

Emotional Evidence of Change: Highlanders Experiences with Glacial Retreat in Peru

By

Kara Chipiwalt

July 2019

Director of Thesis: Beth A. Bee

Major Department: Geography, Planning and Environment

Global climate change is a phenomenon studied by some, but experienced by many. Communities in various places across the globe live with the physical and social effects of that phenomenon each day, with the most highly vulnerable residing in developing countries, especially those in mountainous environments. Much like a keystone species, glaciers are largely depended upon at global and local scales. They offer climate data from core samples, influence sea level, serve as a water resource for individuals, communities, and agriculture, provide spaces for recreational activities and cultural practices, as well as influence religion and beliefs. Because of this, they are widely representative for showcasing the effects of climate change. There is ample evidence within the physical sciences backing the occurrence of changes in mountain environments, with less evidence present in the human dimensions, and particularly less on how it affects individuals who reside in these spaces on an emotional level. An emotional geography lens unveils the need for a deeper understanding of the individualistic ties humans have to people, places, and spaces, while a feminist political ecology lens helps illuminate the gendered capabilities and needs to adapt to a changing climate. This paper draws on a case study conducted using qualitative methods from communities in the Peruvian Andes as evidence of the need to address emotional welfare. This study utilizes the frameworks of feminist political

ecology and emotional geography to understand the various challenges to adapting to climate change in a mountain environment.

**EMOTIONAL EVIDENCE OF CHANGE: HIGHLANDERS EXPERIENCES WITH
GLACIAL RETREAT IN PERU**

A Thesis

Presented To the Faculty of the Department of Geography, Planning and Environment

East Carolina University

In Partial Fulfillment of the Requirements for the Degree

Master of Science in Geography

by

Kara Chipiwalt

July 2019

© Copyright 2019

Kara Chipiwalt

Emotional Evidence of Change: Highlanders Experiences with Glacial Retreat in Peru

by

Kara Chipiwalt

APPROVED BY:

DIRECTOR OF

THESIS: _____

Beth A. Bee, PhD

COMMITTEE MEMBER: _____

B. Blakely Brooks, PhD

COMMITTEE MEMBER: _____

Jeffrey E. Popke, PhD

COMMITTEE MEMBER: _____

Thad Wasklewicz, PhD

CHAIR OF THE DEPARTMENT

OF GEOGRAPHY, PLANNING AND ENVIRONMENT: _____

Thad Wasklewicz, PhD

DEAN OF THE

GRADUATE SCHOOL: _____

Paul J. Gemperline, PhD

DEDICATIONS

I want to take a moment to dedicate this research to a few individuals who have fueled my drive throughout the process of completing my thesis. First, I would like to dedicate this research to my father, Laurence M. Chipiwalt, who fueled the fire in my soul and cultivated my passion for learning about and protecting the environment, as well as passing on to me the importance of perspective and ability to remain teachable.

Secondly, I dedicate this research to my aunt, Karen L. Poore, who taught me the importance of facing challenges with strength and grace.

Lastly, I would like to dedicate this research to the individuals who participated in this study and allowed me to share their voices with the world, as well as all of those who are suffering from personal, familial, societal, and politically driven impacts in the wake of climate change and feel their voices have not yet been heard. You are seen. Your voice matters. This is for you.

ACKNOWLEDGMENTS

The process of completing my thesis would not be properly fulfilled without giving acknowledgements to the people who guided me through. First and foremost, I would like to thank my advisor, Dr. Beth Bee, for her guidance, support, and most of all encouragement throughout this process. This thesis started out as, what I thought at the time, an impossible idea in my mind, which turned out to be a reality due to her constant encouragement and confidence in my capabilities. Before my time at East Carolina, I had never traveled outside of the United States or on an airplane. Furthermore, I had taken years of Spanish, but never immersed myself within a Spanish-speaking culture. By pushing myself to step outside of my comfort zones, I was able to gain perspective regarding the topics of this research, the world in general, and achieve much personal growth throughout this process. For that, I have Dr. Bee to thank.

I would also like to thank Dr. Jeff Popke and Dr. Thad Wasklewicz for their guidance and recommendations in refining the thoughts, ideas, and scope of my thesis content. Their insights helped me broaden my approaches and perspectives during this process. Likewise, I would like to thank Dr. Benjamin B. Brooks for also providing support, guidance, recommendations, and encouragement throughout this process. Dr. Brooks led the 2018 field school team that I was a part of through ECU study abroad, which helped me learn how to conduct ethnographic research and thus provided me with the tools I needed to conduct my own study. Because this type of research was very new to me, the process was challenging at times. However, I was able to overcome any obstacles with the guidance and support of Dr. Brooks.

Additionally, I would like to thank each and every one of the individuals who agreed to participate in my research and offer their insights, experiences, and knowledges regarding the topics to precede. I am humbled and honored with the opportunity to share their narratives.

Lastly, I would like to acknowledge each of my family members and friends for their support and encouragement throughout this process. Their constant faith in my abilities continuously pushed me to carry on and achieve my goals. This research would not have been possible without them, or those mentioned above. I thank and appreciate each and every one of you.

TABLE OF CONTENTS

LIST OF TABLES	x
LIST OF FIGURES	xi
CHAPTER 1: INTRODUCTION	1
CHAPTER 2: LITERATURE REVIEW	8
2.1 Climate change, glacial retreat, and the implications	8
2.2 Embodied knowledge of socio-ecological change	13
2.3 Feminist political ecology	16
2.4 Emotional geographies and experiential knowledge	23
CHAPTER 3: STUDY AREA	28
3.1 Peruvian culture and identity	28
3.2 Huaraz and the Cordillera Blanca	30
3.3 Water availability, access, and quality in the Cordillera Blanca	35
CHAPTER 4: METHODOLOGY	39
4.1 A qualitative methodological approach	40
4.2 Data sampling and participant recruiting	41
4.3 Data collection	42
4.3.1 Semi-structured interviews	43

4.3.2 Free listing	45
4.3.3 Participant observation	45
4.4 Data analysis	47
4.4.1 Qualitative methods of analysis	47
CHAPTER 5: EMOTIONAL EVIDENCE TOWARD A CHANGING CLIMATE	50
5.1 Emotional evidence of environmental changes	51
5.1.1 Categories of emotional evidence	56
5.1.2 Positive emotions	58
5.1.3 Negative emotions	59
5.1.4 Neutral emotions	60
5.2 Experiences with environmental change	61
5.2.1 Experiences with glacial changes	64
5.2.2 Experiences with temperature	69
5.2.3 Experiences with water availability	72
5.2.4 Participants' Other Experiences with Environmental Changes	78
CHAPTER 6: GENDERED EXPERIENCES AND EMOTIONS	83
6.1 Gender and the everyday	83
6.1.1 Gendered roles and climate change	84

6.1.2 Gender-nature relations	87
6.1.3 Emotional language use	90
CHAPTER 7: CONCLUSION	98
REFERENCES	103
APPENDIX A: IRB APPROVAL	113
APPENDIX B: PARTICIPANTS	114
APPENDIX C: INTERVIEW GUIDES	116

LIST OF TABLES

1. Temperature and rainfall trends in Huaraz for the month of July	33
2. Example Semi-Structured Interview Guide	44
3. Example Codes – Deductive Analysis	49
4. Emotion Words in Total	51
5. Semi-Structured Interview Question Types and Emotional Responses	52
6. Emotion Words by Category	57
7. Glacial Changes: Participants Experiences with Appearance	67
8. Glacial Changes: Participants Other Experiences	68
9. Participants Experiences with Temperature	71
10. Participants Experiences with Water Availability	72
11. Participants Experiences with Water Management	74
12. Participants Experiences with Water Availability and Glaciers	77
13. Participants Experiences with Other Environmental Changes	80
14. Participants Experiences with Mining	81

LIST OF FIGURES

1. Levels of carbon dioxide in the atmosphere	9
2. Changes of water runoff in the Cordillera Blanca	11
3. Plaza de Armas, Huaraz	31
4. The Market, Huaraz	31
5. Sources of water runoff	32
6. Map of the Cordillera Blanca	34
7. Map of the Santa River watershed	35
8. Semi-structured interview question types	53
9. Emotional Language: Total Participants	54
10. Emotional Language: Total Frequency	55
11. Emotional Language: Total Frequency per Category	58
12. Positive Emotional Language in Total	59
13. Negative Emotional Language in Total	60
14. Participants' experiences with environmental changes	63
15. Participants' experiences with glacial changes	65
16. Uses for water per gender	87
17. Cause of Environmental Changes per Gender	90
18. Emotional Language: Total by Gender	92
19. Emotional Language: Frequency per Gender	93
20. Emotional Language: Frequency by Gender, per Category	95

CHAPTER 1: INTRODUCTION

Though the planet goes through natural cycles of change throughout its lifespan, climate scientists argue that human actions have prompted a higher rate of warming, specifically a “0.2°C” rise “per decade” (Allen et al., 2018, p. 51). The baseline effect of climate change is a global temperature increase. That increase then becomes a catalyst for other effects, such as extreme weather events, sea level rise, and glacial changes, as well as impacts to ecosystems, populations, and levels of biodiversity (NASA, 2019; Allen et al., 2018; EPA, 2017). As far as human risk is concerned, the Intergovernmental Panel on Climate Change, or IPCC, Special Report written by Allen et al. (2018) states with high confidence that the effects of climate change “fall disproportionately on the poor and vulnerable” (p. 51). Those individuals are likely to live in “low and middle income countries,” which experience or are on the rise of experiencing food insecurity (Allen et al., 2018, p. 53). Among the places those vulnerable individuals are residing are mountainous areas, which are one of the utmost affected spaces by climate change (Allen et al., 2018; EPA, 2016; Winkler et al., 2010; Huber et al., 2005; Haeberli et al., 2007; Barry, 2006; Diaz et al., 2003).

Mountains provide water for most of the river systems worldwide (Haeberli & Beniston, 1998; Viviroli & Weingartner, 2004). Those regions merely occupy a little over one-fourth of the globe, but they “supply a far greater part of the world’s population with water” (Viviroli & Weingartner, 2004, p. 6). Likewise, people who reside alongside mountainous regions with glaciers utilize the water runoff for various reasons (Bradley et al., 2006; Barnett et al., 2005; Viviroli & Weingartner, 2004). Not all mountainous areas consist of glaciers, as glaciers are likely to form via snow accumulation on higher elevational mountains, also known as mountain glaciers (Ben & Evans, 2013). Ben and Evans (2013) state:

“... in glaciers and ice sheets ice can exhibit a wide variety of surprising and fascinating behaviour. It can flow plastically, like toothpaste, mould itself around hills and valleys, and creep and slide from high snowfields down towards lower ground. It can curve out huge troughs and alter entire landscapes, scouring away soil and other surficial material or blanketing large tracts with glacial deposits. Glaciers and ice sheets can alter the Earth’s climate, chilling the atmosphere and the oceans, and profoundly affecting the global hydrological cycle” (Preface to the First Edition).

Glaciers are critical resources both locally and globally (Carey et al., 2016). They serve as a water resource for individuals and agricultural practices, provide electricity through hydropower, offer climate data from core samples, effect sea level, provide spaces for cultural and recreational activities, as well as shape the practices, principles, and ideals of many individuals (Carey et al., 2016; Jianchu et al., 2009). As a result, glaciers are globally representative for showcasing the effects of climate change (Kaser et al., 2006). Physical evidence backing the occurrence of glacial retreat exists in abundance and is crucial to understanding the impacts to those landmasses, as well as to their surrounding ecosystems (Jiménez Cisneros et al., 2014; Vuille et al., 2008; Barnett et al., 2005; Mark & Seltzer, 2003). However, less common is evidence of glacial retreat within the human sciences, particularly the human dimensions of geography, and that viewpoint is viable and credible as well.

In recent years, scholars have begun to account for natural phenomena, such as the effects of climate change, using narratives of individuals (du Bray et al., 2018; Ryan, 2016; Brugger et al., 2013; Sakakibara, 2008). The narratives of individuals who have experiences with glaciers and glacial retreat provide viable, credible evidence and knowledge of the topic. In some cases, generations of populations have resided near glaciers and offer knowledge about climate change

over centuries of time (Cruikshank, 2001). Nevertheless, those narratives appear veiled in leading climate science discourse about glacier retreat (NASA, 2019; Allen et al., 2018; EPA, 2016; Rice et al., 2015; IPCC, 2014; IPCC, 2007). According to Haraway (1988), science is “a contestable text and a power field” (p. 577). The idea that physical science holds more weight than human science could stem from the age of enlightenment. Before the age of enlightenment, both physical and human sciences were on the same playing field; neither dimensions were commonly viewed as *good* or *bad*, credible or non-credible, masculine or feminine (Sharp, 2009; Livingstone & Withers, 1999). Livingstone and Withers (1999) state that:

“In scientific circles, the Enlightenment in France was characterized by a rational enthusiasm or the sense that, with the right questions, most puzzles could be elucidated; by a belief in progress, both human and natural; by a passion for exploration, observation, and the collection of information (and specimens) and the sense that the collection and classification of observations would in itself lead to enlightenment...” (p. 238).

Although the scholars, scientists, and individuals involved in the spreading of those ideals intended to enlighten or evolve knowledge, those ideals also brought on a separation of what type of knowledge is acceptable (Sharp, 2009). Thoughts and knowledge beginning and relying within individuals themselves were “opposing the enlightenment ideal of the rational, objective... knower” (Sharp, 2009, p. 75). Since the brink of industrialization and technology, science has come to mean *apart from society*, as well as nature (Nightingale, 2003; Cruikshank; 2001; Haraway, 1992; Haraway, 1988; Merchant, 1980). Cruikshank (2001) aims to understand the narratives of locals about glaciers in Alaska and comments on how some individuals may view those narratives as “myth,” while others in that area consider them “science” (p. 378). As a

result, rather than having both *myths* and *science* working toward the same goal, or meaning and describing the same phenomenon, the two words assume one is valid while the other is not.

Science itself is considered to be an unbiased, unemotional, and untampered with account of the world (Haraway, 1988). As a result, some individuals associate the idea of science specifically with physical dimensions of knowledge. Nevertheless, Nightingale (2003) explains how:

“Qualitative, interpretive methods provide rich, thick results, but combined with other methods, these results can be richer and thicker, and we can demonstrate how fragmented and situated all knowledge is. What is at issue is not whether different methods, qualitative or quantitative, are feminist, but rather do they fully embrace the notion of different knowledges. When different kinds of knowledges are taken seriously and all are critically interrogated, richer results are generated, new interpretations emerge and the supremacy of any one kind of knowledge is challenged” (p. 86).

The narratives of people who are close to nature, both in proximity and self-perceived, have unveiled obstacles that could provide insight and help decision-makers find proper solutions to climate change impacts (Piersall & Halvorson, 2014; Tschakert et al., 2011; Sakakibara, 2008; Albrecht et al., 2007; Cruikshank, 2006; Cruikshank, 2001). Some of those obstacles include issues associated with gender, power, access, and agency over resources (Brugger et al., 2013). One way to better understand those obstacles is to utilize a feminist political ecology (FPE) lens, which looks at how power dynamics over natural resources can shape access and agency, and differ per gender, among other identities.

Feminist political ecology focuses on individual, embodied experiences (Elmhirst, 2015; Rice et al., 2015; Nightingale, 2011; Truelove, 2011). When scholars use an FPE lens to

understand broad issues like climate change impacts, they are able to look at how those issues affect individuals systematically. FPE brings forth the opportunity to look at the factors that shape how individuals have or lack power, access, and agency over natural resources, depending on their gender and other identities (Elmhirst, 2015; Elmhirst, 2011; Nightingale, 2011; Sultana, 2011; Truelove, 2011; Sharp, 2007; Nightingale, 2006; Hovorka, 2006; Rocheleau et al., 1996). In order to progress toward understanding the individual's experiences with climate change effects, considering their narratives is also a key piece to the puzzle. An emotional geography lens challenges typical knowledge production, by bringing the knowledge produced back to the actual body producing the knowledge (Bondi et al., 2007; Morris & Thomas, 2005; Anderson & Smith, 2001; Kemper, 2000; Widdowfield, 2000; Williams, 2000). Therefore, using the narratives of individuals who have experienced climate change impacts as evidence of those phenomena could enhance the knowledge base for decision-making. By "valuing people's everyday experiences of climate change and diverse ways of knowing climate," solutions can be realized through the use of "the knowledge and experience they already have" (Rice et al., 2015, p. 254). This is especially important in cases where individuals express emotional concern about climate change effects. Scholars have begun to consider using emotion as data, but presenting such cultural information as clear evidence for scientific processes like climate change is still in its infancy (Cruikshank, 2012).

Leavitt (1996) discusses how emotions offer insight to "experiences that involve both meaning and feeling, mind and body, culture and biology" (p. 516). Here, experience is defined as a type of knowledge, a knowledge that is gained through living. Certain experiences, or knowledge, can yield emotional responses. Rocheleau et al. (1996) also state that there are "gender differences in experiences of, responsibilities for, and interests in 'nature' and

environments” (p. 3). By adding emotion, and experiences, to the mix, decision-makers can make more effective and efficient solutions for the impacts associated with climate change. In past studies on emotion and climate change, scholars have also focused less on gender (Brugger et al., 2013; Ryan, 2016; Sakakibara, 2008). By adding a gender component to emotion work, gaps can be filled that could also better inform decision-makers. This is especially important when focusing on areas of the world that struggle the most with climate change effects, such as the global south.

This research focuses on a case study in the Peruvian Andes, within the Cordillera Blanca mountain region. The purposes of this research are to provide evidence of glacier retreat using the narratives of individuals, bring awareness of the need to address emotional welfare, as well as the need to address personal identities, such as gender, when understanding the various challenges to adapting to climate change in a mountain environment. Drawing from the two frameworks of feminist political ecology and emotional geography, this research seeks to shed light on the following questions: **(1) what emotional evidence do Peruvian highlanders offer towards climate change, specifically glacial retreat** and **(2) are those emotional narratives gendered.**

The subject of this research is particularly relevant in current geographic discourse as the rise of climate change impacts increase. The answers to those two questions could potentially add to and improve the knowledge base within geographic literature concerning individuals’ experiences with climate change impacts in highly vulnerable areas. Additionally, by focusing on emotional evidence, I argue that a deeper understanding of how those impacts affect the lives of *individuals*, rather than mere communities or populations, is necessary. I also argue for unpacking how the various identities of knowledge producers, such as gender, affect their

experiences with climate change and means to adapt. The results of this research could potentially provide evidence of issues with current solutions to climate change impacts, as well as establish necessary means to creating more effective and efficient resolutions.

The following chapters encompass the results of my research. I will first discuss the literature concerning the subjects of my study, followed by the study site and methodology I used to conduct this research. Chapter 5 will elucidate the experiences of my participants with climate change effects, which have led to their emotional concern of the issue. Chapter 6 will focus more on the gendered dimensions of my participants emotional responses. The final chapter of this thesis includes a conclusive overview of possible meanings and applications of my findings, as well as future directions of research.

CHAPTER 2: LITERATURE REVIEW

2.1. Climate change, glacial retreat, and the implications

Based on ice-core data samples, scientists have estimated that the current level of carbon dioxide in the atmosphere is higher than it has been in the last couple of hundred thousand years (Karl et al., 2009; NASA, 2019). According to the National Aeronautics and Space Administration (2019), or NASA, most of Earth's natural cycles of warming occur due to "small variations in Earth's orbit that change the amount of solar energy our planet receives" (n.p.). Nevertheless, contemporary climate change factors also include human-induced warming (National Academies of Sciences, 2005; Karl et al., 2009; IPCC, 2014; NASA, 2019). According to the IPCC Fifth Assessment Report, human "interference with the climate system is occurring, and climate change poses risks for human and natural systems" (IPCC, 2014, p. 3). One of the most telling signs of climate change is glacial retreat, due to the size of glaciers, their masses, and the processes that take place for them to begin retreating (Oerlemans, 2001; Brugger et al., 2013).

Carey et al. (2016) refer to glaciers as basic gauges for measuring the physical environmental effects of climate change. Glacial recession is occurring globally and because many factors play a role in the retreat of a glacier, much research surrounding recession dwells within the physical sciences (Oerlemans, 2001; Möller et al., 2007). Henry Pollack (2009) states:

Nature's best thermometer, perhaps its most sensitive and unambiguous indicator of climate change, is ice. When ice gets sufficiently warm, it melts. Ice asks no questions, presents no arguments, reads no newspapers, listens to no debates. It is not burdened by ideology and carries no political baggage as it crosses the threshold from solid to liquid.

It just melts. (p. 114)

with “almost all glaciers in the tropical Andes” experiencing rapid “shrinking... since the 1980s” (Jiménez Cisneros et al., 2014, p. 236). Authors of the IPCC Fifth Assessment Report agree that climate change is deteriorating the quality of drinking water, as well as that glacial meltwater “yields from stored glacier ice will increase in many regions during the next decades but decrease thereafter” (Jiménez Cisneros et al., 2014, p. 233). Both of those impacts are vital to the survival of ecosystems in glacial areas.

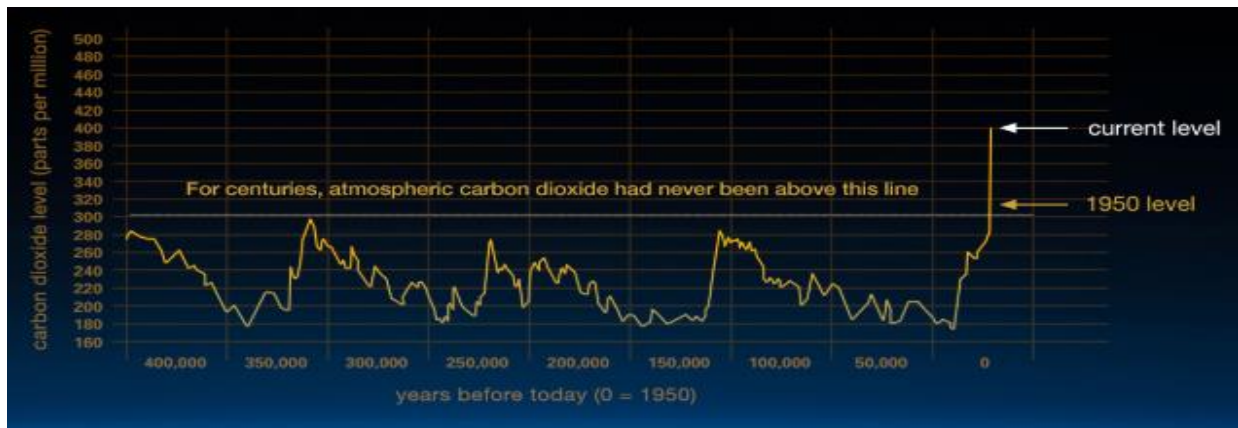


Figure 1. A chart depicting levels of carbon dioxide in the atmosphere over time, based on data collected from ice-core samples. This chart is derived from NASA (2019, n.p.).

The physical evidence of glacial recession is studied worldwide (Kaser et al., 2004; Bolch, 2007; Sorg et al., 2012; Piao et al., 2010; Vuille et al., 2008; Cook et al., 2005). Although climate change threatens human populations and ecosystems in glaciated areas worldwide, communities near these spaces in the global south increasingly witness its burdens, particularly those in Peru. The IPCC’s Fourth Assessment Report (2007) includes discussion of climate change effects in Peru such as precipitation changes, an increase in temperatures, an increase in extreme weather events, and acceleration of glacial melting. Additionally, those effects are likely

to increase given the projections of either a 1 to 4°C or 2 to 6°C average temperature rise in Latin America, derived from models depicting several scenarios labeled as medium on their confidence scale (IPCC, 2007). Those consequences of climate change affect Latin American ecosystems, particularly those in mountain and glacier environments (Bury et al., 2011; IPCC, 2007). The Cordillera Blanca is one of the many mountainous regions of the Peruvian Andes and is home to the tallest Peak in Peru, Huascarán (Parks Watch, 2004).

In the Cordillera Blanca, precipitation is seasonal and comprises of a rainy season occurring between October and April and the dry season receiving rare to no rain (Baraer, et al., 2012, p. 135). Both temperature and precipitation affect the glacial processes taking place in this area, such as ablation, sublimation, and accumulation. Glacial ablation in the Cordillera Blanca occurs year-round. However, during the dry season sublimation can slightly reduce the melting rate (Baraer et al., 2012). The accumulation process takes place at high altitudes on the glaciers throughout the wet season (Baraer et al., 2012). Baraer et al. (2012) conduct trend and model analyses on the glaciated areas of the Cordillera Blanca by utilizing historical data on temperature, precipitation, streamflow, and “annual discharge” from 1930 to 2009 (p. 136). The results of that study show from “1930 to 2009 the percent glacierized area within every watershed decreased” and there is “a clear acceleration” of this event (Baraer et al., 2012, p. 140-141). Additionally, Baraer et al. (2012) provide statistics which show “indications that these systems have crossed a critical threshold,” exhibiting “decreasing annual and dry-season discharge” driven by “the glacial retreat” (p. 148). Because there is clear acceleration in decreased discharge due to glacial retreat, water resources could potentially be threatened. For example, mountainous communities in the Cordillera Blanca largely depend upon water runoff from glaciers to supply their household, agricultural, and community needs (IPCC, 2007). Figure

2 below shows a table produced by the IPCC (2007), which reports major changes in glacial runoff and streamflow within the last couple of decades. As a result, the IPCC (2007) reports with high confidence that many Andean glaciers “are very likely to disappear, affecting water availability and hydropower generation” within the next twenty or so years (p. 53). Most contemporary experiences locals have with glacial recession deal with changes in water usage and scarcity.

Environmental factor	Observed changes	Time period	Location	Selected references
Runoff/ streamflow	Annual increase of 5%, winter increase of 25 to 90%, increase in winter base flow due to increased melt and thawing permafrost	1935-1999	Arctic Drainage Basin: Ob, Lena, Yenisey, Mackenzie	Lammers et al., 2001; Serreze et al., 2002; Yang et al., 2002
	1 to 2 week earlier peak streamflow due to earlier warming-driven snow melt	1936-2000	Western North America, New England, Canada, northern Eurasia	Cayan et al., 2001; Beltaos, 2002; Stone et al., 2002; Yang et al., 2002; Hodgkins et al., 2003; Ye and Ellison, 2003; Dery and Wood, 2005; McCabe and Clark, 2005; Regonda et al., 2005
Runoff increase in glacial basins in Cordillera Blanca, Peru	23% increase in glacial melt	2001-4 vs. 1998-9	Yanamarey Glacier catchment	Mark et al., 2005
	143% increase	1953-1997	Llanganuco catchment	Pouyaud et al., 2005
	169% increase	2000-2004	Artesonraju catchment	Pouyaud et al., 2005

Figure 2. A table derived from the IPCC (2007) portraying the rate of changes in runoff and streamflow, particularly in the Cordillera Blanca, Peru (p.89).

According to Chevallier et al. (2011), water runoff from Cordillera Blanca glaciers is vital not only for local communities, but also economically for the country as well. Water runoff is used to produce hydropower in some areas, such as those in Cañón del Pato, which provides much of Peru’s electric power (Lynch, 2012). Communities in the Cordillera Blanca region also utilize runoff for household, agricultural, and community-based needs (Bury et al., 2011; Lynch, 2012). Examples of uses derived from a study in the Rio Santa Valley by Lynch (2012) include grazing, fishing, tourism, livestock, agriculture, mining, and urban use, depending upon the community. In areas between 6,000 and 13,000 feet, communities use a technique called “irrigated slope agriculture,” which allows them to irrigate based on the natural paths created by

water flow (Chevallier et al., 2011, p. S185). Areas from 2,000 feet to the base of the mountain use irrigation to replenish larger farms (Chevallier et al., 2011). However, because of climatic changes and multiple uses for the glacial water runoff, there is competition issues amongst communities that use water runoff for irrigation, domestic use, and energy (Lynch, 2012; Chevallier et al., 2011).

The vast and complex effects of climate change is not only creating in these mountainous areas, therefore, call for a depth of understanding. If the effects are not only seen, but also felt by individuals in these spaces, there needs to be a reconstruction of how decision makers view credible knowledge, as well as how they create and implement solutions. According to an IPCC Special Report written by Allen et al. (2018):

“Multiple forms of knowledge, including scientific evidence, narrative scenarios and prospective pathways, inform the understanding of 1.5°C. This report is informed by traditional evidence of the physical climate system and associated impacts and vulnerabilities of climate change, together with knowledge drawn from perceptions of risk and the experiences of climate impacts and governance systems. Scenarios and pathways are used to explore conditions enabling goal-oriented futures while recognizing the significance of ethical considerations, the principle of equity, and the societal transformation needed” (p. 52).

Although that “traditional” evidence is necessary, valid, and credible, social science is also necessary to complete the understanding of the changing climate and its impacts on social and ecological systems (Allen et al., 2018). Those data are common in the form of statistics, figures, models, etc. (Brugger et al., 2013). Among individuals in the science world, academia, and even for individuals outside those realms, physical evidence is viewed as the most viable and credible (Harding, 1986; Code, 1991; Lawson, 1995; Sundberg, 2003; Moosa & Tuana, 2014; Carey et

al., 2016). Harding (1986) comments that “neither God nor tradition is privileged with the same credibility as scientific rationality in modern cultures” (p. 15). The view of physical scientific evidence being viable and credible is valid, matters, and is crucial for advancement in knowledge and science. Within the social sciences, a feminist lens and a focus on embodied knowledge is one way of better understanding those impacts.

2.2. Embodied knowledge of socio-ecological change

By looking at nature-society relationships through a feminist lens, scholars can focus on actual bodies that are experiencing phenomena such as climate change. Nature-society relations are an important component to understanding climate change, beings that humans have resided near spaces heavily impacted for centuries (Cruikshank, 2001; Cruikshank, 2006; Cruikshank, 2012; Tschakert et al., 2013; Piersall & Halvorson, 2014). The aim of these studies is not to discredit or disqualify certain areas of expertise, science, or facts, but rather focus on filling in gaps and understanding, in order to offer a more holistic approach to knowledge. Physical science methods “can be utilized in conjunction with other methods to probe human environment issues in new ways” (Nightingale, 2003, p. 86). By leaning too heavily on the physical sciences, Haraway (1988) points out that a distance forms away from the “knowing subject from everybody and everything in the interests of unfettered power” (p. 581). Therefore, a sense of embodiment is now necessary to fill those voids.

Contemporary feminism and feminist studies allows scholars to focus on the individual and embodied knowledge. Feminist studies allow the “embodied others, who are not allowed to have a body, a finite point of view... inevitably disqualifying and polluting bias” a seat at the table (Haraway, 1988, p. 575). The inclusion of embodied knowledge is crucial when dissecting

nature-society relationships, especially in the wake of climate change as solutions often entail too broad of a scale. Haraway (1988) states:

I am arguing for politics and epistemologies of location, positioning, and situating, where partiality and not universality is the condition of being heard to make rational knowledge claims. These are claims on people's lives. I am arguing for the view from a body, always a complex, contradictory, structuring, and structured body, versus the view from above, from nowhere, from simplicity..." (p. 589).

The exclusion of certain individuals from discussion about climate change solutions is limiting the prospects of successful remedies, beings that decision-makers are rarely experiencing changes first-hand. According to Skinner (2011), the "poorest women and men in the global South who have contributed the least to the problem find their livelihoods most threatened" (p. 2). By excluding individuals who are actually experiencing climate change, solutions are often disembodied. However, in many mountainous areas, especially in the global south, culture is closely tied to nature. Brugger et al. (2013) discuss the narratives of individuals located near the Cordillera Blanca, where a few community members "speak of 'the end' in reference to not only the glacier but also to their own existence, viewed as intrinsically linked to the glacier" (p. 8). When climatic changes occur, communities in those areas are quick to take notice. Therefore, seeking out their expertise on issues of climate change could be beneficial.

Plumwood (1993) explains that the creation and cycled view of the nature-human dualism has prohibited decision-makers and western culture from understanding the importance of the fluidity between the two. Plumwood (1993) states that:

"... western culture has treated the human/nature relation as a dualism and that this explains many of the problematic features of the west's treatment of nature which

underlie the environmental crisis, especially the western construction of human identity as ‘outside’ nature” (p. 2).

Local knowledge is crucial, especially concerning places where individuals are most experiencing climate change and their cultures are closely tied to nature. Locals are producers of the kind of knowledge that counts. According to Cruikshank (2006), some locals in glaciated areas have been around for centuries, migrating due to changing climates, marking territories they have come to know inch-by-inch, and documenting wildlife and weather.

According to Carey et al. (2016), there is a demand for a “greater plurality in knowledge about and representations” of climate change (p. 784). Local narratives and knowledge are those new alternatives. Those narratives are crucial because “large populations of non-Western and indigenous peoples inhabit” glacial areas, signifying their extensive experience with knowledge surrounding them (Carey et al., 2016, p. 773). The idea of embodied knowledge is beneficial when studying climate change effects because it focuses on the smallest possible scale, the individual (Tschakert, 2012). Additionally, local knowledge unveils underlying factors that may be exacerbating issues like climate change, especially in global south communities. Gender is one of those factors and particularly one that is rooted in feminist work. Feminism and feminist studies focus on understanding how gender is woven into many areas that people may not always be aware of.

According to Du Bray et al. (2017), not only do individuals have different experiences with climate change by place, but also by gender. There is a need to understand how the power, access, agency, and roles of gender affect the everyday lives of individuals, such as “at the household level and at the wider community level” (Skinner, 2011, p. 16). Haraway (1988) explains that there does not need to be a standard or universal pattern to being or experiencing.

The gendered roles of males and females “do not always fall into universal ‘normal’ patterns,” which means solutions to the impacts of climate change on individuals should be diverse and situational (Skinner, 2011, p. 16). Climate change effects are not experienced proportionally. Therefore, understanding individual, embodied experiences could highlight systematic issues in communities, such as with power, access, and agency over natural resources. Additionally, taking a step further to understanding how those factors affect certain identities, like gender, could offer more profound insight. In order to look into those systematic issues, a feminist political ecology lens is needed.

2.3. Feminist political ecology

Concerning climate change solutions, decision-makers could provide effective solutions by using a feminist political ecology (FPE) lens. FPE is a subfield that seeks to understand the existing complexities between nature and humanity, including issues related to resources and the access and power societies have over them. Usually, unpacking resource-related issues brings to light systematic issues that are oppressing certain individuals based on their personal identities, among other factors. Because of that, this framework is especially crucial for issues related to climate change.

By using an FPE lens, scholars can take a closer look at the dynamics of power and access of a place, which can reveal underlying issues that influence how individuals are affected by climate change, such as inequalities, opportunities, and challenges (Truelove, 2011). Power and access go hand-in-hand in many ways. In some cases, individuals who lack particular power also lack access to certain resources. Power comes in numerous forms and can be gendered in various ways (Elmhirst, 2015; Harris, 2015; Elmhirst, 2011; Sharp, 2007; Nightingale, 2006). Likewise, certain individuals may have or lack power and access based on other identities, such

as race or ethnicity. When it comes to climate change, many times the topic of power relates to decision-making abilities and capabilities. The lack of inclusion for decision-making roles occurs at both large and small scales (Nightingale, 2006).

Regarding gender in particular, Wutich (2012) discusses an example of how power dynamics interplay within a smaller-scale context, utilizing a shantytown community in Cochabamba, Bolivia as an example. They discuss the scarcity of resources and gender, specifically who is making decisions regarding those resources, who “enforces” them, and who “pays the cost” (p. 98). The men of the community were designated as the leaders and decision makers, although many of the women accompanied roles directly associated with the resources in question. Similarly, Anh Vu (2012) and Cruz-Torres (2012) examine how gender plays a role in the management of resources regarding the shrimp business in Vietnam and Mexico. Anh Vu (2012) discusses how in Vietnam, men were seen as the managers of the larger roles in dealing directly with shrimp. However, women held many duties dealing with the shrimp behind-the-scenes, if not more than the men, but were forbidden to enter certain shrimp boundaries because they were believed to cause “bad luck” (p. 172). The power dynamic here seems merely for public appeasement, since in reality the women handle the aspects of the shrimp business that keep it afloat. Cruz-Torres (2012) uses an FPE approach to understand how the women of Mexico participate in shrimp trading. Although those women held many roles in the shrimp business, most of the shrimp trading was legally left to the men, as “gender roles dictated that women should not fish” (p. 213). Here, the power dynamic between genders legally dictated the ability of women to gain income specifically through shrimp trading. Those examples portray the displacement of power per gender, which can also influence access.

Often times, gender affects individuals' access to resources. Concerning climate change specifically, using an FPE lens is necessary to better grasp how gendered power relations shape human relations and experiences with their environments. Particular to climate change, gender has remained a factor because of the presence of inequality, the distribution of power, the amount of access, opportunities, and agency individuals hold, among others, per place and space (Sultana, 2011; Rocheleau, 1996). A focus on gender provides a "key marker of social difference," which allows scholars to gather a holistic understanding of experiences with climate change. Additionally, two prominent themes within environment discourse involving gender are that women are assumed to be closer to nature and therefore "more vulnerable" to climate change impacts (Arora-Jonsson, 2011). Concerning women's relationships with nature, women are often viewed as closer to nature, protectors of nature, and are like nature in that they are passive (Arora-Jonsson, 2011; Ruether, 1995; Plumwood, 1991). According to Ruether (1995), women are also viewed as the "caretakers of small children, the gardeners, weavers, cooks, cleaners and waste managers" (p. 36). Those social constructions of roles placed on particular genders are situational and could potentially impact the way solutions are proposed and implemented per place, as well as how certain individuals experience climate change impacts.

Gender plays a tremendous role in "experiences of, responsibilities for, and interests in 'nature,'" especially due to the socialization and social constructs placed on gender identities (Rocheleau, 1996, p. 1). As discussed above, some places encompass deeply rooted social structures that emphasize the differentiation of everyday roles and duties of women and men, especially in rural Andean communities (Radcliffe, 2003). Concerning natural resources, some women in developing countries have less economic access, but the gender roles associated with their culture designate them with duties such as providing water for their household. Therefore,

when climate change affects freshwater supplies, women with less access to those economic resources may face challenges to collecting additional sources of water (Skinner, 2011).

Braun (2015) discusses the impact dam infrastructure has had on individuals access to water in Lesotho, Africa. At this location, women carry many roles, such as “reproduction of the household, including food preparation, cooking, collecting water and fuel, and childcare” (Braun, 2015, p. 23). The roles of men tend to include “wage labor... farming and raising livestock” (Braun, 2015, p. 23). Therefore, because women in that place are responsible for reproductive duties, they would potentially be vulnerable to impacts affecting those roles. Nevertheless, often times those gendered needs are veiled, especially those associated with productive and reproductive roles (Rocheleau, 1996). Production and reproduction are crucial components to understand in any culture, but especially with those experiencing climate changes.

Production and reproduction are crucial for survival, yet many times the concept is experienced and understood differently depending on place and system. Rocheleau et al. (1996) explain that in terms of “the environment, we are referring to the ecosystem on which production and reproduction depend” (p. 15). Concerning social science, production and reproduction are necessary to keep a community or household functioning, among other social systems. Within a household, there are usually productive and reproductive roles and each individual is either directly or indirectly associated with those roles. In feminist studies, reproductive roles are those that “are often de-valued and seen as undesirable,” such as household duties (Hopkins, 2015, p. 136). Reproductive duties are those that maintain systems and reproduce for “the next generation” (Bakker, 2007, p. 541). On the other hand, productive roles are duties that are viewed as necessary, valuable, and sustain life in systems, such as farming or wage labor. The idea of productive and reproductive roles are essential to understand within FPE, as feminist

scholars have found that both incorporate dimensions of gender, race, and class, among other factors (Bakker, 2007; Hopkins, 2015; Scambler, 2007). In terms of culture, the idea of production and reproduction also differs.

In most cases, individuals who live in western cultures, especially the United States, depend on the productive, and often reproductive, roles of others to sustain life, or support communities. For example, many individuals in western cultures are separated from food production, which creates an unawareness of where certain foods originate. Additionally, past studies have shown that individuals in western cultures who advocate for environmental conservation do so thinking about “‘quality of life,’ whereas in Africa, Asia, and Latin America they had to do with survival” (Rocheleau, 1996, p. 5). Whereas some are striving to create a better quality of life, others focus on merely surviving. This is especially true in cultures that directly depend on nature for resources, such as those in mountainous communities in Peru. When those resources become threatened, the individuals directly involved are the first to notice and suffer (Rocheleau, 1996). Nevertheless, Rocheleau et al. (1996) state:

“Perhaps it would be more accurate to recast this dichotomy along different lines, based on a careful analysis of the gender division of rights, responsibilities, and environmental risk in everyday life. While there are several axes of power that may define peoples' access to resources, their control over their workplace and home environments and their definitions of a healthy environment, we focus on gender as one axis of identity and difference that warrants attention” (p. 5).

By incorporating an FPE lens, the scale changes from a broad view of production and reproduction, to how those two dichotomies affect individuals based on gender, among other identities. Although that view requires a shift of thinking, doing so would open the door to more

individualized, situational solutions to negative environmental impacts from climate change. Further, a situational lens is more suitable when discussing the main impacts of climate change, such as those associated with water, because many times there is a multitude of other factors intertwined.

In some places, social power over water resources is more prominent than in others. Many times, finding solutions that encompass all individuals having power and access to water resources is difficult if those social dynamics are historical and are politically driven (Budds, 2008). For example, some developing countries, lower-income cities, and certain communities, individuals within a household may or may not have the same amount of access to water resources compared to those around them. Therefore, their power and access can be shaped based on their place, among their other identities. Sultana (2006) discusses the access rural populations have compared to urban in relation to clean, fresh water in Bangladesh. In the rural parts of Bangladesh, many people only have access to arsenic-contaminated tubewells, while those who are wealthier can afford access to clean water. Outside of the rural areas, in the “capital city Dhaka, the premier site of social, economic, and political power in the country... action would perhaps have been more swift and decisive” in regard to access to clean water resources and decision-making about finding a solution (p. 370). Yet, the existing power dynamics between the rural and urban populations create differences in access to that clean water. Access to clean water may vary due to the power dynamics present within a given situation, per place and space, and effect individuals based on numerous identities. Although some people believe water is a universal right, many countries participate in water privatization (Bakker, 2003).

Water privatization involves companies having private control over water resources for a profit (Bakker, 2003). In many developing countries, such as Peru, “public-private partnerships” exist, which involve the individuals in control over the water supplies managing those infrastructures that provide the resource to the consumers (Bakker, 2003, p. 38). The issue with this type of system is that many times it causes stress on certain individuals depending on their identities or socio-economic status. According to Bakker (2003):

“In most cases, the introduction of private-sector participation entails a degree of commercialization, whether through a reworking of allocation principles... and infrastructure management goals (from security of supply to cost recovery), or through a redefinition of principles underlying the business of water supply; water ceases to be a service, supplied at subsidized rates to citizens as a right, and is increasingly viewed as a commodity, sold to consumers on a profit-making basis of willingness-to-pay, rather than ability-to-pay. Even when water moves from public to private monopoly control, without the introduction of competitive markets, privatization is frequently accompanied by a discursive rescripting of water as a commodity rather than a public good” (Bakker, 2003, p. 39).

The introduction of public-private partnerships in places where people are unable to pay for their water resources may bring on issues with water scarcity (Bakker, 2003). Although the idea of “human right to water” exists and signifies that “all people, regardless of citizenship, location, or ability to pay should be assured access to water needed for life, basic needs, and human dignity,” it has rarely been put into action (Yates and Harris, 2018, p. 75). However, with climate change impacts to resources like water, a deeper understanding of these underlying issues is crucial to the survival of many individuals. An understanding of those issues could also start shifting the power out of the hands of contemporary decision-makers and into the hands of those individuals

who have been most affected. Often times, the changes witnessed by individuals bonded to a place, or a place they rely on for resources, fuel deep, profound experiences, such as emotion.

2.4. Emotional geographies and experiential knowledge

In terms of climate change, perception can often be generalized over large populations, whereas emotion offers personal, embodied information. Emotions give credit to those producing knowledge, whereas often perceptions are lost in space. Whereas FPE seeks to illuminate the gendered issues related to power, access, and agency over resources, emotional geography seeks to understand how those experiences potentially yield emotional concern. According to Sultana (2011), using an emotional geography lens shows:

“the importance of heeding the various emotions and meanings attached to processes of resource access, use and conflict in order to better understand the emotionality of the resources that exist in everyday struggles” (p. 163).

Therefore, utilizing FPE and emotional geography frameworks together is appropriate for understanding how individuals experience climate change impacts. Although combining the two frameworks allows for a deeper understanding of these issues, emotional geography is viewed as less valid (Plumwood, 1991).

Historically, emotions have been viewed as “feminine... unreliable, untrustworthy, and morally irrelevant,” and thus kept out of much academic work (Plumwood, 1991, p. 5). However, Anderson and Smith (2001) explain how suppressing emotions in research “produces an incomplete understanding of the world’s workings” and neglecting them is to “exclude a key set of relations through which lives are lived and societies made” (p. 7). An emotional response from an individual offers ways of understanding the ties they have to other people, places, and

spaces (Sharp, 2009). According to Sakakibara (2008), emotion is inevitable because “places are emotional embodiments of lifeways that are essential foundations of human culture” (p. 462). There is a profundity to emotions that other units of measurement are unable to attain, insight that provides a comprehensive source of information, both historically and presently, including cultural, personal, and locational. According to Akerlof et al. (2013), there is a process to feeling and portraying emotions.

Akerlof et al. (2013) explains the process of noticing changes and experiencing them as the experiential system, which allows individuals to experience an event and “tag” that event with “negative or positive affect and emotion” (p. 82). Many times, those affects and emotions influence an individual’s perception of their own risk or vulnerability. At a basic level, if a person experiences an event and has a high perception of risk, they make have a stronger reaction or emotion. However, when there are associated personal and cultural ties, those emotions can be intensified. Brugger et al. (2013) found that many individuals’ residing in the Siete Imperios region of Peru expressed concern with losing the personal ties they had with their surrounding environment due to climate change. Residents often offered narratives such as that they “will all die” or “what water will we use to live” regarding the nearby glacier and water runoff (Brugger et al., 2013, p. 8). In this particular instance, water scarcity is a concern for the residents, as many use the water runoff of the glacier as a main resource (Brugger et al., 2013). Because their water resources were threatened, their responses to related questions provoked an emotional response. Outside forces may also influence the experiences an individual has with climate change. Akerlof et al. (2013) found that culture constructs of the phenomenon and the associated “beliefs can strongly influence people’s perceptions of their experience” with climate change (p. 82). Those beliefs may influence an individual’s view of what climate change actually

is or how, as well as why, it occurs. That factor, among others, adds a uniqueness to an individual's experience.

A few researchers have found a correlation between gender and emotional responses to specific topics, such as climate change (du Bray et al., 2017). Du Bray et al. (2017) state that “women will have increased emotional response to climate change compared to men” (p. 286). That occurrence could stem from a difference of risk perception due to the differences in associated roles, especially in the global south. Du Bray et al. (2017) discuss research conducted by two scholars, who found that “men, and particularly the group of white, conservative men... feel that they are less vulnerable in general, and in particular, are less vulnerable to the effects of environmental change” (p. 286). Here and in other instances, emotions appear to offer insights into intersectionality that are not apparent with mere perception. However, du Bray et al. (2017) found that gender was not particularly significant in their emotion research conducted in North American states. Du Bray et al. (2017) conducted research in three states, including Arizona, Alaska, and Alabama. They found only one state showed evidence of women offering more emotional language compared to men, while the other two observed an equal amount from both. They also found that many people did not express significant concern with climate change, which could stem from the presence of the human-nature dualism.

Concerning emotions and climate change, predominate effects are seen in glaciated areas, where there is a history associated with communities closely tied to that land and their environments (Brugger et al., 2013; Cruikshank, 2012; Cruikshank, 2006; Cruikshank, 2001; Carey et al., 2016). In many of these areas, people see themselves as one with their surroundings. Since the beginning of human existence, people have strived to make their surroundings “into a home” (Sakakibara, 2008, p. 462). Cruikshank (2012) discusses how some people can form

emotional bonds with their physical environments, known as solastalgia (Stedman, 2003; Williams & Stewart, 1998). Solastalgia is the “distress that is produced by environmental change” most associated with people or communities closely tied to their surrounding “home environment” (Albrecht et al., 2007, p. S95). According to Sakakibara (2008):

“Places are emotional embodiments of lifeways that are essential foundations of human culture. Many memorials consecrate places to reflect the culture of the people with whom they communicate. People make homes and become rooted to places through narratives about both. When homes become threatened or moved, or places become transformed or uncertain, stories necessarily capture and respond to the changes. A story about an eroding homeland is thus a reflection on a changing place, and a changing identity with, and uncertainty about, that place the [person] experienced” (p. 462).

Because some individuals form relations with their environments and places, they may experience distress when those places start to change, also known as solastalgia (Sakakibara, 2008; Albrecht et al., 2007). Du Bray et al. (2018) investigated place attachment during their research at four different islands. The results of that study shed light on the emotional ties locals have with their physical environments and their negative emotions associated with climate change (du Bray et al., 2018). One individual they interviewed from New Zealand expressed they were “sad; this is my home. The trees are going down; [I’m] sad to see hometown changing” (du Bray et al., 2018, p. 14). Likewise, many others offered emotional responses stemming from the changes in their surrounding environment (du Bray et al., 2018). Many scholars believe these emotional ties began in early history.

Human emotion has been tied to glaciers for centuries, according to scholar Mark Carey (2007), who describes his theory of the “endangered glacier,” which was derived from archival

knowledge of glaciers dating prior to contemporary climate change (p. 500). Some of the narratives he collected included anxiety-ridden European colonists who feared glaciers, poets whom fanaticized the romanticism of glaciers, to an attraction to glacial recreations (Carey, 2007). His findings suggested that the emotion tied to glaciers was not always a “response to melting ice,” although contemporary emotions may be (Carey, 2007, p. 500). Brugger et al. (2013) found residents of the Siete Imperios community near the Cordillera Blanca to be conscious and anxious about glacial retreat in their area. During that study, 129 of the 132 participants who were interviewed discussed the significant loss of glacial mass that had been witnessed in their community over decades, as well as anxiety about them disappearing all together (Brugger et al., 2013). To those individuals, the social ties they had with the glaciers, such as using them for social gatherings, harvesting ice and flowers, or just visits, were lost along with the mass (Brugger et al., 2013). Although the glaciers still exist and have not completely disappeared, participants described the remnants left as “farther away” and “dangerous due to the steep rock walls left” behind (Brugger et al., 2013, p. 8). Those detailed and intimate accounts with glaciers are crucial to understanding the realities of the effects of glacial retreat.

CHAPTER 3: STUDY AREA

This chapter is designated to exploring the culture behind the study area in order to better understand the basis and findings of this research. The culture of a place can often contribute to an individual's sense of identity (Phinney, 2000). Cultural identity involves a group of individuals imagining themselves within a particular group based on a collective set of rules (Allen, 1981). The histories and structures of a society help contribute to those present-day rules, such as those regarding productive and reproductive roles associated with gender (Hopkins, 2015). Examining those factors could provide a contextual understanding of participants' emotions. Likewise, understanding the culture and possible cultural identities could help in developing a holistic understanding of the types of emotions present and potentially why they exist.

3.1. Peruvian culture and identity

The face of contemporary Peruvian culture is a sum of multiple factors, such as the regional landscapes, ancestry of individuals in various spaces, economy, and the history of colonization in the area. The various regions of Peru include the coast, the highlands, and the Amazon and within each of those regions, there are urban and rural areas (Barron, 2008). The ethnic groups in this country at a general level include "indigenous, mixed, and white," or more specifically Spanish, Quechua, Aymara, Ashaninka, and others (Barron, 2008, p. 57). The Quechuan individuals are most associated with indigenous, as they have resided in Peru since Incan domination in the country. Those individuals mostly reside in the highlands of Peru, and "Quechua is the main indigenous language in the Andes" (Barron, 2008, p. 57). Therefore, they are one keystone of Andean culture in Peru. Other important aspects of Andean culture include

the social structures, such as the division of labor to maintain efficiency and production in that region.

According to Lázaro (1990), pre-colonization in many Andean communities consisted of complementary labor structures in Peru. Women as well as men ran ayllus, or communities with “extended families with a territorial base and political claims” (Lázaro, 1990, p. 234). Later, Incan influence and domination began the separation of roles according to gender. For example, men served as the “main representatives” while women had “economic power” at the community level (Lázaro, 1990, p. 234). Incan influence did not “affect the structures of socio-economic reproduction within the communities... traditional local religious, cultural and economic practices were respected by the state” (Lázaro, 1990, p. 234). According to Lázaro (1990):

“It is important to underline that women's work was not only oriented toward the reproduction of their household structures but also toward the continuance of the communitarian or Andean mode of production, a mode of production based on the reciprocity or interchange of solidarities between members of the family units within allyus' boundaries, between different communities, and between the ayllus and the state” (Lázaro, 1990, p. 235).

During that time, women served as important players in both productive and reproductive roles and reciprocity was a cultural practice. According to Strensrud (2016), reciprocity is “an exchange of resources in which the goal is equilibrium of relations” (p. 60). That practice was then and still is to this day a part of Andean culture and identity. Although reciprocity still exists in the region as a cultural practice, other structures in the area changed after Spanish conquest and are still prominent today (Lázaro 1990).

The Spanish conquest over the Andean regions forced various ideologies and structures to those areas (Cade, 1992). One of those social structures included labor roles that have

continued into current Andean culture. Contemporary social structures within Peruvian communities in the Andes consist of male domination both inside and outside of the household (Lázaro 1990). Like a positive feedback loop, the “Peruvian society... systematically reproduces the hierarchical division of labor between men and women” which feeds the “capitalist relations of production within... an underdeveloped country” (Lázaro 1990:238). Within the Ancash region of the Peruvian highlands, a little over 30 percent of women do not have their own income, earn less than men, and only account for 35 percent of agricultural production, as opposed to 64 percent of men (Arana, 2016, p. 14). Particular to this research, the main study area is Huaraz within the Ancash region of the Peruvian Andes.

3.2. Huaraz and the Cordillera Blanca

The main study area of this research is the town of Huaraz, as well as two smaller neighboring hamlets called Jangas and Llupa. I chose Huaraz as my main study area because it was the destination of a study-abroad trip through East Carolina University. I also chose to collect data at the two nearby hamlets, Jangas and Llupa, based on travel with the ECU study-abroad group and networking.

Huaraz is located at the base of the Cordillera Blanca mountain range in the Peruvian Andes of South America (“Huaraz,” n.d.). The town of Huaraz sits at nearly “10,000 feet above sea level and has a population of 100,000” (Brooks, 2014, p. 422). The communities of Huaraz, Jangas, and Llupa are located in the Ancash region of Peru (Brooks, 2014). The town of Huaraz consists of many culturally significant centers, such as the Plaza de Armas pictured in Figure 3, where residents visit, shop, and engage in cultural activities, and the market pictured in Figure 4, where residents sell produce, meats, and various goods. Huaraz is a popular tourist destination, as it sits at the base of many popular hiking areas and is close in proximity to popular places,

such as Huascarán National Park. All of those factors serve as cultural identifiers for the individuals residing in this particular area.



Figure 3. Image of a parade outside of the Plaza de Armas in Huaraz. Source: Kara Chipiwalt.



Figure 4. Image of the market in Huaraz. Source: Kara Chipiwalt.

This area is within the Callejón De Huaylas, also known as the Huaylas Valley and the Santa River watershed (Bury et al., 2013; “Huaylas Valley,” n.d.). The Santa River watershed “captures runoff from the majority of the glacierized valleys of the Cordillera Blanca” (p. 365). According to Bury et al. (2013), because precipitation is seasonal, glacial “melt water is thus an important buffer to runoff, providing 10 to 20 percent of the total annual discharge in the Santa River, and exceeding 40 percent in the dry season” (p. 365). Many Huaraz residents are involved in and rely on both the Santa River and direct glacial melt water for agricultural practices, producing staple foods like “alfalfa, barley, potatoes, and wheat” (Bury et al., 2013, p. 369). However, residents in the area have increasingly experienced issues with water availability and access due to changes in the Cordillera Blanca, water governance in the area, and mining.

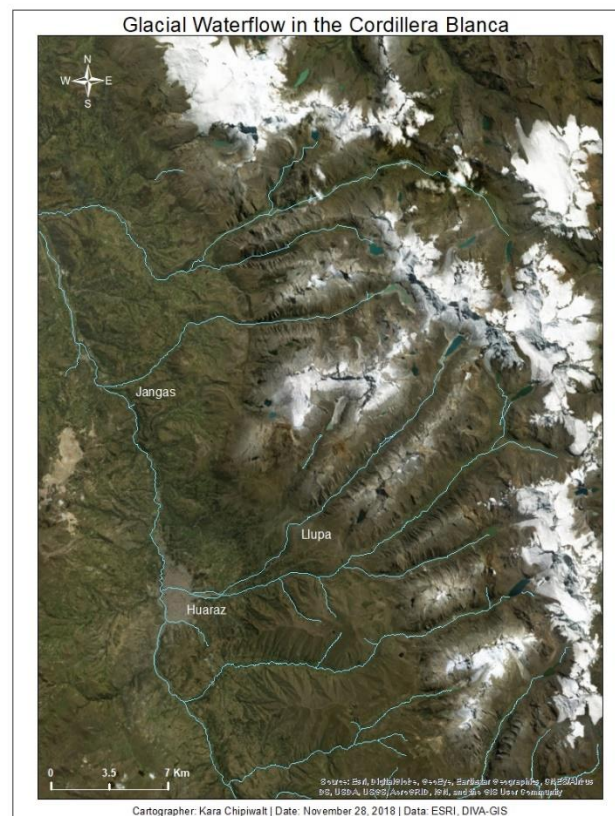


Figure 5. A map portraying the main study area, Huaraz, two hamlets where I collected data, and their sources of water runoff. Source: Kara Chipiwalt.

Known as the leading conglomeration of glaciers in the world’s tropics, the Cordillera Blanca runs contiguous from north to south and consists of 722 glaciers (Bury et al., 2011; USGS, 1999). Pictured in Figure 4, the largest 27 summits of the Cordillera Blanca reside along the “Andean continental divide” and form three main watersheds, the Santa River, the Marañon River, and the Pativilca River, that flow into the Atlantic and Pacific Oceans (Mark & Seltzer, 2005, p. 2267). The climate varies with altitude, with precipitation ranging in some areas from 31 to 47 inches and temperatures between 32 and 48°F annually (Bury et al., 2011). Precipitation is seasonal, with the rainy season occurring between October and April and the dry season consisting of scarce rainfall (Baraer et al., 2012). In regard to how precipitation affects glacial mass, the most rainfall occurs in February, which is when there would likely be the most glacial accumulation (Mark et al., 2005). The least rainfall occurs in July, which would likely result in the most glacial ablation (Mark et al., 2005). Table 1 depicts climate trends in Huaraz over the last five years. The data retrieved from the Ministerio del Ambiente, or Ministry of the Environment, of Peru show a steady decrease in minimum and maximum average temperatures, while a slight increase is present in average rainfall (SENAMHI, n.d.).

Table 1. Temperature and rainfall trends in Huaraz for the month of July			
	Average Temp (°C)		Precipitation (mm)
Year	Min	Max	Average
2014	5.7	24.5	0
2015	4.9	24.6	0.02
2016	4.2	24.8	0.2
2017	4.1	24.4	0
2018	4.8	24	0.4

In this specific mountain range, nearly “91 percent of the total [glaciers] are classified as mountain glaciers; they are generally short and have extremely steep slopes” (USGS, 1999, n.p.). Many of the glaciers in the Cordillera Blanca have “experienced an increase in runoff in recent decades, while precipitation has not changed, or tended to decrease. This can be interpreted as the consequence of glacier retreat” (Coudrain et al., 2005, p. 931). Pictured in Figure 6 is a map of the Cordillera Blanca, including Huascarán, which is considered the tallest peak in Peru and rises over 22,000 feet (USGS, 1999). The communities of Huaraz, Jangas, and Llupa are all in close proximity to Huascarán, and the depleting ice of that glacier was often mentioned in the narratives of participants. For some individuals in the Peruvian Andes who reside near glaciers, those landforms serve as a piece of their identity and culture. Water security is becoming an increasingly relevant topic for this area, as many threats are on the rise, such as glacial retreat, mining, as well as sourcing for hydroelectricity and coastal irrigation (Bury et al., 2013).

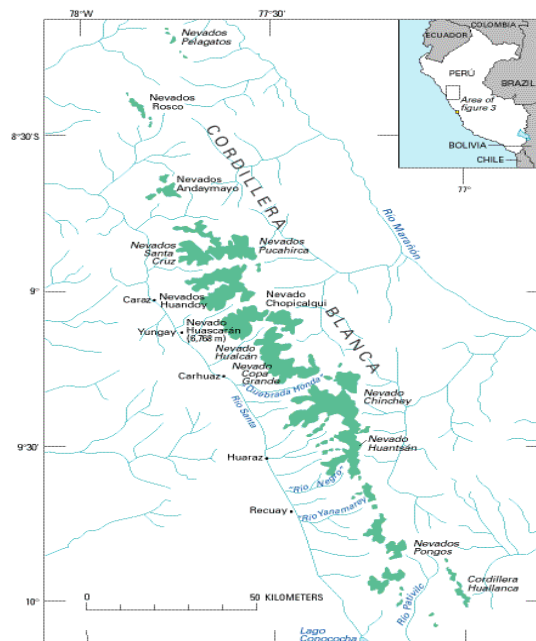


Figure 6. A map of the Cordillera Blanca, including location of Huascarán, derived from the United States Geological Survey, or USGS (USGS, 1999).

3.3 Water availability, access, and quality in the Cordillera Blanca

Coincidentally, water-sourcing projects in the area, such as the “Chavimochic project,” started constructing canals during the 1980s, which has “generally been diverting at least 35 m³/second from the Santa River” (Bury et al., 2013, p. 371). Likewise, companies use the Chavimochic canals for hydropower, and “water is returned to the Santa River after generating hydroelectricity” (Bury et al., 2013, p. 371). Those factors have placed tension on available water supplies. Because of the rising population of this region, there has been an increase in “water users” and the need for larger quantities of water (Bury et al., 2013, p. 370). As a result, potable water delivery has increased since 1999 (Bury et al., 2013). In Huaraz specifically, there have been changes over the last couple of years regarding water management in the area that residents are experiencing.

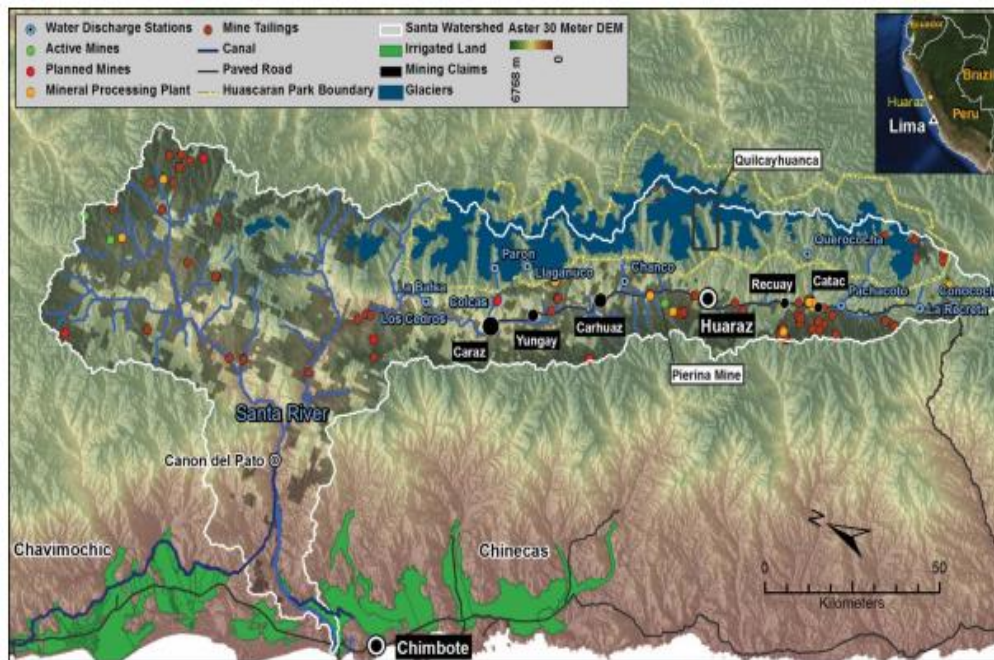


Figure 7. A map derived from Bury et al. (2013) depicting sources and uses of water within the Santa River watershed area (p. 365).

In the early 1900s, the Peruvian government issued a law that “established the right to private appropriation of water” (Stensrud, 2016, p. 60). However, as water issues continued in the country, the government issued another law in 1969 stating that water was a public resource. Starting in the 1990s, the “neoliberal Fujimori government” tried to allow for the privatization of water via “property rights,” yet continuously failed to do so (Stensrud, 2016, p. 60). Since then, the individuals living in the mountainous regions of Peru are facing water scarcity as the glaciers recede (Bury et al., 2013). Likewise, due to the nature of the landscape along the coast, individuals residing in those areas are also facing issues with water availability for agriculture (Bury et al., 2013). Because of those factors, the Peruvian government issued another law intended to help mitigate the issues. According to Stensrud (2016):

“In 2009 the Peruvian government passed a water resources law justified in terms of the need to address the country’s growing water problem in connection with the threat of climate change, urban population growth, and the increasing importance of the mining industry... in the law, as in other versions of integrated water resource management, water is explicitly valued as an economic good but at the same time valued as a basic human right to be equitably distributed, a principle that is not consonant with its market value ” (p. 60-61).

This creates a barrier for accessing water with some individuals, as “the use rights to water come at a price, which is calculated according to the purpose and the amount of water used... the price may be experienced as high by a peasant farmer but microscopic in the budget of a mining company” (Stensrud, 2016, p. 62). Mining in the area has also increased significantly since the 1990s and is not only affecting water supplies due to high costs, but is also creating problems with water contamination in the area (Bury et al., 2013).

Mining has been a popular industry in Peru for decades and accounts for half of the “national economy” (Patrick & Bharadwaj, 2016, p. 468). Although the mining industry is seen as a good for the Peruvian economy and reeks social benefits for some, not all of those benefits are shared equally (Patrick & Bharadwaj, 2016). Over “90 percent of all recorded mining claims” are in the Santa River watershed (Bury et al., 2013, p. 370). As a result, those individuals are most experience the negative impacts associated with mining. From the early 1980s through the early 2000s, studies were conducted to test the water in the area for contaminates. The findings of those tests concluded that the water being used for human, animal, and agricultural needs exceeded what the water quality standards were at those times (Bury et al., 2013). The most abundant contaminant of those samples was arsenic, which accounted for 89 percent (Bury et al., 2013). Additionally, not only is the mining industry disproportionately affecting people in this area due to the contamination, but it is also causing issues with water availability. Bury et al. (2013) state:

“Mining and mineral processing activities have become significant users of surface and subsurface water supplies in the watershed largely due to current extraction technologies such as cyanide heap leach gold mining and mineral concentration that require large quantities of water. In 2008 Barrick’s Pierina gold mine above the city of Huaraz extracted 29.7 million tons of rock and 400,000 ounces of gold and consumed approximately 10 million cubic meters of freshwater” (p. 370).

Because the people in the Santa River watershed are also dealing with hydrologic changes due to glacial recession, the use of water by the mining industry is further complicating the issue. Due to the issues associated with climate change, mining, and water in the area, Huaraz has become a popular destination for research.

As a result of the topics discussed above, Huaraz has acquired much attention for environmental research, especially regarding the nearby glaciers. However, much of that research involves the physical sciences, rather than human-based research. Therefore, it is apparent that additional research on the subject matter is necessary to gain a more holistic understanding of critical issues taking place in this area, such as those with the mining industry, water governance, and environmental change.

CHAPTER 4: METHODOLOGY

The foundation of my research entails subjective concepts such as emotion and experience, which are multifaceted areas to understand and study. Because extensive research has been conducted about glacial retreat within the physical dimensions of geography, I opted to use a qualitative methodology to deepen the knowledge base within the human dimensions, as well as complement and provide a richer understanding of the quantitative data that already exists. I used a combination of qualitative methods with this approach, such as semi-structured interviews, free listing, and participant observation. Likewise, I chose to use qualitative analysis to gain a better understanding and observation of the following two research questions: **(1) what emotional evidence and experiences do Peruvian highlanders offer towards glacial retreat;** and **(2) are those emotional responses gendered?**

This chapter is dedicated to describing the methodological approach and methods stated above in order to provide explanation of how I came to answer my research questions. I will start by introducing my study area and provide background information for context. The first section of this chapter provides information pertaining to a qualitative methodological approach and why that specific approach is well suited for my research. Secondly, I describe the process I used to sample and recruit participants to partake in my research. The third section will consist of the various tools I used to collect data, including semi-structured interviews, free listing, and participant observation. Lastly, I will describe the methods I used to analyze and understand my data.

4.1. A qualitative methodological approach

A qualitative methodological approach is common among human geography research (Hay, 2005). Because my research is focused on subjective matter like experience and emotion, using qualitative tools and analysis methods is crucial to gain a deeper understanding of my data. According to Hay (2005), two “fundamental questions tackled by qualitative researchers are concerned either with social structures or with individual experiences” (p. 5). For the purposes of my research, I aim to tackle both questions, which my frameworks of FPE and emotional geography help me do. One of the focuses of my research is to first gather insight on the experiences, or knowledge, of participants, followed by emotional responses related to climate change, water, and glacial retreat. Because experiences and emotions are subjective, in-depth knowledge and narrative is necessary to unveil any social structural issues. According to Hay (2005), a study conducted by:

“Winchester (1999) found that the in-depth interviews illuminated underlying structures of patriarchy and masculinity in ways that were much more profound than anticipated. Depths of individual anger and despair reflected mismatches between those individuals’ romanticized expectations of marriage and gendered behaviour and their actual experiences of married life” (p. 17).

In that particular instance, in-depth interviews are used to achieve a more holistic understanding of each individual’s view of marriage by gathering information on their personal experiences and emotions. Interviews allow researchers to gain information about complex “behaviours and motivations,” as well as “fill a gap in knowledge that other methods, such as observation or the use of census data, are unable to bridge efficaciously” (Hay, 2005, p. 150). Other useful methods of qualitative research include free listing and participant observation, both of which allow

researchers to gather data about and observations of culturally significant information (Bernard, 2017). Similarly, the qualitative methods of analysis I use also shed light on culturally significant information. Those methods include concept mapping, content analysis, and descriptive coding. Because my research focuses on the individual and places emphasis on “embodied experiences,” which highlights the agency of individuals, qualitative methods and analysis are appropriate (Hay, 2005, p. 17).

4.2. Data sampling and participant recruiting

To collect data for my research, I first focused on sampling from both cis-male and cis-female individuals over the age of 18 residing within and near the town of Huaraz. For the purposes of this study, I considered individuals residing near Huaraz to be those in smaller neighboring hamlets, such as those of Jangas and Llupa. The smaller neighboring hamlets were within a 20-mile radius. Because my research is focused on glacial retreat in the Cordillera Blanca, particularly around the town of Huaraz, I focused on collecting data from individuals who meet the criteria above to ensure the references of my participants were based on similar environmental surroundings. By doing so, I can observe both similar and different correlations between participants emotional responses and experiences. Additionally, I gathered data keeping in mind the various users of the areal water cycle (farmers, market sellers, domestic, household, and other water users... etc.). By doing so, I can search for patterns associated with similarities or differences in the emotional responses and experiences of participants who utilize water resources from the mountains for various reasons.

Overall, my sample size included 30 individuals, with 15 males and 15 females. Participants were recruited primarily through convenience, purposive, quota, and snowball sampling. First, all participants were recruited based on quota sampling. This sampling technique

is used when there is a “binary” component, such as male and female (Bernard, 2017, p. 146). Second, many participants were recruited using a convenience sampling approach in the Plaza de Armas, which is one of the most popular centers of Huaraz, near the market, as well as in Jangas. Convenience sampling is a “glorified term for grabbing whoever will stand long enough to answer your questions” (Bernard, 2017, p. 149). At these locations, many residents of the town gather for various reasons, including leisure, work, shopping, or cultural activities. Third, some participants were recruited using a purposive sampling approach, based on their experiences of being users of the water cycle in the area. Additionally, I used purposive sampling as I developed rapport with some participants by helping them manage household duties and farm. Lastly, several participants were recruited based on a snowball technique, as previous participants referred other participants to me (Bernard, 2017). For example, I visited my Peruvian friend’s family whom resided in Llupa and they referred me to their neighbors and other family members.

4.3. Data collection

To answer my first research question of (1) what emotional evidence and experiences do Andean highlanders in Peru offer towards glacial retreat, I used methods such as semi-structured interviews, free-listing, and participant observation. In order to answer my second research question of (2) are those emotional responses gendered, I used participant observation and gained insight through analysis. All of my data collection tools were designed in English and then translated to Spanish with the help of Dr. Brooks and a local translator to ensure cultural relevancy. All of the data collection was completed in Spanish with the help of Dr. Brooks and a local translator.

4.3.1. Semi-structured interviews

For this research, conducting interviews was important for several reasons. First, interviews allow the participant to have a voice in the data. Therefore, the data is solely based on their own words, rather than pre-determined categories or lists. According to Ian Hay (2005):

“Interviews provide insights into the differing opinions or debates within a group, but they can also reveal consensus on some issues... a method is required that shows respect for and empowers the people who provide the data. In an interview, the participant’s view of the world should be valued and treated with respect. The interview may also give participants cause to reflect on their experiences and the opportunity to find out more about the research project than if they were simply being observed or if they were completing a questionnaire” (p. 150).

I follow a semi-structured interview approach in particular, which is significant because it allows for both order, based on content specific to my research, as well as openness for discussion by the participant. Semi-structured interviews allow the researcher to be more of an “interventionist than in unstructured interviews” as they may “redirect the conversation if it has moved too far from the research topics” (Hay, 2005, p. 158). This was particularly crucial for my research, as the foundations are very subjective (i.e. experience and emotion). I used the semi-structured interviews to observe the experiences and emotions of my participants per three categories, which were environmental changes, water, and glaciers (Table 2). In order to gain a better understanding of their experiences and emotions, I first asked yes or no questions per category (i.e. environmental changes, water, and glaciers) to understand whether they were experiencing changes. Each yes or no question per category was followed by non-prompting and prompting open-ended interview questions to attract in-depth narratives from participants (Table 2). One aspect of this research I was particularly interested in was understanding if participants would

offer emotional responses without being prompted. Because of that, I included non-prompting and prompting questions within the semi-structured interview. Non-prompting questions did not explicitly elude to any sort of emotion or feeling. For example, one question from the semi-structured interview asks *what environmental changes have you noticed where you live?* (Table 2). Oppositely, the prompting questions did explicitly elude to emotion or feeling. For example, a prompting question within the semi-structured interview asks *how do those changes make you feel?* (Table 2).

Table 2. Example Semi-Structured Interview Guide	
Environmental Changes	
<ul style="list-style-type: none"> <i>Have you noticed changes in the environment where you live (yes or no)</i> 	
Yes	No
<ul style="list-style-type: none"> <i>What environmental changes have you noticed where you live? (non-prompting)</i> <i>How do those changes make you feel? (prompting)</i> 	
Water	
<ul style="list-style-type: none"> <i>Do you use water from the canals? (yes or no)</i> 	
Yes	No
<ul style="list-style-type: none"> <i>What do you use the water from the canals for, specifically? (non-prompting)</i> <i>How did that shortage make you feel? (prompting)</i> 	
Glaciers	
<ul style="list-style-type: none"> <i>Have you noticed any changes in nearby glaciers? (yes or no)</i> 	
Yes	No
<ul style="list-style-type: none"> <i>What changes have you noticed in the glaciers? (non-prompting)</i> <i>How do those changes make you feel? (prompting)</i> 	

4.3.2. *Free listing*

During the semi-structured interview, I asked one free listing question. Free listing is “a deceptively simple, but powerful technique” used to get participants to “list as many items as they can in a domain” (Bernard, 2017, p. 235). Domains are systems of “classification—that is, how people in a group think about lists of things that somehow go together” (Bernard, 2011, p. 241). When engaging in qualitative research, free listing questions are helpful in understanding how a population or culture views a certain topic. For the purposes of this research, I wanted to focus a question on participants’ relations with glaciers specifically, allowing them to formulate the context via offering narratives, ideas, or words. For example, these items can be experiences participants’ have with glaciers, perceptions of glaciers, emotions about glaciers, thoughts about glaciers, etc. For this particular question, I asked participants, *what do you think of when you hear the word glacier?* The responses could potentially help unpack the relations participants’ have with the glaciers and mountains, in order to enhance my understanding of their previous narratives and gain insight into their culture based on the sample population.

4.3.3. *Participant observation*

As a final method, I engaged in participant observation. Participant observation allowed me to gain additional insight and data on the emotions and experiences participants and residents have pertaining to environmental changes, water, and glaciers. With participant observation, the researcher “is immersed the day-to-day lives of the people and observes and interviews the group participants” (Cresswell & Poth, 2017, p. 90). I was able to engage in participant observation on multiple occasions. First, I was able to help a Peruvian friend farm their land in the neighboring hamlet of Llupa a few times. For context, in this particular culture, many times family, friends, and neighbors will help an individual(s) farm their land, as then that individual(s) would aid

them in some way later. While helping this individual farm, I was able to mentally observe techniques, behaviors, as well as conversations between individuals. Additionally, I was able to take notes and interview some of the neighbors once we were finished. One day in particular, a thunderstorm interrupted our duties and we were forced to stop harvesting the produce as a result. Because the time of my visit was during the dry season, I was able to observe the behaviors of those individuals in relation to that weather event. Also, many participants spoke about lack of water as a resource that they could retrieve directly from the canals and rivers, so they would have to purchase bottled water. While engaging with the culture and observing, I was able to find out that the bottled water residents can purchase are normally higher in price than other beverages or items in stores.

Second, I was able to observe within the market, where many of the produce grown in the area are sold. While there, often times it was uncertain whether the individuals selling had grown the produce themselves or not, which is where participant observation and conversation were significant. Similarly, I was able to conduct participant observation within other culturally significant centers of Huaraz, such as the Plaza de Armas. There, I was able to observe the behaviors, conversations, and activities of a variety of residents, as well as interview some participants. Many participants spent leisure time in the Plaza de Armas to enjoy nature. That was a significant space to conduct participant observation because many different people came together in the area, as well as there was a view of the mountains. After observing, I retreated to a quiet space away from the activities where I could hand-write all of the information down in my notebook. Later, I typed that information in my computer for future coding and analysis. Overall, this method allowed me to gain complementary knowledge and understanding of the culture, as well as the narratives of my participants. I used this additional knowledge to

complement my data, in order to later make sense of the narratives of my participants during analysis.

4.4. Data analysis

The subjective nature of this research calls for qualitative analysis, which is particularly useful in understanding the embodied experiences and emotions of my participants. Qualitative analysis provides a basis for analyzing both my interview notes and participant observation, as well as data provided by my participants. To interpret my data, I used qualitative techniques to code, categorize, and visualize those data.

4.4.1. Qualitative methods of analysis

For the purposes of this research, I used qualitative methods of analysis to gain an understanding of the emotions and experiences of my participants. By using qualitative analysis, I am allowing the voices of my participants to serve as evidence of a changing climate. I used two specific coding techniques to understand my data, including inductive and deductive. Qualitative coding involves the researcher coding text, they think “about what each piece of text means, developing hypotheses about the people who are described, boiling the text down to a series of mnemonics” (Bernard, 2017, p. 492).

Inductive coding is conducted when a researcher sits with the data and pinpoints various themes from that data, this technique is the “exploratory and discovery phase” of research (Bernard, 2017, p. 460). Inductive analysis does not require a hypothesis to be tested. Rather, that technique is used to find themes that may be present in a set of data; there does not need to be a previous concept, theme, or hypothesis developed, the data develops those elements for the researcher. This became particularly useful for my research upon examining the notes I had

obtained through interview observations and participant observation. By doing so, I realized a couple of themes that were unexpected. As a result, I allowed those themes to serve as codes and continued to analyze them. This particular method of analysis is intriguing because it allows unexpected or surprising themes to emerge from data not specifically offered from the narrative of the participants themselves. For instance, I found that three prominent themes emerged from my data according to gender, such as more men associating their emotions to the happenings outside of their control. Additionally, nearly every male gave a generous amount of information pertaining to most questions, while the majority of women required probing. I may not have stumbled across those themes if I had solely predetermined categories. Therefore, the utilization of both inductive and deductive analysis is necessary in order to fill the gaps in understanding of research and by using both techniques, I was able to gain a more holistic interpretation of the patterns present in my own data.

Oppositely, deductive coding allows a researcher to enter the “confirmatory stage” of their research by testing a hypothesis (Bernard, 2017, p. 460). The deductive coding technique I used was derived from a study focused on emotional responses to climate change by du Bray et al. (2018), which focused on positive, negative, and neutral emotions (Table 3). I presumed that because my own research topic related to climate change effects, the emotions of my participants could fall into any three of those categories as well. Upon analyzing my data, I found that the emotions of my participants could be grouped into those three categories.

Table 3. Example Codes – Deductive Analysis

Positive Emotions	Negative Emotions	Neutral Emotions
<ul style="list-style-type: none"> • <i>Enjoy</i> • <i>Hope</i> • <i>Proud</i> • <i>Respect</i> 	<ul style="list-style-type: none"> • <i>Annoyed</i> • <i>Awful</i> • <i>Desperate</i> • <i>Difficult</i> 	<ul style="list-style-type: none"> • <i>Different</i> • <i>Responsible/Responsibility</i>

Lastly, to organize my findings I used visual techniques to represent my data, such as graphs and charts depicting commonalities, differences, and frequencies. I analyzed elements by frequency of emotional language and experience (i.e. sex and emotional language or sex and experience). First, because my research comprises a gender component, I needed to be able to compare or contrast similarities and differences in emotional responses and experiences per gender (i.e. observing the frequency of emotional language). In order to do so, I imported the qualitative data into excel, such as emotional language, and conducted analysis on elements like the frequency of words. For example, I made graphs for the frequency of emotional language per gender.

CHAPTER 5: EMOTIONAL EVIDENCE TOWARD A CHANGING CLIMATE

The focus of this research is to investigate whether or not the experiences that Peruvian highlander individuals have with environmental changes provoke emotional responses concerning the topic. Specifically, this study seeks to understand whether participants' express emotional responses regarding glacial retreat. This chapter aims to provide evidence of those topics based on the semi-structured interviews, free listing, and participant observation that took place during the fieldwork portion of this research. I will call on the voices of my participants to assist me on answering the following research question: **(1) what emotional evidence do Andean highlanders in Peru offer towards glacial retreat?**

In order to answer my first research question, I separated this chapter into two specific sections. First, this chapter focuses on providing evidence of emotion present within my participants' responses. I will pull from my semi-structured interviews and free listing to provide that evidence. To attain a deeper understanding of those emotional responses, I investigate how those responses can be categorized based on previous literatures (Akerlof et al., 2013). Though all 30 out of 30 participants expressed emotion in their responses, not all participants expressed emotion concerning the same environmental changes. Therefore, the second section of this chapter focuses on understanding the particular changes that may lead my participants to developing emotional responses. In order to do so, this chapter uncovers the overall experiences of my participants with environmental changes and what emotional responses are present regarding each of those experiences. Specifically, this research seeks to gauge what emotions participants embody particular to glacial changes in the area.

5.1. Emotional Evidence of Environmental Changes

In order to address emotion, I focused on two main tools: semi-structured interviews and free listing. The semi-structured interviews were the focus for gauging whether or not emotional well-being was important to consider in this research. The semi-structured interviews were designed in a way to 1) gauge whether participants were experiencing environmental changes; 2) understand what those experiences are; and 3) investigate whether emotion was present first without being prompted and second while being prompted. For the purposes of this section I represent the emotion data by word use. When I refer to emotional language throughout the following chapters, I am referring to participants' use of words and phrases that portray feeling. Out of 30 participants, all 30 expressed emotional language concerning environmental changes in the area. Although all 30 out of 30 participants expressed emotional language, not all 30 participants used emotional language for the same questions. I was able to gather 40 emotional words in total (Table 4). Likewise, I was able to portray how many participants used emotional language given each question (Table 5).

Table 4. Emotion Words in Total		
<ul style="list-style-type: none"> • <i>Desperate</i> • <i>Sad</i> • <i>Difficult</i> • <i>Upset</i> • <i>Uncomfortable</i> • <i>Suffer(ing)</i> • <i>Hard</i> • <i>Precautious</i> • <i>Pissed</i> • <i>Helpless</i> • <i>Powerless</i> • <i>Different</i> • <i>Responsible/Responsibility</i> 	<ul style="list-style-type: none"> • <i>Hope</i> • <i>Enjoy</i> • <i>Proud</i> • <i>Trust(ful)</i> • <i>Respect(ed)</i> • <i>Wish</i> • <i>Care/Caring</i> • <i>Appreciate(d)</i> • <i>Protect</i> • <i>Nice</i> • <i>Indignant</i> • <i>Worried</i> • <i>Bad</i> 	<ul style="list-style-type: none"> • <i>Exasperating</i> • <i>Disappoint(ing/ed)</i> • <i>Distressed</i> • <i>Struggle/Struggling</i> • <i>Irresponsible</i> • <i>Awful</i> • <i>Neglect(ing)</i> • <i>Frustrated/Frustrating</i> • <i>Hurt</i> • <i>Unbearable</i> • <i>Worse</i> • <i>Careless</i> • <i>Annoyed</i> • <i>Sorry</i>

Table 5. Semi-Structured Interview Question Types and Emotional Responses			
Question #	Question	Type	Number of Participants Using Emotional Language
4	What environmental changes have you noticed in your surrounding area?	General	4
5	What do you think is causing those changes?	General	3
6	How do those changes make you feel?	Prompted	25
8	Where does the water that you use every day come from?	General	0
9	What do you use the water from the canals for specifically?	General	1
11	Why have you had water shortage?	General	4
12	How did you feel about the shortage of water?	Prompted	18
14	What changes have you notices in the nearby glaciers?	General	1
15	What do you think of when you hear the word glacier?	Free Listing	7
16	Since the glaciers have changed, how has it affected your life?	General	13
17	How do these changes make you feel?	Prompted	22
18	Is there anything else important you would like to mention...?	General	12
19	Do you have any questions for me?	General	0

Within my semi-structured interviews, there were non-prompting, general questions and prompting questions concerning emotion. Non-prompting, general questions were not intended to probe for emotion or feeling, therefore those questions did not elude to possible emotional responses. For instance, the first general question asks *what environmental changes have you noticed in your surrounding area?* (Table 5). The prompting questions did intend to elicit emotion or feeling from participants, such as the first prompting question of *how do those changes make you feel?* (Table 5). For the purposes of this section, the yes or no questions will

not be explicitly discussed as they consisted of merely *yes* or *no* answers. Out of the 19 questions in total, three were prompting and the 16 were non-prompting. Figure 8 depicts the types of questions in total. The emotion questions followed the general non-prompting questions regarding the environmental changes in the area. Out of the 16 non-prompting questions, participants answered seven of those expressing emotion (Table 5). Out of 30 of my participants, seven of them offered emotional responses when asked the free listing question (Table 5).

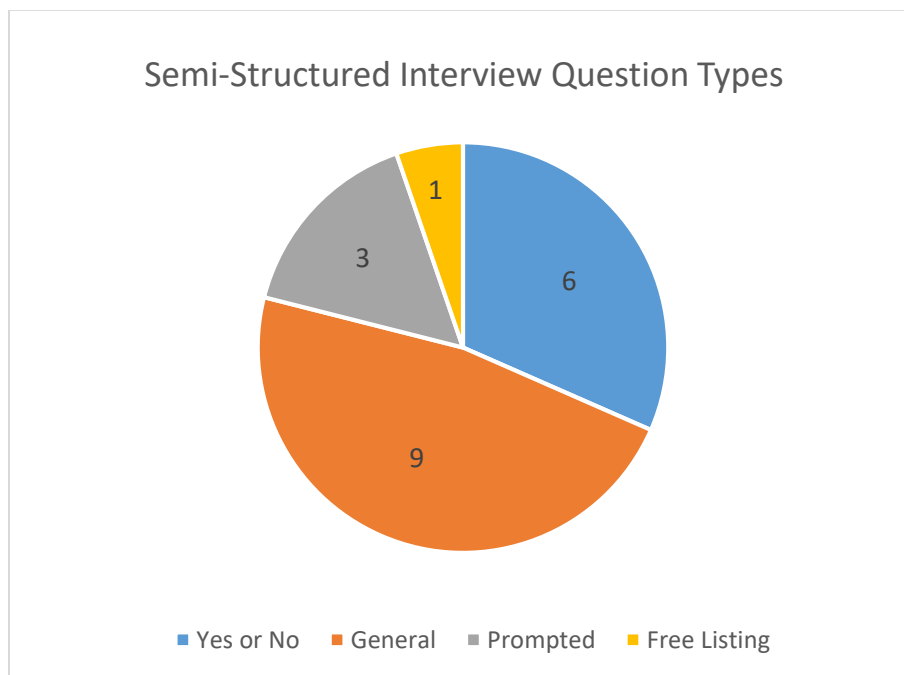


Figure 8. A pie graph depicting the types of questions and total number of each within the semi-structured interview.

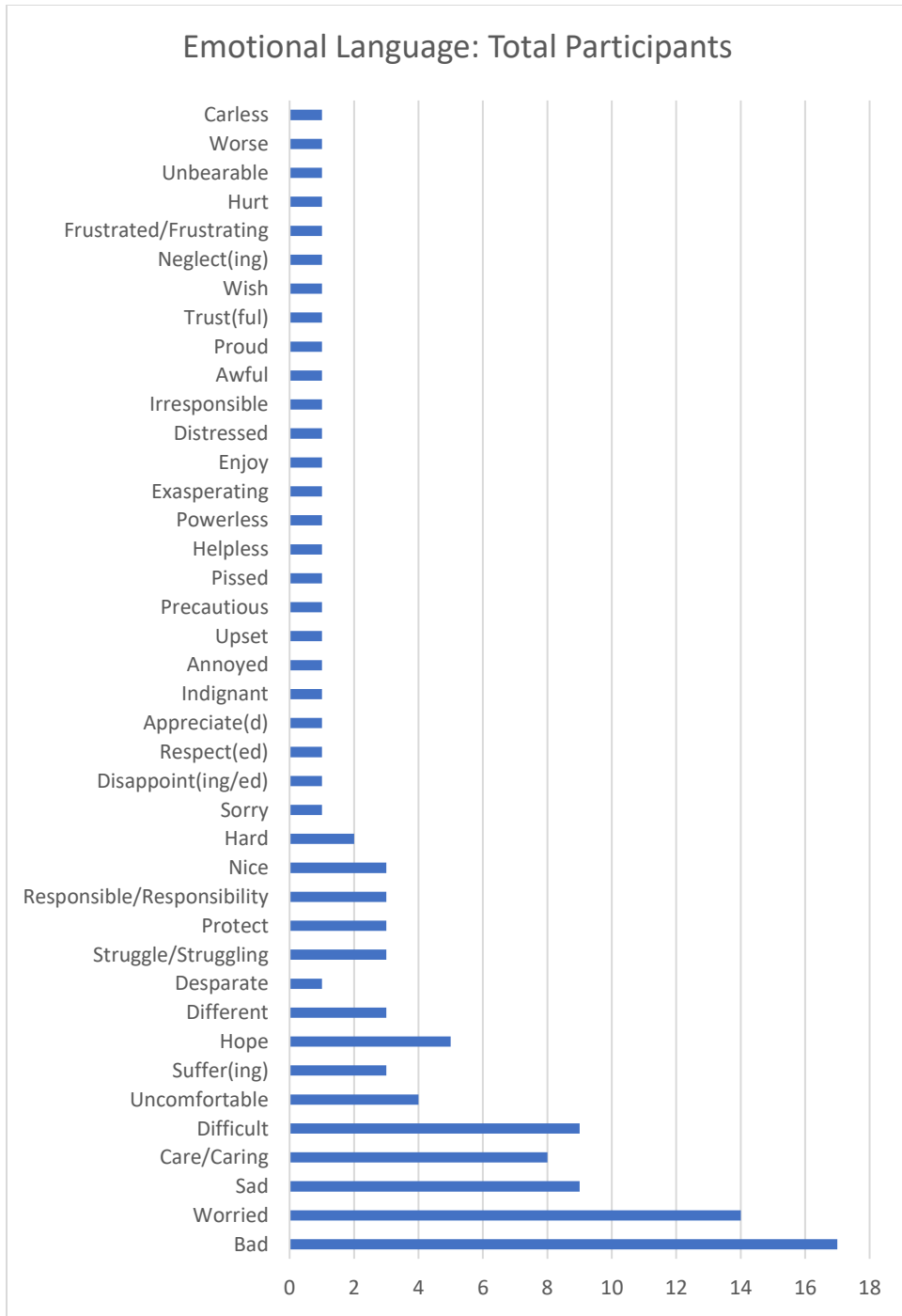


Figure 9. This bar graph represents the total number of words used by participants', as well as the number of participants' that used the word.

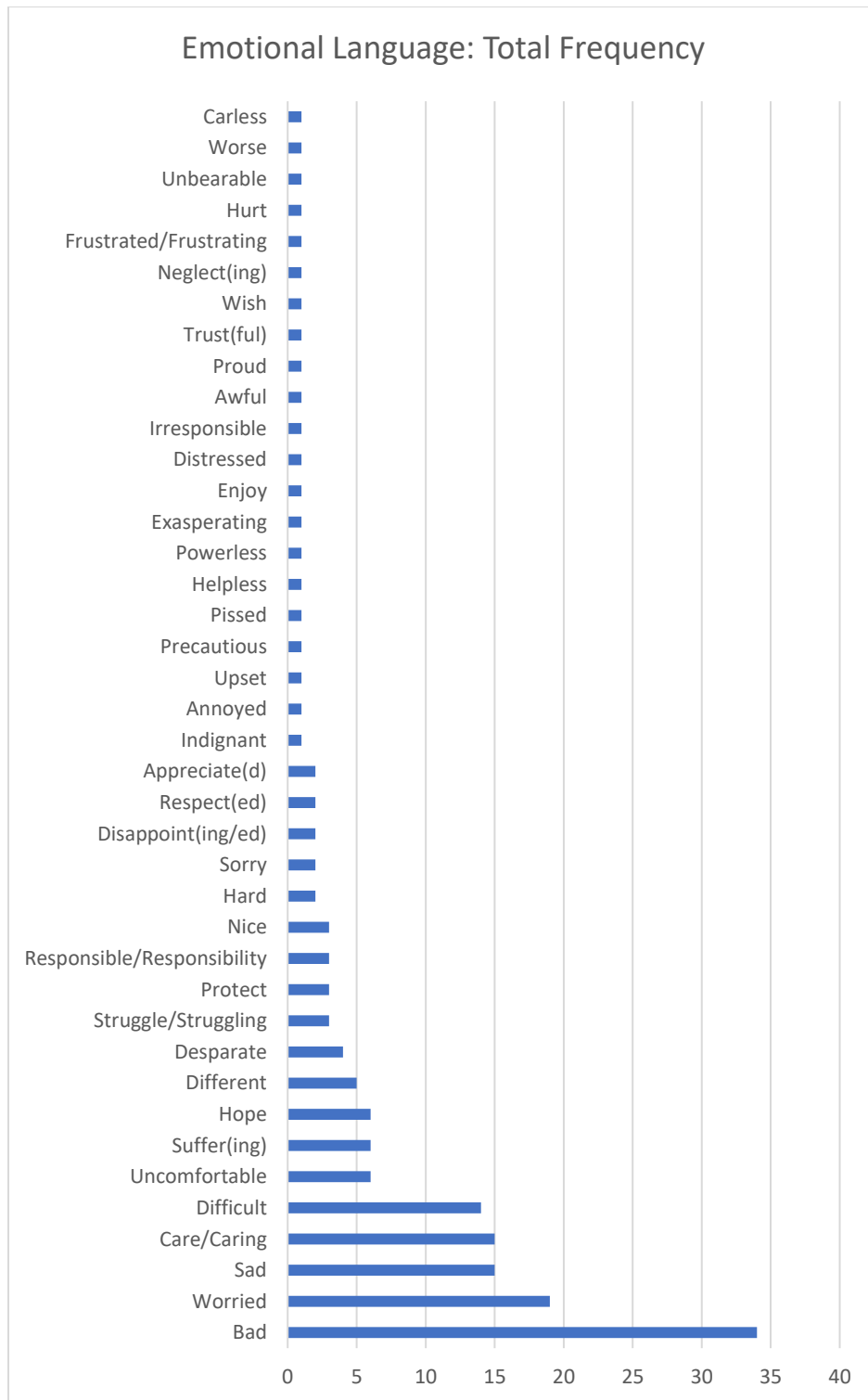


Figure 10. This bar graph represents the total occurrences, or frequencies, of each emotional word. For example, the word *bad* was mentioned 34 times out of all of the interviews, including the free listing question.

To further analyze those emotional responses, I separated them by three main categories according to the literature: positive, negative, and neutral (Akerlof et al., 2013; Bondi et al., 2016; Brugger et al., 2013; Ryan, 2016). Particular to studies concerning climate change and emotion, those categories are used within the literature to gauge whether individuals feel the impacts of climate change are positively, negatively, or not affecting them at all (Akerlof et al., 2013; Bondi et al., 2016; Brugger et al., 2013). According to Brugger et al (2013), individuals who express negative emotional concern over climate change impacts may be more motivated to “change the environment in ways that reduce” those negative feelings “of being at risk” (p. 10). Because the Brugger et al. (2013) article discusses negative feelings from their participants regarding glacial retreat in the Cordillera Blanca region, I wanted to investigate whether the same types of emotions were present within my own data.

5.1.1. Categories of Emotional Evidence

By analyzing the emotional responses of my participants by category, I am seeking to better understand the types of emotions offered. The categories I am referring to throughout this section include positive, negative, and neutral types of emotion. According to literature, positive emotional responses are usually concerned with a more positive outlook for the future (du Bray et al., 2017). In that research, participants expressed positive emotional language such as *happy*, *hope*, or *optimistic* (du Bray et al., 2017). Negative emotional responses were most common in climate change discourse, which included feelings of *anger*, *sad*, or being *overwhelmed*, among others (du Bray et al., 2017, p. 1; Brugger et al., 2013). Lastly, neutral emotional responses are those that cannot be placed in either positive nor negative categories, such as *different* (du Bray et al., 2017). Based on the emotional responses of my participants, I was able to group emotion words in each of the three categories (Table 6).

Table 6. Emotion Words by Category

Category	Positive	Negative	Neutral
Words	<ul style="list-style-type: none"> • <i>Hope</i> • <i>Enjoy</i> • <i>Proud</i> • <i>Trust(ful)</i> • <i>Respect(ed)</i> • <i>Wish</i> • <i>Care/Caring</i> • <i>Appreciate(d)</i> • <i>Protect</i> • <i>Nice</i> 	<ul style="list-style-type: none"> • <i>Indignant</i> • <i>Worried</i> • <i>Bad</i> • <i>Annoyed</i> • <i>Desperate</i> • <i>Sad</i> • <i>Difficult</i> • <i>Upset</i> • <i>Uncomfortable</i> • <i>Suffer(ing)</i> • <i>Hard</i> • <i>Precautious</i> • <i>Pissed</i> • <i>Sorry</i> • <i>Helpless</i> • <i>Powerless</i> • <i>Exasperating</i> • <i>Disappoint(ing/ed)</i> • <i>Distressed</i> • <i>Struggle/Struggling</i> • <i>Irresponsible</i> • <i>Awful</i> • <i>Neglect(ing)</i> • <i>Frustrated/Frustrating</i> • <i>Hurt</i> • <i>Unbearable</i> • <i>Worse</i> • <i>Careless</i> 	<ul style="list-style-type: none"> • <i>Different</i> • <i>Responsible/Responsibility</i>

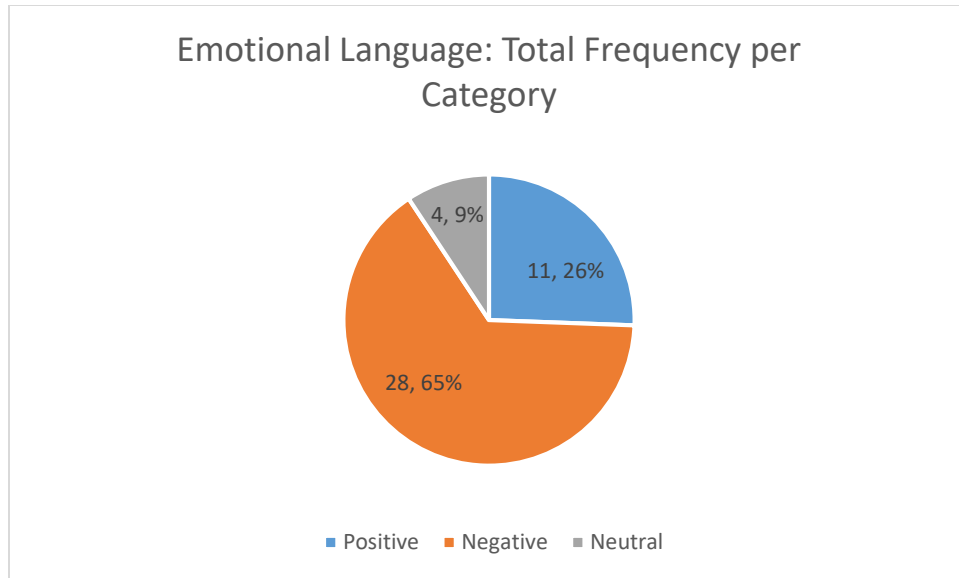


Figure 11. A pie chart depicting frequency of emotional word in total and percentage, per emotional language category.

5.1.2. Positive Emotions

Consistent with the literature, I realized that some of my participants did use positive emotional language (du Bray et al., 2018). For example, a few positive words included *hope*, *care*, *proud*, and *enjoy*. Similar to the literature, these terms were used in reference to a positive outlook on the future or an improvement upon the way we treat nature. For example, one female participant in the Plaza de Armas stated, “*I hope this city remains pretty and nice*” (Participant ID #24; See Appendix B). That participant explained that Peru is very pretty and has beautiful places, including Huaraz, and she did not want that to change. Other participants expressed similar concerns as well. Additionally, participants used positive emotional language in context with the future, such as “*it would be so nice if we could recover the glaciers*” (Participant ID # 21, See Appendix B).

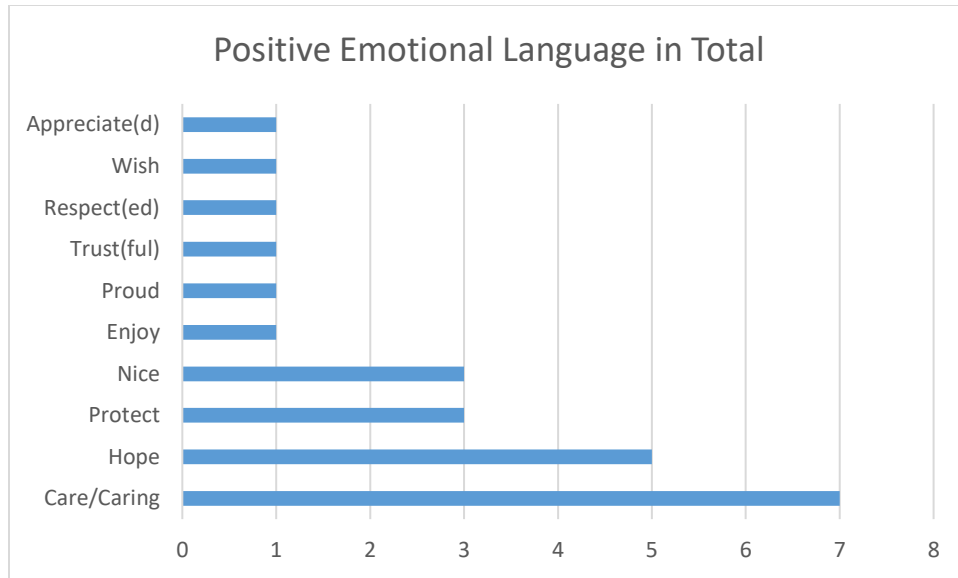


Figure 12. A bar graph depicting number of participants that used positive emotional language.

5.1.3. Negative Emotions

The negative emotions category was the largest within my own research. Among other researchers, this seems to be the case (Brugger et al., 2013; du Bray et al., 2018). Brugger et al. (2013) found that the majority, if not all, of their participants experienced negative emotions related to glacial retreat specifically. Within my own research, negative emotions were present in each of the three main categories (i.e. environmental change, water, and glaciers). Participants' expressed negative emotions about a wide variety of topics and impacts, such as climate change effects, causes of climate change, livelihood impacts, personal and household experiences, experiences throughout the town, etc. The most common words used were *bad*, *worried*, *sad*, and *difficult* (Figure 13). Those four words were expressed by multiple participants', while some negative emotional terms were only mentioned by one in total, such as the word *awful* (Figure 13). Many times, negative emotions originated from talking about experiences with climate change impacts that were detrimental to their family or personal wellbeing.

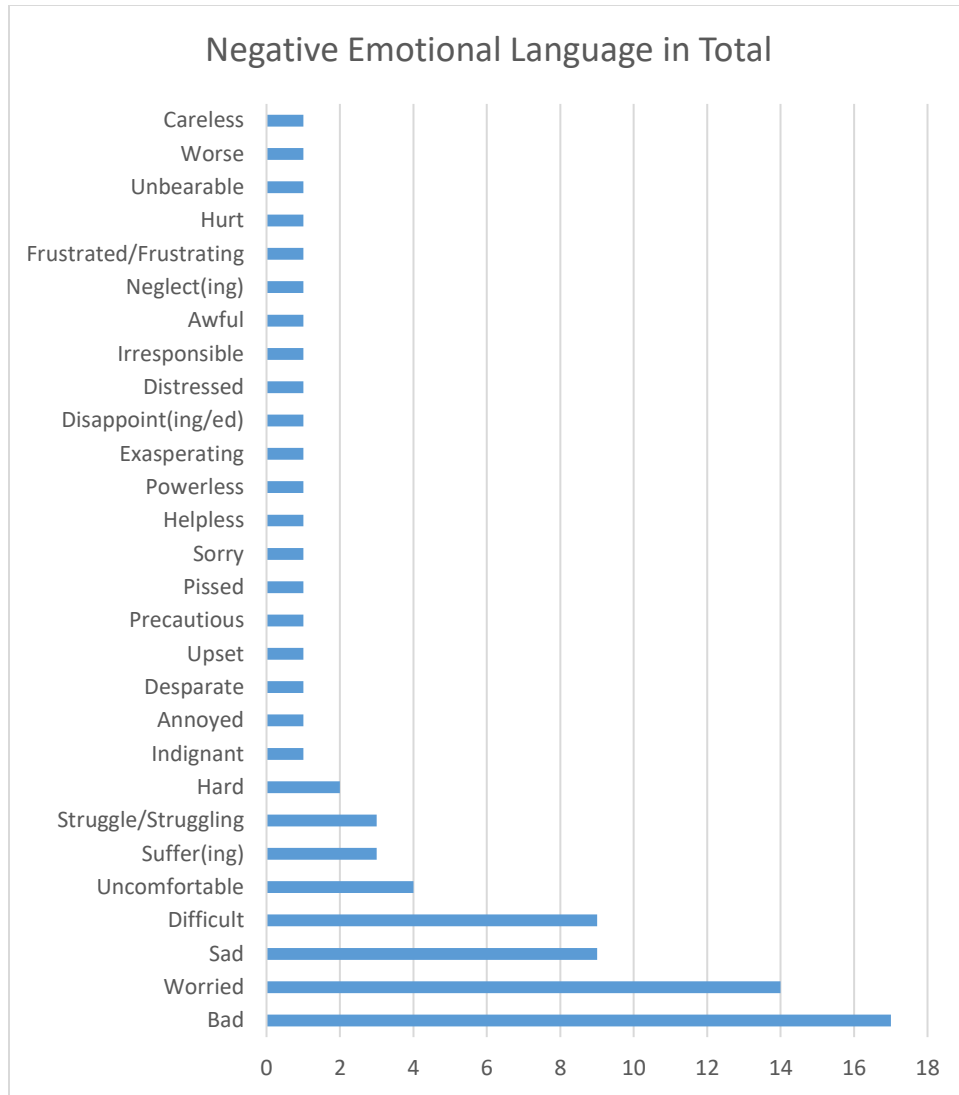


Figure 13. A bar graph depicting negative emotional words.

5.1.4. Neutral Emotions

Neutral emotions was a category I found to be present within my own data, although there is hardly any literature regarding neutrality as an emotional category (du Bray et al., 2017). The one article that does discuss neutrality found that hardly any participants expressed neutral emotions toward climate change (du Bray et al., 2018). Those findings were similar to my own. This category was the smallest, with only three participants' offering emotional narratives that

could be placed here. There was only one instance of a participant specifying that they did not feel a particular way, which occurred when discussing their experiences with environmental changes in the area. That response could not be counted within the emotional responses because the participant did not offer emotional language. The other participants that offered neutral responses used words such as *different* and *responsible/responsibility*. Three participants' used the word *different* and three used the word *responsible/responsibility*. I categorized *responsible/responsibility* as a neutral word because it can be used with both positive and negative meaning.

Overall, all 30 out of 30 participants offered responses with emotion words that could be categorized based on the type of word (i.e. positive, negative, and neutral). Nevertheless, not all 30 out of 30 participants offered emotion words that could be placed in each of the categories, meaning one participant may have used emotion words that could only be placed in the negative category, while another participant used emotion words that could only be placed in the positive or neutral category. Because the negative category was the largest out of all three categories, it is possible that the experiences my participants have witnessed with environmental changes have impacted them negatively in some way. As a result, the next section of this chapter seeks to understand what environmental changes my participants are experiencing and what emotional responses they have to offer toward those changes.

5.2. Experiences with Environmental Change

For the purposes of this study, experiences are a prominent component because they add a contextual base for emotion. Here, the word experience is used to mean a knowledge that is gained through every day living. Generally understanding the experiences of participants' is crucial to gaining a holistic view of why they may develop certain emotional responses to

climate change impacts. Experience plays a tremendous role in emotion. Akerlof et al. (2013) termed the transition from experience to emotional response as the “experiential system,” which “automatically registers information from the environment in terms of frequencies and associations, and tags it with overtones of negative or positive affect, and emotion” (p. 82). Because the two concepts are interconnected, each topic under this section will explicitly encompass both the embodied experiences and emotional responses of my participants toward particular changes in their surrounding environment.

The experiences I am focusing on in this section are concerning the possible changes in the environment that my participants have witnessed. The literature surrounding environmental changes in this particular area of Peru suggests there have been changes regarding temperature, rainfall, and glacial retreat, leading to impacts such as water scarcity and issues with crop production (Brugger et al., 2013; Bury et al., 2013). Concerning environmental changes and emotion in this area, Brugger et al. (2013) study the emotional responses individuals in the Siete Imperios region of the Cordillera Blanca embody toward glacial retreat. Brugger et al. (2013) observed research that show individuals may feel more at risk or threatened by changes if they have recently experienced them, such as the individuals expressing “great concern about glacier retreat immediately after experiencing a very hot summer, which led them to worry that global warming might already be affecting them” (p. 10). In their study, residents were mostly experiencing changes in temperature, which led them to develop emotional concerns about resources like water. I found similar accounts within my own research, among other changes my participants were concerned about. Many of my own participants were concerned about temperature, which was the second most discussed environmental change and water availability was the third most discussed, which many individuals related to temperature changes. This is an

important finding in that it further provides evidence, via individuals residing in the area, of those specific changes. Additionally, both case studies found participants providing emotional responses, thus reiterating the need to address emotional welfare.

To understand the experiences of my participants toward environmental changes in their area, I used semi-structured interviews, free listing, and participant observation. Based on the semi-structured interviews, all 30 out of 30 of my participants did in fact express that they were experiencing changes in their surrounding environment. I first asked one yes or no question, which was *have you noticed environmental changes where you live?* (See Appendix C). All 30 out of 30 participants expressed yes, they had noticed environmental changes where they live. Those results support other research which indicates that community members in the Cordillera Blanca region are indeed, “acutely aware of and concerned about glacial loss and other climatic factors” (Brugger et al., 2013, p. 8). I followed the yes or no question regarding environmental changes with a general open-ended question asking, *what environmental changes have you noticed where you live?* (See Appendix C). Figure 14 depicts those changes, which ranged from glacial, temperature, water availability, rainfall, agricultural, and seasonal.

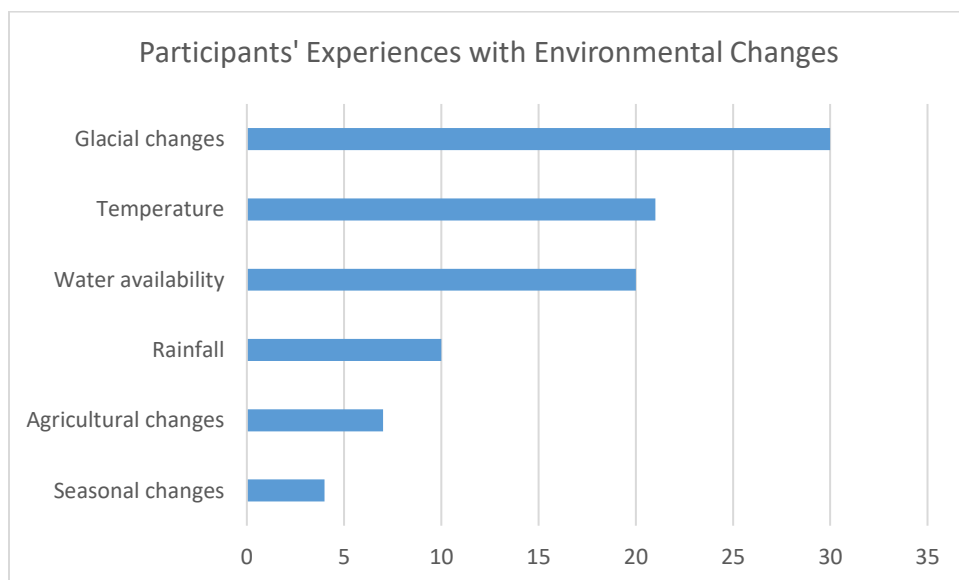


Figure 14. A bar chart depicting participants' experiences with environmental changes in their area.

The subsections to follow encompass the experiences explicitly discussed by my participants. Some participants expressed experiencing more than one environmental change in the area, while others tended to focus on one. The most prominent experiences amongst my participants were those of glacial changes, temperature, and water availability. Because over half of my participants experienced those particular changes, the next few subsections will take a closer look at the details of those experiences. Among those changes, all 30 out of 30 participants expressed notice in the changing glaciers in their area. Participants expressed experiencing various types of changes within the nearby glaciers, which I discuss in greater detail in the subsections below.

5.2.1. Experiences with glacial changes

There are few pieces of literature regarding emotional responses specific to glacial changes (Akerlof et al., 2013; Brugger et al., 2013). Between those, only Brugger et al. (2013) found evidence suggesting a need to address emotional welfare in the wake of glacial changes. Within their research, they found the majority of participants' expressed negative emotions associated with glacial changes. Because Brugger et al. (2013) found those results in the same region of my own research, I kept in mind that the same could also be possible with my data.

All 30 out of 30 of my participants expressed noticing changes in the glaciers in the area. In order to first gauge whether participants were experiencing changes in the nearby glaciers without being prompted, I asked a general question, which was *what environmental changes*

have you noticed in your surrounding area? (See Appendix C). Out of 30 participants, six answered that they had noticed glacial changes in the surrounding area.

However, later in the interviews I asked one yes or no question (See Appendix C). All 30 of my participants expressed that they had noticed changes in the glaciers. This particular experience with environmental changes included the widest variety of answers, which consisted of experiences and emotions about water availability, the changes in appearance of the glaciers, tourism, weather, and concern about the glaciers dying or ending, among others (Figure 15).

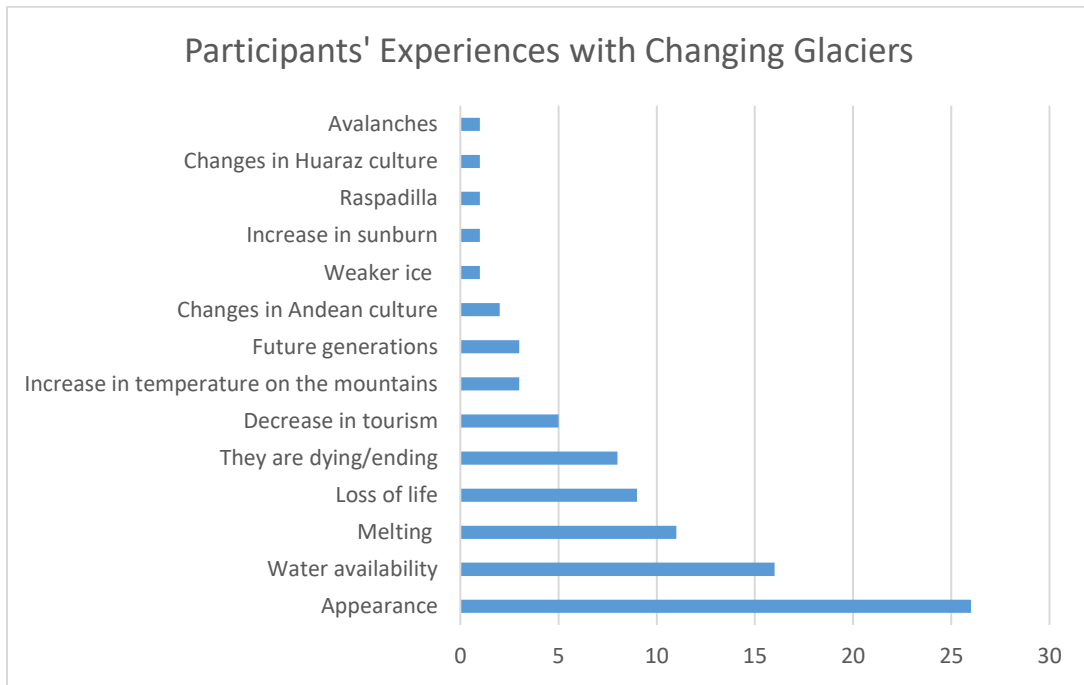


Figure 15. A bar graph depicting the types of changes participants are experiencing concerning glaciers and the number of participants who experienced each topic.

During many of these semi-structured interview questions, the participants used emotional language and expressed concern about the changes in the nearby glaciers. This category ended up being the largest of my findings regarding emotional responses to environmental changes. The majority of the responses focused on how the glaciers have changed

in appearance over time and how those changes have affected their water supplies, which I will discuss later in the water section.

Out of 30 total participants, 26 mentioned experiencing changes in the nearby glaciers' appearance. Participants who had experiences with the glaciers that could be placed in this category used describing words such as [how the glaciers] *look*, [the glaciers are] *smaller*, [the glaciers used to be] *bigger*, [the glaciers] *attract*, etc. Many of the participants who expressed noticing changes in the glaciers' appearances described the glaciers having *spots* that were not present *before*. For instance, one participant stated:

“Before there is almost no place without snowy hill... but now from the bottom up... it is cutting the skies. Before the entire Cordillera Blanca range was continuously white, but now there are patches of rock. The only mountain that reminds me of how the others used to be is Huascarán because it is the tallest mountain where you can still see snow... the smaller ones are getting very less ice” (Participant ID #19; See Appendix B).

That participant in particular expressed being *worried* that those changes in the glaciers would further cause issues with water availability because he and his family *“use water for everything”* (Participant ID #19; See Appendix B). He explained his thoughts on why the glaciers have changed appearance, stating that *“winter is getting very rainy but for a short moment... the mountains do not have time to recover themselves... now they are getting smaller because the winter is very brief”* (Participant ID #19; See Appendix B). One participant also described the glaciers as having *“rocky black spots on them now”* (Participant ID #24; See Appendix B). Other participants expressed similar concerns (Table 7). Additionally, I was able to gather information on the topic from individuals while engaging in participant observation.

Table 7. Glacial Changes: Participants Experiences with Appearance

“I like to talk about the mountains with people and how the mountains used to be bigger... how they look now is impressive... I could not imagine what they used to look like... [it is] very sad”- Female, Participant ID #24, See Appendix B

“Makes me feel sad... how they look now... I cannot even imagine how they will look later” – Female, Participant ID #26, See Appendix B

“I have noticed the mountains getting smaller... when I was younger, they used to be covered in snow... now there is no snow... all these bad things going on... they are our responsibility because we destroyed nature”- Male, Participant ID #18, See Appendix B

“The Cordillera Blanca is getting smaller... [I am] worried” – Male, Participant ID #6, See Appendix B

While engaging in participant observation, one individual pointed to the mountain behind his home in Llupa, explaining that when he was a child that mountain was covered in snow, but now all he can see is a large black mass (Participant ID #9; See Appendix B). As I looked where this individual was pointing, I could see a large bare mountain. Where he once stated snow existed, there appeared to be no trace left. Much like the literature describing how other community members in the Cordillera Blanca region reacted to changes in the nearby glaciers appearances, nearly all of my participants expressed concern about those changes too (Brugger et al., 2013). Brugger et al. (2013) discuss how their participants “quickly and easily pointed out places much lower on the mountain where they used to visit the glacier” (p. 8). Yet, they had ceased to do so after the changes (Brugger et al., 2013, p. 8). Those particular participants’ accounts of the changes in the nearby glaciers relate to the importance of situated knowledge (Haraway, 1988).

Haraway (1988) argues that the knowledge of the individual is just as important as the knowledge of what westerners consider disembodied scientific truth. This would place agency

with different kinds of knowledge producers, those with individual, local knowledge. Likewise, local knowledge, such as those of the participant above, is beneficial for this particular topic because of the location. Much physical science based research on the retreating glaciers takes place after 1930 (Baraer et al., 2012). Therefore, without local knowledges of the landscape in the area, it could be difficult to know exactly how long these changes have been occurring.

Other experiences participants have embodied regarding glacial changes in their area include those specifically with them melting, loss of life, the glaciers dying or ending, a decrease in tourism, an increase of temperatures on the mountains, concern for future generations, changes in Andean culture, among others (Table 8). Out of all 30 out of 30 participants who experienced glacial changes, 11 experienced the glaciers melting, nine expressed concern for the loss of life, eight discussed the glaciers ending or dying, and five experienced a decrease in tourism on the mountains. Brugger et al. (2013) reported their participants using phrases such as “we will all die” and “[the glaciers] time has come” (p. 8). Additionally, their study showed participants did not visit the glaciers anymore because “it is much farther away and more dangerous due to the steep rock walls left by the most recent recession” (Brugger et al., 2013, p. 8). Those phrases were extremely similar to the ones of my participants regarding the same topics. In particular, one of my participants stated that *“everything is just going to end... everything is just going to die... when you say glacier... I think that it is going to end... we are worried about it... losing hope in general”* (Participant ID #20; See Appendix B). Sultana (2011) discusses how conflicts regarding resources can lead to emotional concern, and many of my own participants were expressing emotional concern over the changing glaciers while also relating that to their resources.

Table 8. Glacial Changes: Participants Other Experiences

“Since the mines have come... we have noticed the glaciers melting... I feel desperate because I think about in a long time more or less from here... 10 years or 15 years... what is going to happen? What we see is not going to exist... maybe because I am an adult I will not see it get really bad... but it will affect my children”- Male, Participant ID #3, See Appendix B

“It is very sad that [the glacier] is going away... the changing glaciers can change the Andean culture” – Male, Participant ID #1, See Appendix B

“I am very worried about the situation... if that glacier ends... there is not going to be life... life is going to end... how are we going to live?” - Female, Participant ID #14, See Appendix B

“It used to be that we could go to the glacier and have fun on it... but not anymore... now you cannot enjoy nature as you could in the past” – Female, Participant ID #25, See Appendix B

Out of all 30 of 30 participants who experienced changes in the glaciers, all of them directly related those changes to their lives, the lives of those in the area, or those in the future. Sharp (2009) discusses how understanding the emotions of an individual can elucidate the relations they may have with certain places and spaces. Particular to glaciers in general, there is a long history of individuals residing near them and using them for resources (Carey, 2007). Therefore, those dependencies individuals have with glaciers to access water, among other activities, or even as merely an identity, may lead them to developing emotional concern when changes occur. Additionally, because this category was the largest of my data, with all 30 participants expressing emotional concern, it shows the presence of solastalgia (Albrecht et al., 2007). Many times, participants also related glacial changes to the changes in temperatures in the area, which they felt were one of the causes of environmental changes. Because of that, the second leading experience of participants regarding environmental changes was that of temperature in the area.

5.2.2. Experiences with temperature

Among the experiences that my participants have witnessed regarding environmental changes in the area, temperature was the second most prominent. Out of 30 participants, 21

expressed experiencing changes in temperature. Out of the 21 participants who expressed experiencing changes in temperature in the area, the majority discussed witnessing general temperature changes, such as an increase or decrease in temperatures, especially during seasons where an increase or decrease in temperature is uncommon. For example, one participant was a farmer in Llupa who has noticed *“many changes... very cold and hotter... it is getting much colder before Christmas and I have noticed those changes within the last two years”* (Participant ID #14, See Appendix B). Those changes made her feel *“worried”* because they could *“bring new diseases”* (Participant ID #14, See Appendix B). Another participant stated they were experiencing *“very cold mornings and very hot mid-days... every year the weather just changes. When a change of the weather comes, it brings different diseases... now it is easier to get sick”* (Participant ID #19, See Appendix B). Other participants explained how the changes in temperatures were affecting them personally.

A few participants expressed how temperature changes in the area have affected them personally. For example, one participant who lived within the city of Huaraz and had been spending the day in the Plaza de Armas stated:

“In the past, the cold was not that cold. In the past, Huaraz weather used to be more warmed and now I am pissed that it is very cold... at night you just have to go home and sleep because you cannot do anything” (Participant ID #20, See Appendix B).

That participant explained their frustration for not being able to partake in activities outside of their home because of the decreases in temperature in Huaraz. However, another participant related temperature changes to issues they were experiencing with crop production. This particular participant lived in Llupa and was part of a family who grew potatoes in the area. They explained that the temperature changes made them feel:

“different... everything is changing... nature is changing. Before they used to farm potatoes and they used to be bigger... no matter how much fertilizer we use they are getting smaller and smaller... there is not much production in the fields” (Participant ID # 16, See Appendix B).

Although the experiences of the participants above were fairly detailed, the majority of participants who witnessed temperature changes in the area spoke about the issue briefly, such as the examples presented in Table 9.

Table 9. Participants Experiences with Temperature
<i>“It is getting hotter and getting colder... before it was not like that... [I feel] <u>different</u>... everything is changing”- Female, Participant ID #16, See Appendix B</i>
<i>“The weather is getting colder and colder... it is easier to get sick... in the past I used to take cold baths but now it is too cold and I cannot do that anymore... in general [I feel] <u>bad</u>... even plants do not grow anymore” – Male, Participant ID #18, See Appendix B</i>
<i>“For example, it is getting very very warm... [I feel] really <u>helpless</u>”- Male, Participant ID #22, See Appendix B</i>
<i>“Much climate change... hot and cold. [It makes me feel] <u>bad</u>” – Female, Participant ID #5, See Appendix B</i>

Upon looking over these analyses, it appeared that my data differed from that of other literature regarding environmental changes in this particular area. Brugger et al. (2013) did not find where participants explicitly discussed temperature change in their study. However, my participants’ accounts of temperature changes do correlate with those based in the physical sciences in the area (IPCC, 2007; Baraer et al., 2012). Additionally, participants who expressed emotional concern over temperatures in my research also related those changes to changes in their personal lives. That again signifies the importance of local knowledge, but also the connectedness of humans to their environments (Cruikshank, 2001; Cruikshank, 2006; Cruikshank, 2012; Tschakert et al., 2013; Piersall & Halvorson, 2014).

The third most prominent category of environmental changes that my participants have experienced is those regarding water. The participants who expressed concerns about water resources in the area did so in a variety of contexts and offered many details regarding the issues.

5.2.3. Experiences with water availability

The third most prominent experience of my participants with environmental changes was that of water availability. Two-thirds of my participants expressed directly experiencing changes in water availability. Table 10 represents a few experiences concerning water issues in the area. My participants’ encounters with issues regarding water availability were in the context of canal usage, changes with water management in the area, water shortage, contamination from the mining companies, and glacial changes. According to Brugger et al. (2013), many of the residents of Siete Imperios expressed high-leveled concerns for changes in water availability in the area. Within that research, the majority of the residents expressed negative emotional responses, with no indication of residents expressing positive or neutral responses (Brugger, et al., 2013). I did in fact observe similar findings in my particular study area of the Cordillera Blanca region. Additionally, 17 participants stated they used water from the canals and 23 expressed that they have experienced water shortage.

Table 10. Participants Experiences with Water Availability
<i>“There is less water... there is less rain... the weather is changing so much. It makes me feel super <u>worried</u>... farming is very difficult. When we talk to each other about it... our farms no longer give us as before... it does not leave the crops... we have to sow through fertilizer otherwise there is no production” – Female, Participant ID #23, See Appendix B</i>
<i>“[There is] variation in rain... [I am] <u>worried</u>” – Male, Participant ID #6, See Appendix B</i>
<i>“There used to be more water and rain... now there is not too much... [I feel] bad... sad... uncomfortable” – Female, Participant ID #27, See Appendix B</i>
<i>“Water was more abundant before and there was an abundance of ice... now there is no longer due to the contamination of the mining companies... [I feel] desperate because we depend on the rain” – Male, Participant ID #3, See Appendix B</i>

Participant observation allowed me to gather more information on the canals in the area and the availability and access participants' have to them. According to a few participants in Llupa, the local government controls those canals and they have recently begun blocking off use unless residents purchase a ticket in-exchange for the water. Because the water transported through the canals in the area is from the nearby glaciers, one yes or no question I asked participants' was *do you use the water from the canals?* A total of 17 out of 30 participants expressed that they did use water specifically from the canals. For the 13 participants who expressed that they did not use water from those canals, they explained that the water they use does come from the glaciers, yet they retrieve it from their own canals, the river, water springs, or the city. A few participants expressed changes in management over water resources in the area, which directly affected their access to water.

One participant in particular who was a farmer in the Llupa area expressed that the gating of the canals has led her to experience shortages of water for their farm (Participant ID #16, See Appendix B). While engaging in participant observation, I was able to observe those gates within the canals, which blocked off the water flow for different communal areas. According to Brugger et al. (2013), in the Siete Imperios communities, individuals were expressing concern over "political redistribution" of water in the area (p. 8). Likewise, literature concerning public-private partnerships of water resources in the Andes state corporations that own those resources can take control over them (Stensrud, 2016). Therefore, privatization of water in the area can prevent some individuals from gaining access to the resource.

Another resident from the Llupa area expressed that because of the gating of the canals, some residents have more water than others do. She also expressed that the president of the community lets various water users outside of Huaraz take the water yielded from the glaciers

and they have no control over that happening (Participant ID #15, See Appendix B).

Additionally, another participant explained her experiences with the government controlling their access to water in Lluca via the canals. She had explained that she experienced water shortages and her water supply was “*getting smaller*” (Participant ID #16, See Appendix B). She stated:

“Before we used to have more water... but now the people... the leaders... they closed the gates... now we have less water and if we want to use it for our chakra we have to pay to use the water. [It makes me feel] very bad... before everyone could use [the water] how they wanted it... but now they give us tickets so we have to exchange for water use. They say okay... you can use the water this day and this day and this day... it is really bad because our farms need water every day but we do not have the change to use it... we are getting upset about it” (Participant ID #16, See Appendix B).

Other participants expressed similar experiences with water management in the area (Table 11).

Those experiences also corroborate with literatures regarding privatization of water resources in Peru (Stensrud, 2016).

Table 11. Participants Experiences with Water Management
<i>“I have been suffering shortcuts of water whenever there is a rainy season because the water companies close the gates... they have to treat the water... so I will not have it at home... I have felt very <u>uncomfortable</u>”- Male, Participant ID #18, See Appendix B)</i>
<i>“I use the water system of the city... [there have been] problems with the water companies and management... and when there is shortage of rain... it does not accumulate the reservoirs that distribute to the population... it is <u>exasperating</u> because there is not enough to clean yourself or for anything” – Male, Participant ID #22, See Appendix B</i>
<i>“Occasionally there is a burst in the well for lack of maintenance... sometimes managers stop working in the company and the problem does not take importance and they ignore it for a few days... if it takes two or three days I have to go until they fix it... it makes me feel very <u>uncomfortable</u>” – Male, Participant ID #19, See Appendix B</i>
<i>“I have experienced that when there is a rainy season and there is a lot of rain... the water that comes from the mountains is very dirty and [the government] closes the gates of the canals and we do not have water... [it is] <u>difficult</u>” – Male, Participant ID #20, See Appendix B</i>

Another yes or no question of the semi-structured interview was *have you ever had a shortage of water?* For this question, 23 participants out of 30 responded that they had experienced water shortages. Many participants attributed that shortage to lack of rain, weather changes, low rivers and a decrease in river flow, pollution, changes in control over the water, access to water, shortcuts in city water, industrialization, and the changes in the glaciers. The responses of my participants' ranged drastically, with reports of individuals feeling that the shortages were *difficult, sad, bad, hard, and frustrating*, among others. One participant expressed that it was "*difficult*" because "*you have to look for people around you that have water in big containers... and you have to borrow their water*" (Participant ID #20; See Appendix B). Others reported feeling *bad* or *sad* because they do not have much water to use for "*anything*" (Participant ID #23; See Appendix B). Many times, participants' used various emotional terms while reporting their experiences for this one question. This was similar to findings by both Brugger et al. (2013) and du Bray et al. (2017). Brugger et al. (2013) found that residents even considered "redistributing water between Siete Imperios and communities farther downstream" because the issue was so prevalent (p. 8). While no one in my own research mentioned redistributing water, many participants' mentioned having to borrow water or buy the resource from the store. This related much to the literature I found regarding Andean culture and reciprocity in the area (Stensrud, 2016).

Reciprocity is a cultural identity of Andean communities, as individuals often exchange resources between kin when needed (Stensrud, 2016). Because my participants expressed partaking in the borrowing of resources, it shows the continued existence of the practice of reciprocity in the area. Additionally, the issues my participants have experienced related to their water shortages connect to much literature on power dynamics, both in general and in the area

(Stensrud, 2016; Budds, 2008). Sultana (2006) found that rural areas of Bangladesh had far less access to clean water supplies than did the urban areas. In Peru specifically, Bury et al. (2013) found that water was being redistributed from the rural areas (i.e. the Andean region) to the coasts, leaving the individuals in the Andes with less access to water. Lastly, participants expressed experiencing water scarcity issues directly related to the glacial recession in the area.

Out of 30 total participants, 16 expressed experiencing changes in water availability directly linked to the changes in the nearby glaciers. Nearly all individuals who described these experiences expressed emotional concern over how the changes in the glaciers will affect their water supplies in the future. Out of those who did express emotional concern, all expressed negative emotions. For instance, one participant stated:

“Before... it was covered with ice and now it is just rock... it is disappearing... now there is no water. Soon we will not have any water... it is necessary for humans and it is very sad that it is going away... we are going to end up like the coast... we are not going to be able to do agricultural work... [I am] very worried” (Participant ID #1; See Appendix B).

That participant was a farmer in Llupa, who stated that he uses water from the canals because *“there is no rain... the heat is thawing the glaciers and there is absolutely little water”* (Participant ID #1; See Appendix B). Another farmer from Llupa expressed similar experiences with the glaciers and water availability. When asked where he obtains his water supply from he pointed down the hill from his home and stated:

“This river... it comes from the mountain but it is not suitable for human consumption and there is no fish in it. As the ice is melting down to the bed rock... that is where the bad minerals are and those minerals are what is in the river... [it is] really bad... before the glaciers were closer to use and now they are farther away” (Participant ID #4; See Appendix B).

When I asked him *since the glaciers have changed, how has it affected your life*, he stated that it mostly affected him *“with the water... [it is] very bad”* (Participant ID #4; See Appendix B). Other participants stated how the changes in the glaciers leading to not having enough water makes life *difficult, hard*, and a *struggle*, as well as makes them feel *worried, bad* and *sad*. Among those emotion words, *worried* was used the most, with eight participants stating that particular concern. The majority of my participants who expressed concerns with glacial changes and water availability also described experiencing various other types of phenomenon regarding glacial changes.

Similar to my own findings, Brugger et al. (2013) found that the “people of Siete Imperios very clearly connect glacier recession with water availability” (p. 8). Both their research and my own also found that participants expressed emotional concern over the issue. Not only does that provide further evidence of the need to address emotional welfare, but also the need for situational knowledge. Because situational knowledge focuses on the smallest possible scale, those knowledges could help find solutions to the water scarcity issues in Huaraz, as well as other places (Tschakert, 2012). Likewise, using an FPE lens to focus on situational knowledge would also help create better solutions for other experiences participants are witnessing as well.

Table 12. Participants Experiences with Water Availability and Glaciers
<i>“The ice is going away... the mountains are disappearing... all the time... not having water makes life difficult”- Male, Participant ID #9, See Appendix B</i>
<i>“I think... what is going to happen when we do not have more glaciers? Water is going to run out. I am <u>worried</u> about the fact that later... what are we going to do without water? Because the water comes from the mountains” – Female, Participant ID #16, See Appendix B</i>
<i>“I get <u>worried</u> because I think... what is going to happen when there is no more glacier? There is not going to be any water. How are we going to live?” - Female, Participant ID #14, See Appendix B</i>

“I have noticed that when I was younger... the mountains used to be very big and had big areas... now they are getting smaller and people are saying with time they will disappear... what will happen when that happens? Water is the most important... and with time it is going to end” – Male, Participant ID #20, See Appendix B

5.2.4. Participants’ Other Experiences with Environmental Changes

Based on my semi-structured interviews and participant observation, there were other less common mentions of experiences with environmental changes in the area. Out of 30 participants, 10 discussed experiencing changes in rainfall, seven experienced changes in agriculture, and four expressed they were experiencing seasonal changes.

Particular to rainfall, one evening that I was engaging in participant observation, one participant expressed her concern about precipitation changes after it started to rain while we were farming (Participant ID #16, See Appendix B). That same participant expressed that the patterns in precipitation have drastically changed over the 46 years of her life. She went on to explain how although it was the winter season, the rainy season had begun to come earlier and earlier in the year, now arriving in August when it used to arrive in late September or early October. Here, participant observation helped me better understand the responses from participants regarding rainfall patterns in the area. The participant’s account of rainfall changes that I was able to gather through participant observation relates to much literature regarding the topic (Baraer et al., 2012; Bury et al., 2011; IPCC, 2007). According to Baraer et al. (2012), the rainy season has historically known to occur between October and April. Therefore, participants are witnessing changes that corroborate with historical evidence of seasonal times. Many other participants referenced the same phenomenon when prompted in the semi-structured interviews.

Out of the four participants who experienced changes in the seasons, all four related those seasonality changes to rainfall patterns. For example, one participant stated that the *“seasonality of our environment has changed... the seasons have been displaced... normally in July, the temperature is cooling and the rainy season is supposed to start... but it has gotten delayed... all of that makes me sad”* (Participant ID #25, See Appendix B). A few participants who engaged in farming in the area directly related the changes in rainfall to the changes they have witnessed with agriculture.

One participant stated they had noticed that there *“used to be more water and rain... now there is not too much”* and later they mentioned that she felt *“bad, sad, and uncomfortable... we had so much before... we do not have healthy food... there is no longer that”* (Participant ID #27, See Appendix B). Other participants specifically talked about food as well, with one individual who lived in the city of Huaraz stating that *“nothing is nature anymore... like our food”* and later discussing how *“farming used to be more natural... we used the waste of animals, but now we use chemicals and that is destroying everything... I feel distressed”* (Participant ID #26, See Appendix B). Because farmers interact with their surrounding environments often in this area, they are aware of the environmental changes and may experience feelings of distress due to their dependence on those environments (Brugger et al., 2013; Tschakert et al., 2013; Skinner, 2011). Those relations between farmers and their environments allow them to embody knowledge of changes that differ from others, which Haraway (1988) discusses can be quite valuable.

The participants who spoke about chemicals and pollution that was contributing to the changes they were witnessing in the area, the majority of them brought up mining, which participants expressed was causing various issues.

Table 13. Participants Experiences with Other Environmental Changes

<i>“The weather changes because of the seasons... people are getting sicker... the kids are getting the flu... now it is more cold... I am <u>worried</u>” – Female, Participant ID #17, See Appendix B</i>
<i>“[There is] variation in rain and with heat... [it makes me feel] <u>worried</u>” – Male, Participant ID #6, See Appendix B</i>
<i>“I’ve seen changes in the seasons... it is raining a lot less now... it is colder in the cold season and hotter in the hot season... [it makes me feel] really <u>bad</u>” – Male, Participant ID #4, See Appendix B</i>
<i>“The seasonality of our environment has changed... the seasons have been displaced. For example, in Huaraz... normally in the month of July the temperature is cooling and the rainy season is supposed to start... but it has gotten delayed... all of this makes me <u>sad</u>” – Female, Participant ID #25, See Appendix B</i>

Out of 30 participants, 12 mentioned mining during the semi-structured interviews. After discussing the changes they had witnessed in their surrounding environments, all 12 participants mentioned the mining companies when asked *what do you think is causing those changes?* (See Appendix C). Additionally, while engaging in participant observation, a few individuals were able to point and direct me as to where some mines were located in the area. Additionally, while traveling in the Peruvian highlands I was able to see areas where a few mining companies had placed the leftover waste into large piles in close proximity to the main roads. The 12 participants who discussed mining in the area expressed experiencing changes in the landscape, food, water supply, and culture (Table 14). For example, one participant stated:

“Since [the mine] arrived, there is a lot of examples in our food... or passing a low river where there is mining oppression. When I was a child, before it was taken, anyone could drink the river, but since the mine I no longer see that. There have even been cases of the occurrence of death of trout... changes of color of the river on several occasions... an increase of flow rate and smell... sometimes like a rotten egg. There has also been a cultural change from the community. What is happening now with the people? People have changed a lot... culturally before, people were very united and now... not anymore... union is no longer seen. In the past, land used to be very

healthy and people used regular fertilizer like from animals... but not anymore. We have to use chemicals and that is maybe why people are getting sick because people are consuming the chemicals and people are getting diseases that we didn't have in the past... it is a difficult situation in general” (Participant ID #29, See Appendix B).

According to that particular participant, the mines in the Huaraz area were the reason the environment was changing. He also discussed that when the mines first began in Huaraz, the residents believed it was *“a dream to work in the mine... because you could make a lot of money and buy a lot of stuff and give your family some welfare”* (Participant ID #29; See Appendix B). However, they soon found out that it polluted the *“water, the land, the air”* and it ended up being a *“nightmare”* (Participant ID #29; See Appendix B). Other participants who expressed emotional concern over the mining in the area had similar accounts.

Table 14. Participants Experiences with Mining
<i>“I live close to the mining operation area... there have been many changes in pollution of water, land, and air... when they do their operations they use heavy chemicals to separate the chemical from the land... the leftovers of that production can go to the rivers or huge areas where they put the polluted water... it starts evaporating because of the sun and then pollutes the air... I feel really <u>bad</u>... this situation is bad for people in the area”- Male, Participant ID #30, See Appendix B)</i>
<i>“There is much mining and there is no adequate treatment of the waste... people are not well educated about environmental issues... all of that makes me <u>sad</u>” – Female, Participant ID #25, See Appendix B</i>
<i>“The mountains are getting smaller and there is deforestation of the forests... it is more than all the carelessness of the government by the mining exploitation... they do not control the mining or how they are producing it... I feel <u>sorry</u> because there are unfortunately many professionals... but this network of corruption... there is no interest in improving” – Male, Participant ID #21, See Appendix B</i>
<i>“The harvest used to be much larger and now they are smaller... it is because of the mines... [it makes me feel] very <u>bad</u>” – Female, Participant ID #8, See Appendix B</i>

Needless to say, based on the literatures I found relating to mining in the area, my participants have been experiencing some of impacts associated with that industry (Patrick &

Bharadwaj, 2016; Bury et al., 2013; Himley, 2013). Because the majority of participants expressed experiencing water issues, and the mining companies have a history of introducing competition in the area regarding water, participants seemed to relate the two (Patrick & Bharadwaj, 2016; Bury et al., 2013). Although both men and women expressed concern over mining in the area, there seemed to be a pattern within my data with men expressing concern over industrialization and capitalism related to mining. Likewise, other gendered patterns stood out to me as well.

As a result of finding patterns within my data relating to possible gender dimensions, I moved forward with trying to answer my second research question. Based on the literature, gender can often times be an identity that causes individuals to have or lack access and power over resources (Truelove, 2011). Likewise, gendered division of labor has historically been cultural for the Andean region of Peru (Lázaro 1990). The next chapter focuses on answering the question of whether or not gender is a factor regarding the emotions of my participants.

CHAPTER 6: GENDERED EXPERIENCES AND EMOTIONS

The second focus of this research is to investigate whether the experiences and emotional narratives of numerous Peruvian highlanders toward climate change may be gendered. Here, by gender I am referring to cis-men and cis-women. I refer to gender in this particular way due to the historical emphasis placed on gendered roles of Andean people in Peru (Ames, 2013; Forstner, 2013; Molyneux & Thomson, 2011; Lynch, 1991; Silverblatt, 1987; Radcliffe, 1986; Wilson, 1984). This chapter aims to provide evidence of the emotional narratives of participants through a gendered lens acquired through participant observation and analysis of data. This particular chapter will focus on answering the following research question of **(2) are the emotional narratives of Peruvian Highlanders gendered?**

In order to answer that question, this chapter is will first reflect on addressing gender in relation to the literature (Arora-Jonsson, 2011; Sultana, 2011; Rocheleau, 1996; Ruether, 1995; Plumwood, 1991). That includes gendered experiences of climate change through embodied knowledge of everyday living, including the roles associated with gender and gender-nature relations. Second, this chapter seeks to shed light on my second research question by highlighting similarities and differences surrounding emotional language use.

6.1. Gender and the everyday

In order to understand whether or not the experiences and emotions of my participants are gendered, I focused on drawing from the semi-structured interviews and participant observation. A couple of themes emerged from my data that elucidated possible gendered dimensions in the everyday lives of my participants. Those themes were consistent with relevant literature on the

topic and included factors such as gendered roles and gender-nature relations (Arora-Jonsson, 2011; Sultana, 2011; Rocheleau, 1996; Ruether, 1995; Plumwood, 1991).

6.1.1. Gendered roles and climate change

Gendered division of labor was apparent through participant observation and within my data, particularly when participants discussed general changes or how changes were making them feel. Instances eluding to gendered division of labor included mentions of children and uses for water.

In particular, among participants, five women explicitly mentioned the wellbeing of children, while two male participants mentioned children and family. During one interview, I asked a female participant *what environmental changes have you noticed where you live?* In response, she expressed that *“the weather changes because of the seasons... now it is more cold and there is rain when there is not supposed to be. The kids are getting the flu... people are getting sicker”* (Participant ID #17, See Appendix B). Likewise, four other female participants expressed concern over the health and wellbeing of their own children and children in the area. In regard to water, one of the questions I asked was *how did the water shortage make you feel?* A female participant interviewed at the market expressed *“I think towards the future and say that there is no water because I see that already with the contamination of the environment and of nature... my children and grandchildren will suffer”* (Participant ID #28, See Appendix B). Additionally, a female participant who resided in Jangas expressed that she is *“very sad... when the children are growing up, they are not going to be able to see [the glaciers]”* (Participant ID #8, See Appendix B). Less males than females discussed children during the semi-structured interviews or during participant observation.

Two male participants discussed children and family during the semi-structured interviews. One male farmer in Llupa stated “[*the glacial changes*] *make me feel desperate... psychologically it is bad because it makes me feel desperate... maybe because I am an adult I will not see it get really bad... but it will affect my children*” (Participant ID #3, See Appendix B). The other male participant stated his concern for the future of all children if the glaciers continue to melt (Participant ID #21, See Appendix B). Although there is not enough data to say that there is a strong correlation between gender and roles associated with children and family, according to the literature, women are more likely to conduct the reproductive duties and men the productive duties of a household (Bakker, 2007; Hopkins, 2015). Likewise, while shopping within the market in Huaraz and interviewing women there, I myself noticed the majority of those individuals having children with them. Because this is a historically structural component of household labor roles in the Andes, this subject would need further exploring in my study area to show a strong correlation still exists. In contrast, the emergent theme of water was explicitly correlated with gender.

During the semi-structured interviews, I asked participants *what do you use water from the canals for, specifically?* The majority of the male participants expressed using the water for one or two things at most, while the majority of my female participants expressed using water for a variety of reasons. A total of 10 out of 15 female participants explicitly expressed using water for household and domestic chores, while only three out of 15 men expressed the same. Additionally, a total of five out of 15 females expressed using water for farming, while 10 out of 15 male participants expressed that they did use water for farming (Figure 16). Those results corroborate with the literature regarding productive and reproductive duties of individuals in this area (Bakker, 2007; Hopkins, 2015). Household duties, such as cleaning and cooking, are seen as

reproductive (Hopkins, 2015). Labor roles such as farming are viewed as productive, which are commonly conducted by men (Bakker, 2007).

One female participant whom I interviewed in the Plaza de Armas expressed that she used water *“for domestic chores in general. What do we do without water? Water is life”* (Participant ID #27, See Appendix B). Later during the interview, she also expressed that she had faced water shortages from time to time because *“there is not enough water for everything... farming in the higher areas uses a lot of water, so here in the city there is not enough for everyone.”* When I asked her *how did the water shortage make you feel?* She expressed that *“in all aspects it is just very difficult and uncomfortable... it makes me feel very bad”* (Participant ID #27, See Appendix B). Further, one male participant I interviewed in the Plaza de Armas expressed that they use water to *“irrigate the farms and for drinking water”* (Participant ID #13, See Appendix B). He later expressed that he also experiences water shortages, which he states is from *“less and less water... pollution and the mining companies pollute our water,”* which when asked how that shortage made him feel he expressed that it creates *“a lot of extra work... because there is less water”* (Participant ID #13, See Appendix B). Although both my male and female participants experienced water shortages, FPE literature discusses how the gendered division of roles leads to specific concerns.

Within FPE literature, scholars explain how the gendered division of roles within a household can cause certain types of stress to particular individuals (Skinner, 2011). For example, Skinner (2011) discusses how some women in developing countries maintain duties within the household, such as providing water for the family. Likewise, women in those places likely have less economic access than the men of the household (Skinner, 2011). Therefore, when water resources are dwindling, those women may face challenges to collecting additional

sources. Additionally, literature regarding reproductive and productive duties in the household explain how women are more likely to engage in reproductive roles like caring for their families and children, cleaning, and cooking, while men are more likely to engage in productive roles such as farming (Hopkins, 2015; Bakker, 2007). My findings expressed above echo those literatures. Male participants are also worried about their family and children, but as my results reflected, there are fewer that mention that topic, as well as cooking and cleaning, than women participants do. Therefore, the *extra-work* due to water shortages, as mentioned by Participant #13, may differ between males and females.

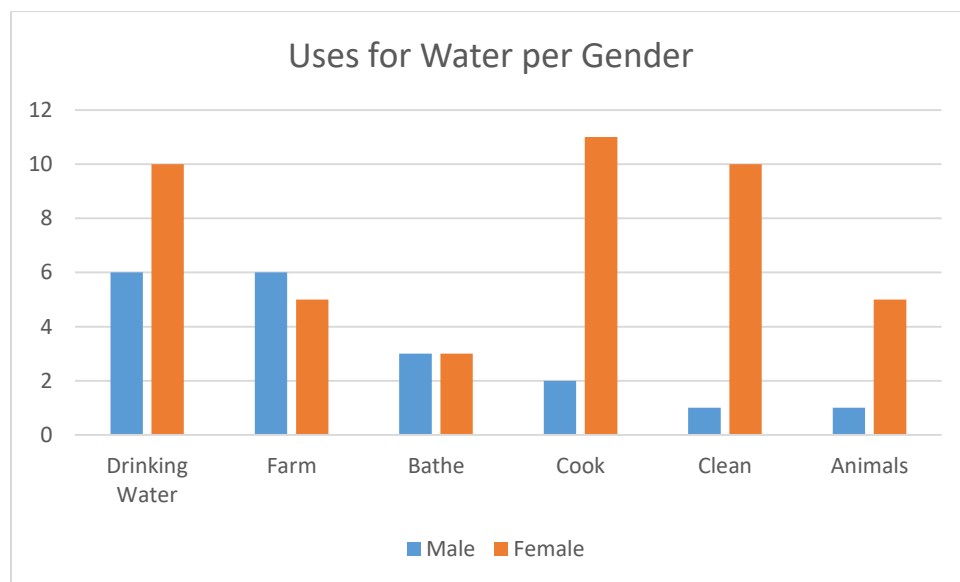


Figure 16. A bar graph depicting the uses for water as stated by participants.

6.1.2. Gender-nature relations

Another category in my data elucidating gendered everyday living is with nature. This theme was consistent with the literature on the subject and derived from data gathered during semi-structured interviews (Arora-Jonsson, 2011; Ruether, 1995; Merchant, 1981; Merchant,

1980). Instances of gender-nature relations within my data included my participants views of nature itself as well as the relationship between nature and causes of environmental change.

During the semi-structured interviews, a total of six out of 15 female participants explicitly expressed concerns about nature. On the other hand, three out of 15 males explicitly mentioned nature. All six of the female participants mentioned the word nature were in the context of protecting, preserving, and caring for it. The three male participants who mentioned the word nature did so in the context of nature being destroyed. Although only a handful of participants per gender explicitly mentioned the word nature, the context surrounding the topic fit within the literature on the subject, which talk about how women are more connected to nature (Arora-Jonsson, 2011; Ruether, 1995; Merchant, 1981; Merchant, 1980). Likewise, the frequencies regarding each gender's mention of nature throughout the interviews were different. For example, out of the six females who explicitly spoke about nature, the total frequency of the word nature in their responses was 15, compared to the four times the word was mentioned by three male participants. One female participant spoke of nature as if it was a person, she expressed that *"we should preserve nature better and be more trustful and protect it... learn to treat it well... nature does not need to be a person to be respected... but it is alive and it is like a person and it should be respected"* (Participant ID #28, See Appendix B). On the other hand, one male participant expressed that *"all these things that are going on... all these bad things that are going on... they are our responsibility because we destroyed nature"* (Participant ID #18, See Appendix B).

The second signifier of gender-nature relations within my data was participants' views on the relationship between nature and causes of environmental change. Although the literature regarding this subject does not focus on gender, they do mention people in Andean communities

experiencing stronger cultural ties to the landscape (Allison, 2015; Brugger et al., 2013). Those stronger cultural ties correlated with the majority individuals expressing that they “feel glacial recession is a more natural phenomenon” (Brugger et al., 2013, p. 8). However, the results of my data differ in my participants’ views on causes of glacial recession vary, as well as are gendered.

Through examining my data, I found that more men believed external forces were at work with facilitating climatic changes. Here, I am referring to external forces as factors not explicitly natural. Those external factors ranged from human pollution, to the mining companies, to various industries or companies, to the United States, China, and capitalist systems. Only three of my male participants in total believed that environmental changes in the area were natural, while nine of my female participants did think the causes were natural. One female participant who was a farmer residing in Llupa stated that the environmental changes in the area were caused by “*just nature... that is just how nature works*” (Participant ID #16, See Appendix B). Oppositely, one male participant who was spending time in the Plaza de Armas during his lunch break from working in Huaraz stated that the environmental changes in the area were “*because of the industrialization of the capitalist countries... the United States and the Chinese for Enlightenment... that harms the atmosphere and brings climatic changes [here] that we are living*” (Participant ID #22, See Appendix B). Those findings within my own literature are similar to those found by Brugger et al. (2013). Brugger et al. (2013) found that their participants were referencing “contamination by cars, burning practices” as well as “plastic use” (p. 8). Although my participants provided more detail, there seems to be a correlation between places and the participants’ views of the causes of environmental changes.

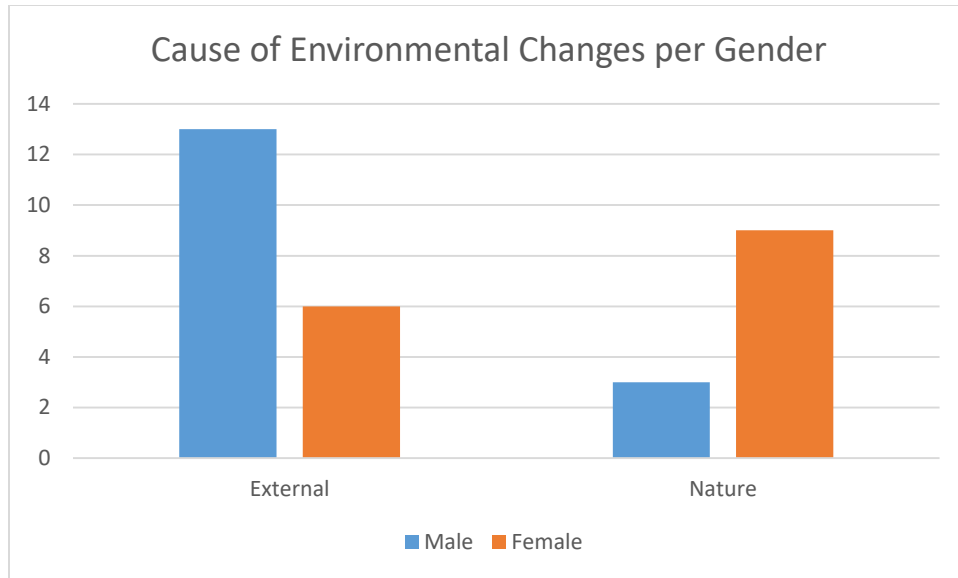


Figure 17. A bar graph depicting causational factors to climatic changes.

6.2. Emotional language use

For the last section of my research regarding gender, I relied heavily on the semi-structured interviews and free listing, as my participants expressed emotional language during the use of both tools. Upon analyzing those data, I found that gender was elucidated through my participants' use of emotional language, or words.

For the purposes of this research, all 30 of my participants expressed emotional language throughout the semi-structured interviews and free listing. At first glance, it appears to be even with the amount of emotional words used by both genders, with male participants using 26 emotional language words and female participants using a total of 24 emotional language words (Figure 18). However, upon separating those emotional language words into three categories: positive, negative, and neutral, based upon literature and my own findings, I also found patterns associated with gender (Akerlof et al., 2013; Bondi et al., 2016; Brugger et al., 2013; Ryan, 2016). Further analysis of those patterns showed that male participants were more often using

negative or neutral emotional language, while female participants were using more positive emotional language and doing so more frequently (Figure 19). Often times female participants', like those just referred in the previous section, referenced positive language in context with protecting and caring for nature and glaciers. For example, one female participant whom I interviewed in the Plaza de Armas stated that *"everything we do in the environment is circulating upwards and the heat is not decreasing because we do not know how to care for it"* (Participant ID #28, See Appendix B). Men often referred to positive language in context associated with what they believed caused changes, such as *"I hope that what I told you is worth something... these capitalist systems are destroying everything"* (Participant ID #22; See Appendix B). Overall, negative emotional language was used the most between both genders.

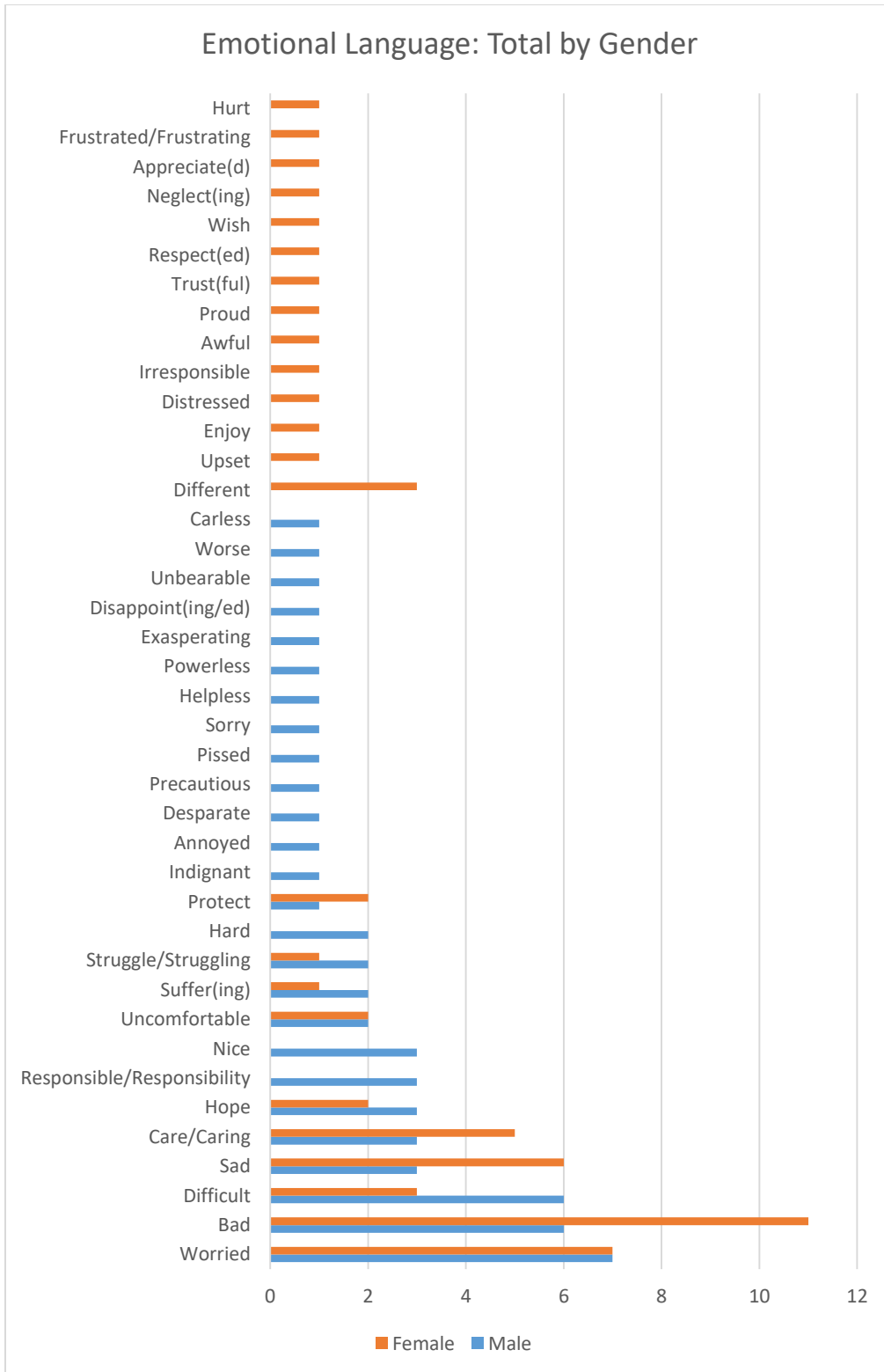


Figure 18. A bar graph depicting emotional language in total, per gender.

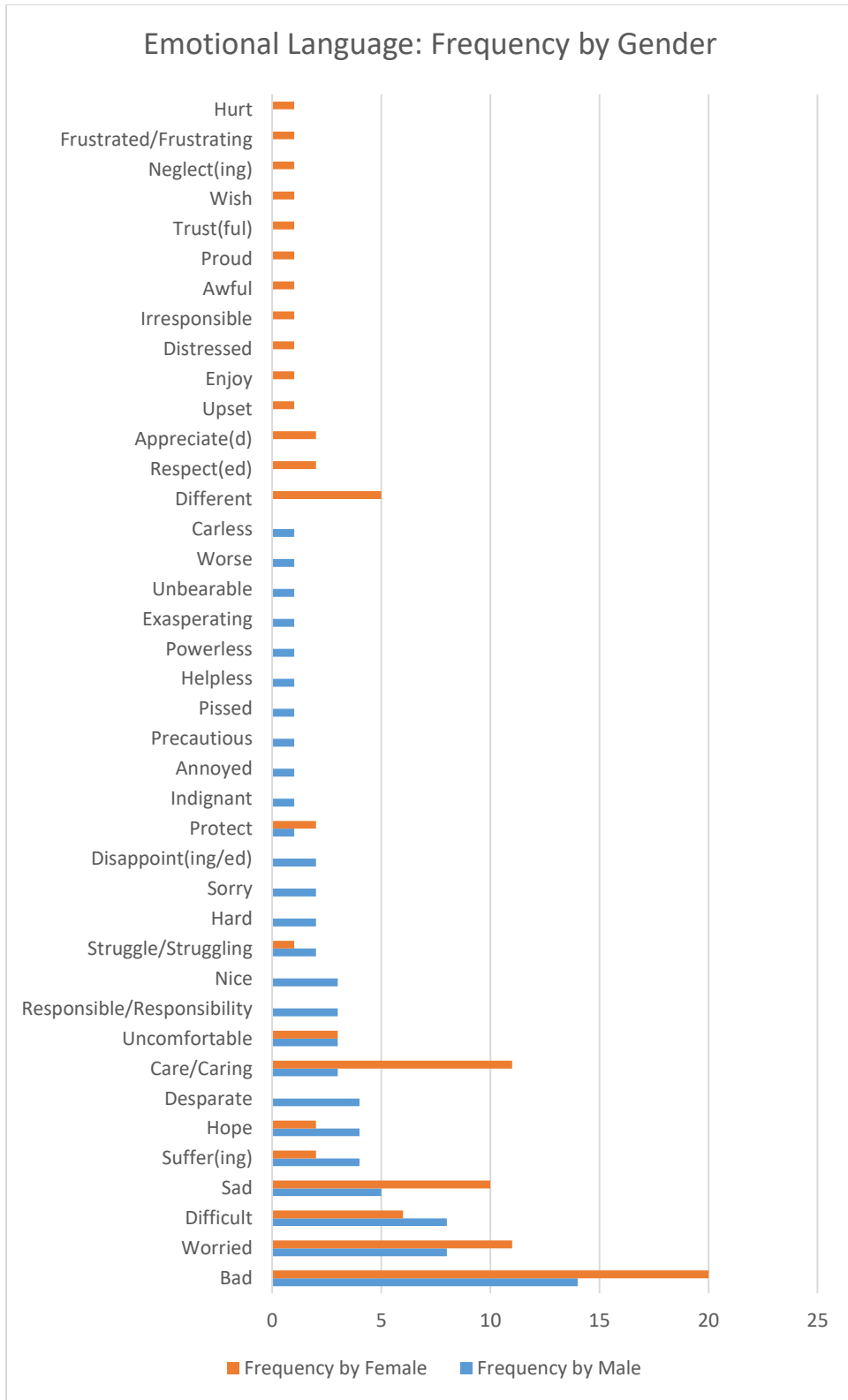


Figure 19. A bar graph depicting frequency of emotional language per gender.

Most of the use of negative language appeared in terms of how environmental changes made them feel. Both genders used negative emotional language often, though men used this type more (Figure 16). Most of my male participants used negative language in regard to what they believe is causing environmental changes in the area. For instance, one male participant who I interviewed in the Plaza de Armas expressed that he thought the causes of the environmental changes he experienced in the area were due to the:

“mining company... it is a difficult situation in general... in the beginning when the mining company opened its operations around here, it was a dream to work in the mine... because you could make a lot of money and buy a lot of stuff... but with time, we realized how bad it actually is... it is polluting the water, the land, the air... the animals drink water from the river and they die” (Participant ID #29, See Appendix B).

Second, for this section of analysis I focused on one question in particular that I asked, which was *how do these changes [in the glaciers] make you feel?* (See Appendix C). The majority of my male participants’ expressed negative emotional concern about the changes in the glaciers, followed by offering information about external factors at play, such as the mining companies, tourism, government abandonment, or foreign affairs. For example, one male participant stated, *“just disappointing as a human being... to see that this beautiful nature eventually will disappear and that will harm the fauna and human beings. Two large investment companies have been what pollutes [the environment]”* (Participant ID # 22; See Appendix B). The most used negative emotional language word by men was *worried*, followed by *bad* and *difficult*.

The majority of my female participants used negative emotional language in a context of their personal feelings about glacial changes. For example, many women gave one word or sentence answers such as *“just bad... the word is bad”* and *“I feel really bad... everyone feels*

really bad. The changes have changed our lives” (Participant ID # 28; Participant ID # 23; See Appendix B). Further analysis showed that the most used negative emotional language word by women was *bad*, followed by *worried* and *sad*. Interestingly, a study conducted by du Bray et al. (2018) found that nearly half more women than men were reporting feelings of sadness due to climatic changes, while men were twice as more likely to report feelings of anger (p. 13). Within my own research, no females reported feeling angry or reported any other feelings similar to anger other than *frustrated*. However, one male participant reported feeling *pissed* and another felt *indignant*. These results were similar to the findings of du Bray et al. (2018). Du Bray et al. (2018) found in their study that more women expressed feeling *sad*, while more men expressed feelings of *anger* (p. 13). They conducted their studies in four different places, including Fiji, Cyprus, New Zealand, and England (du Bray et al., 2018). Among those places, Fiji was the only instant where more men felt sad, and in no other places except Cyprus did women report feelings of anger (du Bray et al., 2018).

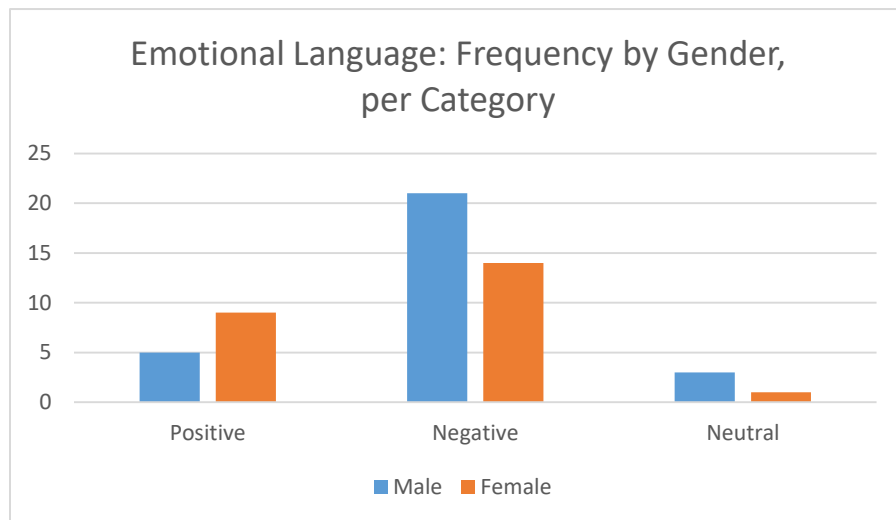


Figure 20. A bar graph depicting the frequency of emotional language used per category and gender.

Overall, the results of my data from participants' responses to the semi-structured interviews did elucidate to gender dimensions, although more data is needed to say there is a strong correlation present. Based on the themes present in my data, we can see that the historical roots of gendered ways of life could still exist within the culture. FPE literature regarding reproductive and productive roles in developing countries state women take on more of the reproductive labor, such as household chores (i.e. cooking, cleaning, caring for the family and children), while men engage in productive roles such as farming or wage labor (Hopkins, 2015; Bakker, 2007). Concerning gendered division of labor within my results, more female participants from my data explicitly discussed children and family, and expressed multiple uses for water such as cleaning and cooking, while more male participants explicitly expressed how environmental changes are affecting their farming and drinking water supplies. Although more data is needed to confirm a strong correlation, there appears to be a pattern with gendered division of labor within my own findings. Additionally, there appeared to be a pattern within my own research regarding gender and the views on environmental changes in the area.

Within my data, more female participants expressed that environmental changes were a natural process, whereas more male participants expressed that environmental changes were caused by unnatural factors. There is much FPE literature regarding women and their relationship with nature (Arora-Jonsson, 2011; Ruether, 1995; Plumwood, 1991). Within those literatures, scholars explain how women are seen as closer to nature (Arora-Jonsson, 2011; Ruether, 1995; Plumwood, 1991). That research provides an understanding of potentially why more women discussed their experiences with environmental changes as more naturally occurring, yet more evidence is needed to suggest a correlation. Brugger et al. (2013) also explain how their results showed more participants viewing the environmental changes

happening in the Siete Imperios region as “a more natural phenomenon” (p. 8). However, those researchers did not focus their studies on gender. Therefore, more information is needed to definitively say there is a strong correlation between gender and the views on causes of environmental changes.

Additionally, more women expressed positive emotional language use, while male participants expressed more negative emotional language use. Within emotional geography discourse, Du Bray et al. (2018) found that more male participants expressed feelings of anger, while more female participants expressed feeling sad. Because both emotion words are negative, there are no definitive correlations supported between gender and types of emotion categories. Likewise, both male and female participants expressed nearly the same amount of emotional language. Therefore, although those patterns do seem to exist within my own data, more research would need to be conducted in this area to show a stronger correlation.

CHAPTER 7: CONCLUSION

My interests in this particular subject for a thesis stemmed from having a background in understanding the physical science behind climate change, but lacking thereof within the human and social sciences. The literature behind climate change research shows more emphasis is placed on the physical evidence, rather than the social (IPCC, 2014). I myself had been a walking testament to that before taking on this research. I had decided to pursue my masters at East Carolina University in order to continue researching the physical effects of climate change and its impacts. However, upon learning more about the social science side of this topic, I realized how beneficial understanding both physical and social science would be to combat such a broad issue. Therefore, I decided to focus on the social science side of climate change research in order to not only begin a journey in fulfilling my own gaps of knowledge, but also to try to help fulfill the gaps of knowledge within geographic discourse. Additionally, I knew that understanding how my participants personally experienced climate change impacts would not only help me come to terms with the severity of the issue, but also with the necessity of utilizing their voices as evidence.

I wanted to develop a better understanding of how people in vulnerable spaces [to climate change] experience effects and how those effects impact them on a personal level. Mountain environments are one of the most affect spaces by climate change, thus I wanted to focus my research in a mountainous area (Allen et al., 2018; EPA, 2016; Winkler et al., 2010; Huber et al., 2005; Haeberli et al., 2007; Barry, 2006; Diaz et al., 2003). Further, I wanted to focus on a place where individuals are currently experiencing the effects of climate change on a daily basis, such as a Latin American country like Peru. After digging a bit deeper into the literature regarding that subject, I found that literature on perception was popular within the

social sciences. However, I began to wonder, if that literature is popular and available, why are the individuals suffering *still* suffering? As a result of that thought, I continued to research that topic until I found a subject focusing on deeper, more meaningful experiences with climate change impacts, i.e. emotional geography. Emotional geography is a subfield stemming from cultural geography and feminist ideology (Anderson & Smith, 2001). This is a particularly useful framework when dealing with spaces that individuals have cultural ties to (du Bray et al., 2018). Because many communities in mountain environments value culture and have those cultural ties, I knew emotional geography would be a key piece to understanding my participants' experiences.

One of the goals of this research was to understand the emotions Peruvian highlanders have toward climate change impacts, such as glacial retreat. I was able to identify the personal experiences of my study participants that led to emotional concern by using semi-structured interviews, free listing, and participant observation. I argued that my participants offered emotions regarding environmental changes and glacial retreat, as well as describe their experiences using positive, negative, and neutral emotions, which were consistent with the literature (du Bray et al., 2018). Likewise, those findings are supported by emotional geography discourse regarding climate change and individuals emotions (Brugger et al., 2013; Cruikshank, 2012; Cruikshank, 2006; Cruikshank, 2001; Carey et al., 2016; du Bray et al., 2018). I therefore argued that understanding the emotional welfare of individuals experiencing climate change impacts was necessary and relevant for climate change discourse. By focusing on my participants' emotional responses, I wanted their narratives to serve as evidence of the climate change impacts they were experiencing. By doing so, I argued that "all knowledge is a

condensed node in an agnostic power field,” i.e. the social sciences aspect of climate change discourse is just as crucial as the physical science aspects (Haraway, 1988, p. 577).

Another goal of this research was to understand whether the emotional narratives of my participants were gendered. Andean communities have a long history with social structures emphasizing gendered ways of life (Ames, 2013; Forstner, 2013; Molyneux & Thomson, 2011; Lynch, 1991; Silverblatt, 1987; Radcliffe, 1986; Wilson, 1984). Therefore, I wondered whether that history could be affecting the everyday experiences of individuals based on their gender. A feminist political ecology framework allowed me to better understand how gender, among other identities, can be shaped by the power, access, and agency that individuals have to natural resources (Truelove, 2011). This was particularly useful for my research based on literature regarding climate change impacting the amount of water runoff in the area (Bradley et al., 2016). Consistent with the literature, there did appear to be gendered dimensions to the experiences and emotional concerns of my participants. I argued that those gendered dimensions to my data included their everyday experiences, including gendered division of roles, and are supported by FPE literature regarding reproductive and productive roles and how those roles may affect individuals’ experiences with impacts from climate change (Hopkins, 2015; Bakker, 2007). Nevertheless, although patterns existed within my data and existing literatures on gender and nature, as well as gender and emotion, more data is needed for a definitive correlation (du Bray et al., 2018; Arora-Jonsson, 2011; Ruether, 1995; Plumwood, 1991). However, I argue that addressing gender is useful when looking at climate change impacts so that a deeper understanding can be obtained and used to promote effective, adaptive solutions.

This research contributes to climate change discourse within geography by offering alternative ways of thinking through the use of emotional geography and feminist political

ecology. The results of this research provide additional knowledge for emerging literature on emotions (du Bray et al., 2017; Bondi et al., 2016; Akerlof et al., 2013; Brugger et al., 2013; Sharp, 2009; Sakakibara, 2008; Anderson & Smith, 2001;) and gender (Carey et al., 2016; Arora-Jonsson, 2011; Sultana, 2011; Rocheleau, 1996) within climate change discourse. I argue for the need to address emotional welfare in situations where individuals are at risk to climate change impacts, as well as the need to investigate gender and how that identity shapes the experiences of those individuals. Additionally, because climate change impacts resources like water, and many times those resources are controlled by other entities, I also argue that a closer examination of social and political power should be conducted to elucidate any inequalities, which may further hinder an individuals ability to access those resources. Lastly, because my research did show patterns regarding gender, but did not encompass enough data to definitely show a correlation, I argue for the need of a closer look at those dynamics in future studies.

Additionally, this research allows me to promote several directions for future studies. One restraint of this research was time. Because of that, I was only able to obtain 30 total interviews. Beings that climate change, experiences, emotions, and gender are all complex concepts, I think gathering more evidence could potentially lead to a more complete understanding of the systematic issues affecting individuals experiences with climate change impacts. Second, although some of my data correlated with the literature regarding emotions and gender, I would like to address that topics such as these are situational. I questioned whether gender was a component based on the literature, yet other identities may be more useful to investigate in other situations, based on place and space. This is especially true due to the possibilities of changes in management of water supplies in the area, which could affect people based on place. Further, in order to be intentional with how we researchers investigate situations

of risk and vulnerability to climate change impacts, we need to include the individuals *actually* experiencing those effects, whether we are conducting physical or social science.

The point of climate change research is to help systems that are experiencing distress. Whether those systems are ecological or social, the only way to achieve effective solutions to those issues is to understand all the factors involved. Concerning social systems, although climate change is affecting some individuals now more than others, those others will have their turn. Emotions may or may not be considered credible to some individuals, yet there is no denying that we humans have them. Further, as complex as it is to understand, many individuals in various places and spaces experience oppression based on their identities, such as gender, in the form of power and access over natural resources, which corrupts their sense of agency. Solely basing climate change governance and planning on emotional evidence seems far-fetched given contemporary views of science. However, utilizing such individualized, embodied, subjective, and alternative knowledge to complement hard-evidence may turn out to be the most effective way to create solutions that *work*.

REFERENCES

- Akerlof, K., Maibach, E.W., Fitzgerald, D., Cedenó, A.Y., & Neuman, A. (2013). Do people “personally experience” global warming, and if so how, and does it matter? *Global Environmental Change* 23: 81-91.
- Albrecht, G., Satore, G., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., Stain, H., Tonna, A., & Pollard, G. (2007). Solastalgia: the distress caused by environmental change. *Australasian Psychiatry* 15: S95-S98.
- Allen, C.J. (1981). To be Quechua: the symbolism of coca chewing in highland Peru. *American Ethnological Society*: 157-171.
- Allen, M., Dube, O.P., Solecki, W., Aragón-Durand, F., Cramer, W., Humphreys, S., Kainuma, M., Kala, J., Mahowald, N., Mulugetta, Y., Perez, R., Wairiu, M., & Zickfeld, K. (2018). Framing and Context. In *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. IPCC.
- Anderson, K., & Smith, S.J. (2001). Emotional Geographies. *Transactions of the Institute of British Geographers* 26(1): 7-10.
- Ames, P. (2013). Constructing new identities? The role of gender and education in rural girls’ life aspirations in Peru. *Gender and Education* 25(3): 267-283.
- Anh Vu, H. (2012). Gender, sustainability, and shrimp farming: Negotiating risky business in Vietnam's Mekong Delta. In M. L. Cruz-Torrezs and P. McElwee (Eds.) *Gender and Sustainability: Lessons from Asia and Latin America*. Tempe: University of Arizona Press.
- Arana, M.T. (2016). Gender approaches in climate compatible development: Lessons from Peru. *Climate and Development Knowledge Network*.
- Arora-Jonsson, S. (2011). Virtue and vulnerability: Discourses on women, gender and climate change. *Global Environmental Change* 21: 744-751.
- Bakker, I. (2007). Social Reproduction and the Constitution of a Gendered Political Economy. *New Political Economy* 12(4): 541-556.
- Bakker, K. J. (2003). A Political Ecology of Water Privatization. *Studies in Political Economy* 70(1): 35-58.
- Baraer, M., Mark, B. G., McKenzie, J. M., Condom, T., Bury, J., Huh, K., Portocarrero, C., Gómez, J., & Rathay, S. (2012). Glacier recession and water resources in Peru’s

- Cordillera Blanca. *Journal of Glaciology* 58(207): 134-150.
- Barnett, T.P., Adam, J.C., & Lettenmaier, D.P. (2005). Potential impacts of a warming climate on water availability in snow-dominated regions. *Nature* 438: 303-309.
- Barron, M. (2008). Exclusion and Discrimination as Sources of Inter-Ethnic Inequality in Peru. *Economía XXXI*(N° 61): 51-80.
- Barry, R.G. (2006). The status of research on glaciers and global glacier recession: a review. *Progress in Physical Geography* 30(3): 285-306.
- Benn, D.I. & Evans, D.J.A. (2013). *Glaciers & Glaciation* (2nd ed.). New York, NY: Routledge.
- Bernard, R.H. (2017). *Research Methods in Anthropology: Qualitative and Quantitative Approaches, 6th edition*. Rowman & Littlefield.
- Bernard, R.H. (2011). *Research Methods in Anthropology: Qualitative and Quantitative Approaches, 5th edition*. Walnut Creek: AltaMira.
- Bolch, T. (2007). Climate change and glacier retreat in northern Tien Shan (Kazakhstan/Kyrgyzstan) using remote sensing data. *Global and Planetary Change* 56(1/2): 1-12.
- Bondi, L., Davidson, J., & Smith, M. (Eds.). (2016). *Emotional Geographies*. New York, NY: Routledge.
- Bourque, S.C. & Warren, K. B. (1984). *Women of the Andes: Patriarchy and Social Change in Two Peruvian Towns*. Ann Arbor: University of Michigan Press.
- Bradley, R.S., Vuille, M., Diaz, H.F., & Vergara, W. (2006). Threats to Water Supplies in the Tropical Andes. *Science* 312: 1755-1756.
- Braun, Y.A. (2015). Interrogating large-scale development and inequality in Lesotho: Bridging feminist political ecology, intersectionality, and environmental justice frameworks. In S. Buechler, A. Marie, & S. Hanson (Eds.) *A Political Ecology of Women, Water and Global Environmental Change*. Taylor & Francis.
- Brooks, B.B. (2014). Chucaque and Social Stress among Peruvian Highlanders. *Medical Anthropology Quarterly* 28(3): 419-439.
- Brugger, J., Dunbar, K.W., Jurt, C., & Orlove, B. (2013). Climates of anxiety: Comparing experience of glacier retreat across three mountain regions. *Emotion, Space and Society* 6: 4-13.
- Budds, J. (2008). Whose scarcity? The hydrosocial cycle and the changing waterscape of La Ligua River Basin, Chile In M. K. Goodman, M. T. Boykoff, & K. T. Evered (Eds.) *Contentious Geographies: Environment, Meaning, Scale*. Ashgate.

- Bury, J., Mark, B.G., Carey, M., Young, K.R., McKenzie, J.M., Baraer, M., French, A., & Polk, M.H. (2013). New Geographies of Water and Climate Change in Peru: Coupled Natural and Social Transformations in the Santa River Watershed. *Annals of the Association of American Geographers* 103(2): 363-374.
- Bury, J.T., Mark, B.G., McKenzie, J.M., French, A., Baraer, M., Huh, K.I., Luyo, M.A.Z., & López, R.J.G. (2011). Glacier recession and human vulnerability in the Yanamarey watershed of the Cordillera Blanca, Peru. *Climatic Change* 105: 179-206.
- Cade, D.W. (1992). Landscape, System, and Identity in the Post-Conquest Andes. *Annals of the Association of American Geographers* 82(3): 460-477.
- Carey, M., Jackson, M., Antonello, A., & Rushing, J. (2016). Glaciers, gender, and science: A feminist glaciology framework for global environmental change research. *Progress in Human Geography* 40(6): 770-793.
- Carey, M. (2007). The History of Ice: How Glaciers Became an Endangered Species. *Environmental History* 12: 497-527.
- Chevallier, P., Pouyaud, B., Suarez, W., & Condom, T. (2011). Climate change threats to environment in the tropical Andes: glaciers and water resources. *Regional Environmental Change* 11(1): 179-187.
- Code, L. (1991). *What Can She Know? Feminist Theory and the Construction of Knowledge*. Ithaca: Cornell University Press.
- Cook, A. J., Fox, A. J., Vaughan, D. G., & Ferrigno, J. G. (2005). Retreating Glacier Fronts on the Antarctic Peninsula over the Past Half-Century. *Science* 308(5721): 541-544.
- Coudrain, A., Francou, B., & Kundzewicz, Z.W. (2005). Glacier shrinkage in the Andes and consequences for water resources-Editorial. *Hydrological Sciences Journal* 50(6): 925-932.
- Cresswell, J.W. & Poth, C.N. (2017). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. Thousand Oaks, CA: SAGE Publications.
- Cruikshank, J. (2012). Are Glaciers ‘Good to Think With’? Recognising Indigenous Environmental Knowledge. *Anthropological Forum* 22(3): 239-250.
- Cruikshank, J. (2006). *Do Glaciers Listen? Local Knowledge, Colonial Encounters, and Social Transformation*. University of British Columbia Press, Vancouver.
- Cruikshank, J. (2001). Glaciers and climate change: Perspectives from oral tradition. *Arctic*

Research 54(4): 377-393.

- Cruz-Torres, M. L. (2012). Contested livelihoods: Gender, fisheries, and resistance in Northwestern Mexico. In M. L. Cruz-Torres and P. McElwee (Eds.) *Gender and sustainability: Lessons from Asia and Latin America*. Tempe: University of Arizona Press.
- Diaz, H.F., Grosjean, M., & Graumlich, L. (2003). Climate Variability and Change in High Elevation Regions: Past, Present and Future. *Climate Change* 59: 1-4.
- du Bray, M., Wutich, A., Larson, K.L., White, D.D., & Brewis, A. (2018). Anger and Sadness: Gendered Emotional Responses to Climate Threats in Four Island Nations. *Cross Cultural Research* 00(0): 1-29.
- du Bray, M. V., Wutich, A., & Brewis, A. 2017. Hope and Worry: Gendered Emotional Geographies of Climate Change in Three Vulnerable U.S. Communities. *Weather, Climate, and Society* 9(2): 285-297.
- Elmhirst, R. (2015). *Feminist Political Ecology*. The Routledge Handbook of Political Ecology.
- Elmhirst, R. (2011). Introducing new feminist political ecologies. *Geoforum* 42(2): 129-132.
- EPA. (2017). Ecosystems and Climate Change Research. Retrieved from <https://www.epa.gov/climate-research/ecosystems-and-climate-change-research>.
- EPA. (2016). Climate Change Indicators: Glaciers. Retrieved from <https://www.epa.gov/climate-indicators/climate-change-indicators-glaciers>.
- Evans, E., & Chamberlain, P. (2015). Critical Waves: Exploring Feminist Identity, Discourse and Praxis in Western Feminism. *Social Movement Studies* 14(4): 396-409.
- Forstner, K. (2013). Women's Group-based Work and Rural Gender Relations in the Southern Peruvian Andes. *Bulletin of Latin American Research* 32(1): 46-60.
- Georges, C. (2004). 20th-Century Glacier Fluctuations in the Tropical Cordillera Blanca, Perú. *Arctic, Antarctic, and Alpine Research* 36(1): 100-107.
- Haerberli, W. & Beniston, M. (1998). Climate Change and Its Impacts on Glaciers and Permafrost in the Alps. *Ambio* 27(4): 258 – 265.
- Haerberli, W., Hoelzle, M., Paul, F., & Zemp, M. (2007). Integrated monitoring of mountain glaciers as key indicators of global climate change: the European Alps. *Annals of Glaciology* 46: 150-160.
- Haraway, D. (1992). The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others. In L. Grossberg, C. Nelson, & P.A. Treichler (Eds.) *Cultural Studies*. New York: Routledge.

- Haraway, D. (1989). *Primate Visions: Gender, Race, and Nature in the World of Modern Science*. New York: Routledge.
- Haraway, D. (1988). Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies* 4(3): 575-599.
- Harding, S. (1986). *The science question in feminism*. Ithaca, NY: Cornell University Press.
- Harris, L. (2015). Hegemonic waters and rethinking natures otherwise. In W. Harcourt and I. L. Nelson (Eds.), *Practising Feminist Political Ecologies: Moving Beyond the 'Green Economy'*, 157-181.
- Hay, I. (2005). *Qualitative Research Methods in Human Geography*. New York: Oxford University Press.
- Himley, M. (2013). Regularizing Extraction in Andean Peru: Mining and Social Mobilization in an Age of Corporate Social Responsibility. *Antipode* 45(2): 394-416.
- Hopkins, C.T. (2015). Introduction: Feminist geographies of social reproduction and race. *Women's Studies International Forum* 48: 135-140.
- Hovorka, A.J. (2006). The No. 1 Ladies' Poultry Farm: A feminist political ecology of urban agriculture in Botswana. *Gender, Place & Culture* 12(3): 207-225.
- "Huaraz." n.d.. In *Encyclopaedia Britannica online*. Retrived from <https://www.britannica.com/place/Huaraz>.
- "Huaylas Valley." n.d. In *Encyclopaedia Britannica online*. Retrived from <https://www.britannica.com/place/Huaylas-Valley>.
- Huber, U.M., Bugmann, H.K.M., & Reasoner, M.A. (2005). *Global Change and Mountain Regions: An Overview of Current Knowledge*. Netherlands: Springer.
- SENAMHI. n.d. *Hydrometeorological Data*. Ministerio del Ambiente. Retrieved from <https://www.senamhi.gob.pe/?&p=estaciones>.
- IPCC. (2014). Summary for policymakers. In C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (Eds.) *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- IPCC. (2007). *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

- Jianchu, X., Shrestha, A., & Eriksson, M. (2009). *Climate change and its impacts on glaciers and water resource management in the Himalayan Region*. IHP/HWRP. Retrieved from <https://core.ac.uk/download/pdf/48022910.pdf>.
- Jiménez Cisneros, B.E., Oki, T., Arnell, N.W., Benito, G., Cogley, J.G., Döll, P., Jiang, T., Mwakalila, S.S. (2014). Freshwater resources. In C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (Eds.) *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. New York, NY: Cambridge University Press.
- Karl, T.R., Melillo, J.M., & Peterson, T.C. (2009). *Global Climate Change Impacts in the United States*. Cambridge University Press.
- Kaser, G., Cogley, J.G., Dyurgerov, M.B., Meier, M.F., & Ohmura, A. (2006). Mass balance of glaciers and ice caps: Consensus estimates for 1961-2004. *Geophysical Research Letters* 33(19): 1-5.
- Kaser, G., Hardy, D. R., Mölg, T., Bradley, R. S., & Hyera, T. M. (2004). Modern glacier retreat on Kilimanjaro as evidence of climate change: observations and facts. *International Journal of Climatology* 24: 329-339.
- Kemper, T.D. (2000). *Research Agendas in the Sociology of Emotions*. Albany, NY: State University of New York Press.
- Lawson, V. (1995). The Politics of Difference: Examining the Quantitative/Qualitative Dualism in Post-Structuralist Feminist Research. *The Professional Geographer* 47(4): 449-457.
- Lázaro, J. (1990). Women and Political Violence in Contemporary Peru. *Dialectical Anthropology* 15(2/3): 233-247.
- Leavitt, J. (1996). Meaning and feeling in the anthropology of emotions. *American Ethnologist* 23(3): 514-539.
- Livingstone, D.N., & Withers, C.W.J. (1999). *Geography and Enlightenment*. University of Chicago Press.
- Lykke, N. (2012). *Feminist Studies: A Guide to Intersectional Theory, Methodology and Writing*. Routledge.
- Lynch, B.D. (2012). Vulnerabilities, competition and rights in a context of climate change toward equitable water governance in Peru's Rio Santa Valley. *Global Environmental Change* 22: 364-373.

- Lynch, B.D. (1991). Women and irrigation in highland Peru. *Society & Natural Resources* 4(1): 37-52.
- Mark, B.G., & Seltzer, G.O. (2005). Evaluation of recent glacier recession in the Cordillera Blanca, Peru (AD 1962-1999): spatial distribution of mass loss and climatic forcing. *Quaternary Science Reviews* 24: 2265-2280.
- Merchant, C. (1981). Earthcare: Women and the Environment. *Environment: Science and Policy for Sustainable Development* 23(5): 6-40.
- Merchant, C. (1980). *The Death of Nature: Women, Ecology, and the Scientific Revolution*. New York, NY: Harper & Row.
- Möller, M., Schneider, C., & Kilian, R. (2007). Glacier change and climate forcing in recent decades in Gran Campo Nevado, southernmost Patagonia. *Annals of Glaciology* 46: 136-144.
- Molyneux, M. & Thomson, M. (2011). Cash transfers, gender equity and women's empowerment in Peru, Ecuador and Bolivia. *Gender & Development* 19(2): 195-212.
- Moosa, C.S. & Tuana, N. (2014). Mapping a Research Agenda Concerning Gender and Climate Change: A Review of the Literature. *Hypatia* 29(3): 677-694.
- NASA. (2019). *Climate change: How do we know?* Retrieved from <https://climate.nasa.gov/evidence/>.
- National Academy of Sciences. (2005). *Understanding and Responding to Climate Change: Highlights of National Academies Reports*. Retrieved from http://masgc.org/assets/uploads/publications/528/tna_cc.pdf.
- Nightingale, A. J. (2011). Bounding difference: Intersectionality and the material production of gender, caste, class and environment in Nepal. *Geoforum* 42: 153-162.
- Nightingale, A. (2006). The nature of gender: work, gender, and environment. *Society and Space* 24: 165-185.
- Oerlemans, J. (2001). *Glaciers and Climate Change*. Exton, Tokyo: A.A. Balkema Publishers.
- ParksWatch. (2004). *Huascarán National Park: Geography*. Retrieved from <http://www.parkswatch.org/parkprofile.php?l=eng&country=per&park=hunp&page=phy>.
- Patrick, R. & Bharadwaj, L. (2016). Mining and campesino engagement: an opportunity for integrated water resources management in Ancash, Peru. *Water International* 41(3): 468-482.
- Phinney, J.S. (2000). Identity Formation across Cultures: The Interaction of Personal, Societal, and Historical Change. *Human Development* 43: 27-31.
- Piao, S., Ciais, P., Huang, Y., Shen, Z., Peng, S., Li, J., Zhou, L., Liu, H., Ma, Y., Ding, Y.,

- Friedlingstein, P., Liu, C., Tan, K., Yu, Y., Zhang, T., & Fang, J. (2010). The impacts of climate change on water resources and agriculture in China. *Nature* 467: 43-51.
- Piersall, A. & Halvorson, S.J. (2014). Local perceptions of glacial retreat and livelihood impacts in the At-Bashy Range of Krygyzstan. *GeoJournal* 79(6): 693-703.
- Plumwood, V. (1993). Feminism and the Mastery of Nature. In T. Brennan (Ed.) *Feminism for Today*. New York: Routledge.
- Plumwood, V. (1991). Nature, Self, and Gender: Feminism, Environmental Philosophy, and the Critique or Rationalism. *Hypatia* 6(1): 3-27.
- Pollack, H. (2009). *A World without Ice*. New York: Penguin Group.
- Radcliffe, S.A., Laurie, N., & Andolina, R. (2003). The Transnationalization of Gender and Reimagining Andean Indigenous Development. *Signs* 29(2): 387-416.
- Radcliffe, S.A. (1986). Gender Relations, Peasant Livelihood Strategies and Migration: A Case Study from Cuzco, Peru. *Bulletin of Latin American Research* 5(2): 29-47.
- Rai, S. M. (2011). The History of International Development: Concepts and Contexts. In N. Visvanathan, L. Duggan, N. Wieggersma and L. Nisonoff (Eds.) *The Women, Gender and Development Reader*. Halifax: Fernwood Publishing.
- Rice, J.L., Burke, B.J., & Heynen, N. (2015). Knowing Climate Change, Embodying Climate Praxis: Experiential Knowledge in Southern Appalachia. *Annals of the Association of American Geographers* 105(2): 253-262.
- Rocheleau, D. (1996). Gender and Environment: A Feminist Political Ecology Perspective. In D. Rocheleau, B. Thomas-Slayter, and E. Wangari (Eds.) *Feminist Political Ecology: Global Issues and Local Experiences*. New York: Routledge.
- Ruether, R.R. (1995). Ecofeminism: Symbolic and Social Connections of the Oppression of Women and the Domination of Nature. *Feminist Theology* 3(9): 35-50.
- Ryan, K. (2016). Incorporating emotional geography into climate change research: A case study in Londonderry, Vermont, USA. *Emotion, Space and Society* 19: 5-12.
- Sakakibara, C. (2008). "Our Home Is Drowning": Iñupiat Storytelling and Climate Change in Point Hope, Alaska. *Geographical Review* 98(4): 456-475.
- Scambler, G. (2007). Social Structure and the Production, Reproduction and Durability of Health Inequalities. *Social Theory & Health* 5: 297-315.
- Sharp, J. (2009). Geography and gender: what belongs to feminist geography? Emotion, power and change. *Progress in Human Geography* 33(1): 74-80.
- Sharp, J. (2007). Geography and gender: finding feminist political geographies. *Progress in Human Geography* 31(3): 381-387.

- Silverblatt, I. (1987). *Moon, Sun, and Witches: Gender Ideologies and Class In Inca and Colonial Peru*. Princeton, NJ: Princeton University Press.
- Skinner, E. (2011). *Gender and Climate Change*. Retrieved from <https://www.genderingdevelopment.net/custom/images/contentBilderGalerie/bilderGalerie1000514/BRIDGE-GIZ-Gender-and-climate-change-2011-EN.pdf>.
- Sorg, A., Bolch, T., Stoffel, M., Solomina, O., & Beniston, M. (2012). Climate change impacts on glaciers and runoff in Tien Shan (Central Asia). *Nature Climate Change* 2: 725-731.
- Stedman, R.C. (2003). Is It Really Just a Social Construction?: The Contribution of the Physical Environment to Sense of Place. *Society & Natural Resources* 16(8): 671-685.
- Stensrud, A.B. (2016). Harvesting Water for the Future: Reciprocity and Environmental Justice in the Politics of Climate Change in Peru. *Latin America Perspectives* 209(43): 56-72.
- Sultana, F. (2011). Suffering for water, suffering from water: Emotional geographies of resource access, control and conflict. *Geoforum* 42: 163-172.
- Sultana, F. (2006). Gendered Waters, Poisoned Wells: Political Ecology of the Arsenic Crisis in Bangladesh. In K. Lahiri-Dutt (Ed.) *Fluid bonds: Views on gender and water*. Kolkata: Stree Publishers.
- Sundberg, J. (2003). Masculinist Epistemologies and the Politics of Fieldwork in Latin Americanist Geography. *The Professional Geographer* 55(2): 180-190.
- Tschakert, P. (2012). From impacts to embodied experiences: tracing political ecology in climate change research. *Geografisk Tidsskrift-Danish Journal of Geography* 112(2): 144-158.
- Tschakert, P., Tutu, R., & Alcaro, A. (2011). Embodied experiences of environmental and climatic changes in landscapes of everyday life in Ghana. *Emotion, Space and Society* 7: 13-25.
- Truelove, Y. (2011). (Re-)Conceptualizing water inequality in Delhi, India through a feminist political ecology framework. *Geoforum* 42: 143-152.
- U.S. Geological Survey. (1999). Peruvian Cordilleras. U.S. Department of the Interior.
- Viviroli, D. & Weingartner, R. (2004). The hydrological significance of mountains: from regional to global scale. *Hydrology and Earth System Sciences* 8(6): 1016-1029.
- Vuille, M., Francou, B., Wagnon, P., Juen, I., Kaser, G., Mark, B.G., & Bradley, R.S. (2008). Climate change and tropical Andean glaciers: Past, present and future. *Earth-Science Reviews* 89: 79-96.
- Widdowfield, R. (2000). The place of emotion in academic research. *Area* 32(2): 199-208.
- Williams, D.R., & Stewart, S.I. (1998). Sense of place: An elusive concept that is finding a home

- in ecosystem management. *Forest Science* 96(5): 18-23.
- Williams, S.J. (2000). *Emotion and Social Theory: Corporeal Reflections on the (Ir)Rational*. SAGE Publications.
- Wilson, F. (1984). *Marriage, Property, and the Position of Women in the Peruvian Central Andes*. In R.T. Smith (ed.) *Kinship Ideology and Practice in Latin America*. Chapel Hill, NC: The University of North Carolina Press.
- Winkler, S., Chinn, T., Gärtner-Roer, I., Nussbaumer, S.U., Zemp, M., & Zumbüchi, H.J. (2010). An Introduction to Mountain Glaciers as Climate Indicators with Spatial and Temporal Diversity. *Erdkunde* 64(2): 97-118.
- Wutich, A. (2012). Gender, water scarcity, and the management of sustainability tradeoffs in Cochabamba, Bolivia. In M. Cruz-Torrez and P. McElwee (Eds.), *Gender and Water in Gender and Sustainability*, 97-120. Tempe: University of Arizona Press.

APPENDIX A: IRB APPROVAL



EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building · Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office 252-744-2914 · Fax 252-744-2284 ·
www.ecu.edu/ORIC/irb

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: [Kara Chipiwalt](#)
CC: [Beth Bee](#)
[Blakely Brooks](#)
Date: 7/16/2018
Re: [UMCIRB 18-001045](#)
Emotional Evidence of Change: Andean Highlanders Experiences with Glacial Retreat in Peru

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 7/15/2018 to 7/14/2019. The research study is eligible for review under expedited category #6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Draft Interview Instrument	Interview/Focus Group Scripts/Questions
Draft Spanish Translated Version of Interview Instrument	Interview/Focus Group Scripts/Questions
English Version of Verbal Consent Information Sheet	Consent Forms
Spanish Translated Version of Verbal Consent Information Sheet	Translated Consent Document
Spanish Version of Verbal Consent Information Sheet	Consent Forms
Thesis Proposal	Study Protocol or Grant Application

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B: PARTICIPANTS

PARTICIPANT ID #	PLACE OF INTERVIEW	GENDER	AGE	NUMBER OF YEARS OF EDUCATION
1	Llupa	Male	50	7
2	Llupa	Male	24	14
3	Llupa	Male	33	11
4	Llupa	Male	30	10
5	Jangas	Female	29	3
6	Jangas	Male	54	10
7	Jangas	Female	36	8
8	Jangas	Female	34	6
9	Jangas	Male	_____	_____
10	Jangas	Female	38	11
11	Jangas	Female	24	15
12	Plaza de Armas, Huaraz	Male	40	11
13	Plaza de Armas, Huaraz	Male	58	6
14	Llupa	Female	49	4
15	Llupa	Female	46	None
16	Llupa	Female	46	11

17	Llupa	Female	33	6
18	Plaza de Armas, Huaraz	Male	58	11
19	Plaza de Armas, Huaraz	Male	50	6
20	Plaza de Armas, Huaraz	Male	80	14
21	Plaza de Armas, Huaraz	Male	52	20
22	Plaza de Armas, Huaraz	Male	55	15
23	Market, Huaraz	Female	50	6
24	Plaza de Armas, Huaraz	Female	64	14
25	Market, Huaraz	Female	41	16
26	Plaza de Armas, Huaraz	Female	42	11
27	Plaza de Armas, Huaraz	Female	42	7
28	Plaza de Armas, Huaraz	Female	19	11
29	Market, Huaraz	Male	35	15
30	Market, Huaraz	Male	23	15

APPENDIX C: INTERVIEW GUIDES – SPANISH & ENGLISH VERSIONS

Sección 1: Información Demográfica

1. ¿Cuántos años tiene usted?
2. ¿Cuánto tiempo ha estudiado?

Sección 2: Cambio Ambiental

3. ¿Ha notado cambios ambientales en donde vive? [SI / NO]

If SI, continue to question four. If NO, continue to question seven

4. ¿Qué cambios ambientales ha notado en donde vive?
5. ¿Qué cree que está causando estos cambios en el medio ambiente?
6. ¿Cómo te hacen sentir esos cambios?

Sección 3: Agua

7. ¿Usted usa el agua de los canales? [SI / NO]

If SI, continue to question nine. If NO, continue to question eight

8. ¿De dónde saca el agua que usas todos los días?
9. ¿Para qué usa el agua de los canales, específicamente?
10. ¿Alguna vez ha tenido escasez de agua? [SI / NO]

If SI, continue to question 11. If NO, continue to question 13

11. ¿Por qué ha tenido escasez de agua?
12. ¿Cómo se hizo sentir la escasez de agua?

Sección 4: Glaciares

13. ¿Usted ha notado algún cambio en los nevados cercanos? [SI / NO]

If SI, continue to question 14. If NO, continue to question 15 and stop for this section

14. ¿Qué cambios ha notado en los nevados?

Question 15 is a Free-List

15. ¿Qué piensa cuando oyes la palabra ‘nevado’?
16. Como los nevados han cambiado, ¿cómo se ha afectado su vida?
17. ¿Cómo se hacen sentir estos cambios?

Sección 5: Cierre

18. ¿Hay algo más importante que le gustaría mencionar que aún no hemos discutido sobre los nevados, los cambios en los nevados, o los cambios en el ambiente?
 19. ¿Tiene algunas preguntas para mi?
-

Section 1: Demographic Information

1. What is your age?
2. How many years did you attend school?

Section 2: Environmental Changes

3. Have you noticed changes in your surrounding environment? [YES/NO]

If YES, continue to question four. If NO, continue to question five

4. What environmental changes have you noticed in your surrounding area?
5. What do you think is causing those changes?
6. How do these changes make you feel?

Section 3: Water

7. Do you use the water from the canals? [YES/NO]

If YES, continue to question nine. If NO, continue to question eight, followed by nine

8. Where does the water that you use every day come from?
9. What do you use the water from the canals for specifically?
10. Have you ever had water shortage? [YES/NO]

If YES, continue to questions eleven. If NO, continue to question twelve

11. Why have you had water shortage?

12. How did you feel about the shortage of water?

Section 4: Glaciers

13. Have you noticed any changes in nearby glaciers? [YES/NO]

If YES, continue to question fourteen. If NO, continue to question fifteen

14. What changes have you noticed in the nearby glaciers?

Question fifteen is a Free List

15. What do you think of when you hear the word glacier?

16. Since the glaciers have changed, how has it affected your life?

17. How do these changes make you feel?

Section 5: Closing

18. Is there anything else important you would like to mention that we have not yet discussed about glaciers, glacial changes, or environmental changes?

19. Do you have any questions for me?

