also: ▪ People don't fear so much anymore as they are getting used to it	For cyclone: ▪ People check the latest developments of potential cyclones on their smartphones; this reduces anxiety Overall: ▪ Migrate to a less vulnerable area ▪ Religion helps, people pray more ▪ Stronger houses and preparation help with the fear

6. Physical wellbeing

LOSSES	RESPONSE
More sicknesses, overall: ▪ Diarrhoea ▪ Vomiting ▪ Itching problems ▪ Water-related diseases ▪ Skin diseases ▪ Skin cancer ▪ Cold ▪ Fever ▪ Hair loss, hair damage **Before a cyclone:** ▪ Headache ▪ Blood pressure **Other:** ▪ Skin is getting darker	**Cyclone:** ▪ People get (dry) foods in house ▪ People store medicine ▪ People buy water **Other:** ▪ People put cream on their body before working in the saline water ▪ Some people first try herbal treatments; for example, paste of Neen trees ▪ People then go to a Kobiraj or village doctor ▪ If that does not work, they go to a 'real' doctor ▪ They use henna for hair **Also:** ▪ The amount of village doctors is rising and more people are becoming village doctors

7. Losses of lives

LOSSES	RESPONSE
Cyclone: ▪ Cyclone Aila: mainly children and elderly people died ▪ After Aila, there were no significant deaths from cyclones **Other:** ▪ People die of water-related sicknesses, like diarrhoea	**Support:** ▪ When someone dies, the community gives support to arrange the funeral and/or other cultural traditions ▪ Mental support for the family **Burying:** ▪ During Aila there was not enough space to bury everyone, so they are buried somewhere else ▪ Reports of being further away, so visiting grave less

8. Indigenous and local knowledge

LOSSES	RESPONSE
Agriculture related: ▪ Traditional knowledge about agriculture is decreasing, and younger generation does not even know what agriculture is **Other:** ▪ Other Indigenous knowledge is disappearing, but this is more due to a rise of technology than a change of environment	**Agriculture related:** ▪ Agriculture is not possible anymore due to the saline ground. This means bringing back this knowledge is not relevant

9. Territory

LOSSES	RE
Attachment: ▪ Attachment is decreasing as it is increasingly harder to live here **Stay or leave:** ▪ People feel tied to the land, as family and community lives here. And they depend on the forest ▪ But if they had the resources, they would leave **Munda people are observed to have a stronger attachment to the land, as:** ▪ They want to stay on their ancestors' land ▪ They want the rights of the land	**Atta** ▪ In la pr

10. Culture and practices

LOSSES	RESPONSE
▪ People cannot grow vegetables, keep domestic animals or do home gardening, due to salinity ▪ People do not celebrate festivals as often ▪ Certain cultural foods have disappeared: rats, frogs and snails **For Hindu people:** ▪ Less fruits and flowers during Puja ▪ Decrease in cow-related rituals	▪ There are floating gardens, where people get soil from somewhere else and put it in buckets ▪ People go greater distances to collect food ▪ People try to grow fruit trees and vegetables, but this is challenging due to the salinity intrusion

11. Munda-related losses and damages

LOSSES	RESPONSE
▪ Overall, Munda people are more affected as they are more vulnerable ▪ Example: there was no room for Munda in the cyclone shelter as they are a minority community	n/a

12. Women-related losses and damages

LOSSES	RESPONSE
Darker skin affects marriage, making it harder for women to find husbands. This can result in more early marriages	Women stay inside more, to make sure that they are less dark and have less skin-related problems
Women have to walk further to get water, resulting in less time for household work	n/a
Women are more susceptible to diseases	
There is less toilet availability after disasters, which is especially tough for women as they feel uncomfortable with this	
People believe women should not go to a broken road, as they will get hurt	

Appendix 11. FGDs: summaries

Specific information from the summaries can be available upon further request.

Appendix 12. Coding table

Available upon request.

People in Burigoalini and Gabura Unions frequently face climate-related hazards. Adequate measures addressing these hazards are often missing, causing losses and damages. Non-economic losses and damages are items that are not commonly traded in markets (for example, biodiversity and culture). The non-economic losses and damages that people in both unions face were explored under ten categories, followed by an examination of local responses to these impacts. A set of conclusions and recommendations were drawn from the observations made during this study. Topics included are local capacity, gender inequality, and the valuation of non-economic losses and damages.

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