

**IMPACT OF CLIMATE CHANGE ON GENDER RELATION**  
(A Case Study from Simjung VDC of Gorkha District, Nepal)

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## LETTER OF RECOMMENDATION

It is with great pleasure that I recommend the approval of the thesis entitled **IMPACT OF CLIMATE CHANGE IN GENDER RELATION (A case study from Simjung VDC, Gorkha Nepal)** completed by Mr. Narayan Prasad Gautam under my supervision for partial fulfillment of the requirements for master of Arts in Sociology/Anthropology. Therefore this thesis is recommended for its evaluation.

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Date: 2071/12/28

## **LETTER OF ACCEPTANCE**

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## CHAPTER-I: INTRODUCTION

### 1.1 Background of the study

Climate change is a major threat to all living creatures. It is a lasting variation in the global climate in response to natural and/or human factors (Aboud, 2011). Climate change, and more specifically global warming, can cause glaciers to melt and sea levels to rise, pushing saltwater into freshwater systems (USEPA, 2013). Significant changes like the salinization of water push species to new locations, directly impacting global ecosystems (USEPA, 2013). Climatic changes affect weather patterns, increasing the frequency and intensity of floods, droughts, and extreme weather events (Mirza, 2003). These types of conditions also result in natural disasters (Helmer, 2006). While climate change is not solely destructive, the negative impacts of global warming on health and agriculture are greater than the benefits for the majority of the world and increase as global temperatures rise (Cook, 2013). A two-degree rise in temperature threatens 25 percent of all plant and animal species on the planet with extinction (Rodenberg, 2009). These climatic changes cause the most harm for the most vulnerable populations or those who lack the ability to cope with and adapt to climate change because of a lack of access to essential resources (UNDP, 2008). Marginalized groups like women, children, the elderly, and the impoverished have less access to and control over resources and therefore are more negatively impacted by climate change (Dankelman, 2011).

Climate change initiatives, such as the Inter-governmental Panel on Climate Change (IPCC), have started discussing the unequal distribution of the risk and impacts of increasing climate variability and future climate change. Climate change is experienced in everyday life (MacGregor, 2010; Tanner and Allouche, 2011), which is not equal but social, economic, and political. Increasing climate variability and future climate change are not the first or ultimate stresses/risks to which poor and marginalized people in the developing world are exposed (Smit and Wandel, 2006; Tschakert, 2006).

Adaptation, vulnerability and resilience of people to climate change depend upon a range of conditions. These vary from their degree of exposure and dependency upon weather patterns for livelihoods and food security, to varying capacities in adaptation, which are influenced by gender, social status, economic poverty, power, access, and control and ownership over resources in the household, community and society. Mountain peoples are especially vulnerable since climate impacts and changes are predominantly acute in mountainous regions (Nellemann et al., 2011).

Gender is the collective social differences between males and females, as determined by culture (CARE, 2010) Gender is one of many components of vulnerability to climatic change (ADENIJI, 2011). Changes in the climate affect genders differently, magnifying existing gender inequality (Aboud, 2011). Both women and men are affected by and vulnerable to climate change and global warming, but women often bear more of the burden (UNDP, 2010). This higher vulnerability is mostly not due to biological or physical differences, but is formed by the social, institutional and legal context. Subsequently, Vulnerability is less an intrinsic feature of women and girls but rather a product of their marginalization (Birkmann, 2014).

People are born female or male but learn to be girls and boys who grow into women and men. This learned behavior make up gender identity and determines gender roles (WHO, 2002). “Gender is the division of people into two categories, “men” and “women”. Through interaction with caretakers, socialization in childhood, peer pressure in adolescence, and gendered work and family roles women and men are socially constructed to be different in behavior, attitudes, and emotions. The gendered social order is based on and maintains these differences (Borgatta and Montgomery, 2000). These differences are vital in determining female status and in tackling the menace of climate changes, in positioning how women and men perceive and experience climate change in diverse ways owing to their distinct socially constructed gender roles, responsibilities, status and identities.

## **1.2 Statement of the Problem**

Gender relations refer to a complex system of personal and social relations of domination and power through which women and men are socially created and maintained and through

which they gain access to power and material resources or are allocated status within society (IFAD, 2000).

The gender implications do not merely mean the linkages between gender and the risk and impacts of climate change. Rather, it is more important to understand how gender intersects with other socioeconomic factors, such as class, caste, ethnicity, and age, to affect the level of the risk and impacts of climate change.

It is widely recognized that climate change does not affect people equally. The related disasters and impacts often intensify existing inequalities, vulnerabilities, economic poverty and unequal power relations (Brody et al., 2008; IPCC, 2007). Differently positioned women and men perceive and experience climate change in diverse ways because of their distinct socially constructed gender roles, responsibilities, status and identities, which result in varied coping strategies and responses (Lambrou and Nelson, 2010; FAO, 2010).

Women play a crucial role in mountain societies as a very significant proportion of the work force in food production and as key players in managing and sustaining their natural resources and environment. At the same time, while being central for opportunities to adapt to changing climates, they are often disadvantaged in terms of power relations and accessing resources, and exposed to increased risks associated with climate change during disasters and lost incomes from climate shocks. These risks include further marginalization, exclusion from decision-making and dislocation from access to resources for survival.

### **1.3 Objectives of the study**

General objective of the study is to assess the impact of climate change on gender relations in Simjung VDC of Gorkha District. Specific objectives are:

1. To find out climate change variability
2. To assess an adaptive capacity from gender perspective
3. To assess an adaptive practices against climatic hazards

## **Research questions**

Recent climatic and environmental changes and its effect on livelihoods and gender relations at the household and community levels over a couple of decades were primarily explored from this study. For that, first of all, pre- and post-disaster socioeconomic conditions and gender relations which are specific to the study site were identified. Similarly, a set of the sub-questions related to the four dimensions of risks perceptions and experiences; vulnerability and adaptive capacity; adaptation practices; and needs for adaptations were assessed. Some key questions which were tried to answer from this study are;

- What is the trend of climate change in the study area?
- What are the effects led by climate change on socio-economic condition and gender relation?
- How do environmental and climatic changes affect the food and livelihood security of people at the household and individual levels?
- What factors affect differences in the security level among different social groups of people?
- What are the perceptions on adaptive practices to climate change from gender perspective?

### **1.4 Significance of the study**

From a gender perspective, some specialists, including Denton (2000, 2002) and MacGregor (2010), argue that women in the developing world, in particular, have been and will be disproportionately affected by climatic changes because they are relatively poor. Others argue that women in the rural developing world are more vulnerable to climate variability, especially limited rainfall, because they are more exclusively dependent on rain-fed agriculture and natural resources for their livelihoods (Dankelman, 2002; Nelson et al., 2002; Skutsch, 2002; Terry, 2009). However, it is questionable whether those women are vulnerable only because they are poor or because they are women.

Often, women are more vulnerable to climate change than men. This is because they make up the majority of the world's economically poor, do most of the agricultural work, bear unequal responsibility for household food security, carry a disproportionate burden for

harvesting water and fuel for everyday survival, and rely on threatened natural resources for their livelihoods (Terry, 2009).

The unequal distribution of vulnerability or susceptibleness to losses/damage from increasing climate variability and future climate change is often linked with the unequal distribution of peoples adaptive capacity (Adger et al., 2007). The gender implications do not merely mean the linkages between gender and the risk and impacts of climate change. Rather, it is more important to understand how gender intersects with other socioeconomic factors, such as class, caste, ethnicity, and age, to affect the level of the risk and impacts of climate change (Nanoguchi, 2012).

Not only the impacts of The IPCC fifth assessment report concludes that there is ‘robust evidence’ for and increase of gender inequalities as a result of weather events as well as for the perpetuation of differential vulnerabilities (Olsson, 2014). The increase of inequalities due to climate change can have several reasons. For example, girls often face more serious risks than boys due to unequal distribution of scarce resources within the household. This effect is amplified by climate change induced resource scarcity (Demetriades, 2009). Furthermore, Climate change often results in an increase of out-migration of men. This leaves women with an increased work-load at home, resulting in a *feminization of responsibilities* (Olsson, 2014). Climate change is predicted to increase frequency and magnitude of natural hazards such as extreme heat (Birkmann, 2014). During and after these hazards especially women are burdened with increased care work for children, the sick and old, adding furthermore to already significant amount of household duties (Olsson, 2014).

The limited explanation of differential vulnerability and adaptive capacity between men and women is due to a lack of relevant empirical and case study-based data. Without the data, the gender implications of vulnerability or adaptive capacity often lead to the stereotyped view of women as helpless victims. Consequent poverty, food insecurity, environmental degradation, and male out migration have put double and triple burdens on poor farmers, especially women who are main food producers and providers, care-givers, and environmental managers (Nelson et al., 2002). Thus, it is important to identify how

vulnerability to climate change as well as other socioeconomic stresses is shaped under unequal power relations in everyday life.

### **1.5 Limitation of the study**

The study covers a limited area. Study was primarily based on respondent's opinion, which might be different from the opinion of the respondents from other areas. Study finding can't be generalized because propose research is a case study.

### **1.6 Definition of terms used in this thesis**

*Operational definitions regarding climate change given here was provided by IPCC (2012)*

**Climate:** Climate is the long-term pattern of weather in a particular area. It is measured by assessing the patterns of variation in temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables in a given region over long periods of time. Climate is different from weather, in that weather only describes the short-term conditions of these variables in a given region.

**Climate change:** A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

**Climate variability:** Climate variability is changes in the components of Earth's climate system and their interaction.

**Adaptation** In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate.

**Adaptation assessment** The practice of identifying options to adapt to climate change and evaluating them in terms of criteria such as availability, benefits, costs, effectiveness, efficiency, and feasibility.

**Adaptive capacity** The combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities.

**Gender relations:** These are the social relationships between women and men. Gender relations are simultaneously relations of co-operation, connection, and mutual support, and of conflict, separation and competition, of difference and inequality. Gender relations are concerned with how power is distributed between the sexes (Christodoulou, 2005).

**Gender roles:** Gender roles are learned behaviours in a given society/community, or other special group, that condition which activities, tasks and responsibilities are perceived as male and female. Gender roles are affected by age, class, race, ethnicity, religion and by the geographical, economic and political environment (Christodoulou, 2005).

## **1.7 Organization of the study**

The study is divided into six chapters. The first chapter deals with study background with objectives and study significance. In second chapter, related literatures were given, which starts from conceptual reviews and ends with theoretical framework. Chapter three describes the research methodology, which includes research designs, sampling, data source and nature of it and data collection techniques with appropriate methods for analyzing the data. Chapter four includes the general description of study area and respondents characteristics whereas fifth chapter deals study results and discussions where results are given accordingly to the stated objectives. Chapter six is the summary, main findings and study conclusion.

## **CHAPTER-II: LITERATURE REVIEW**

### **2.1 Concept Review**

#### **2.1.1 Climate change and gender**

Climate change and gender is concerned with gender differences in the context of climate change and the complex and intersecting power relations arising from it (Olsson, 2014). By altering the ecosystems of the planet, climate change, and more specifically global warming, directly impacts the human race. These effects vary for different segments of the population, specifically for people of different genders (Olsson, 2014). In many cases, women are more vulnerable to the negative effects of climate change because of their lower social status in most countries. Many impoverished women, especially those in the developing world, are farmers and depend on the natural environment for subsistence and income. By further limiting their already constrained access to physical, social, political, and fiscal resources, climate change often burdens women more than men (Olsson, 2014),

Locally and globally, both governments and non-governmental organizations respond to climate change. Some of these efforts focus on mitigating the effects of climate change while others aid societies in adapting their lifestyles to changes in their environment. Most policy responses in the late 20th and early 21st century either did not focus on the social effects of climate change or did not consider gender in these efforts (Roehr, 2007).

Analysis of gender in climate change, however, not only means applying a binary male/female system of analysis on sets of quantitative data but also scrutinizing discursive constructions that shapes power relations connected to climate change (MacGregor, 2010).

#### **2.1.2 Gender differentiated contribution to and perception of climate change**

Contribution to climate change is correlated to gender (Boyd, 2009). A study on car use in Sweden for example found that men are more likely to use the car more, for longer distances and alone compared to women, thereby exhausting more CO<sub>2</sub> than women (Polk, 2003). A study of young people in Finland shows that concern over climate change has



higher impact on Climate friendly consumption in women compared to men (Orkala et al., 2014). This may be incidental to differences in perception of climate change (McCright, 2010) tend to agree with the scientific opinion that anthropogenic pollution is mainly responsible for climate change (m: 56%, f: 64%) and are more concerned about its effects: 29% of men and 35% of women in the US "worry about global warming a great deal" (McCright, 2010). Women furthermore possess unique skills and knowledge, which are important in building equal and sustainable responses to climate change (Habtezion, 2012). The UNFPA report State of world population 2009 - Facing a changing world: women, population and climate identifies women as important actors in mobilizing against climate change (Engelmann and Richard, 2009). The report quotes Wangari Maathai that "Women hold the key to Climate's Future"; "when we talk about reducing emissions from deforestation and degradation, we need to focus on women (Engelmann and Richard, 2009).

### **2.1.3 Gender in climate science**

According to a survey conducted IPCC WGI Co-Chairs and Technical Support Unit (TSU) on April 25th 2014, many of the polled authors stated that they saw the need for a better gender balance (IPCC, 2014). This is reflected in the gender balance of contributors to the fifth IPCC assessment report. Only 27% of contributors to Working Group II, concerned with impacts, adaptation and vulnerability and 18,5% of contributors of Working Group I, concerned with the physical science basis, are female. This also applies to other organisations, as for example only 7% of leadership positions in the offices of National Weather Services are women (Smyth, 2009). On a similar note, a study conducted by the University of Oxford in cooperation with the Nielsen Company found that 18 of the 22 'most influential spokespeople on climate change' are male (Nielsen, 2007). Female spokespeople were neither politicians nor scientists and their direct connection to climate change is therefore doubtful (MacGregor, 2010). Some feminist scholars hold that the debate on climate change is not only dominated by men but also primarily shaped in 'masculine' principles, which limits discussions about climate change to a perspective that focuses on technical solutions (Tuana, 2013). This perception of climate change hides subjectivity and power relations that actually condition climate change policy and science,

leading to a phenomenon that Tuana (Tuana, 2013) terms ‘epistemic injustice’. Similarly, MacGregor (MacGregor, 2010) criticizes the scientific discourse from a less quantitative perspective but focusses on discursive aspects. She attests that by framing climate change as an issue of ‘hard’ natural scientific conduct and natural security, it is kept within the traditional domains of hegemonic masculinity (MacGregor, 2010). Seager (2009) maintains that the 2°C aim, which is a reoccurring topic in the climate change debate, is not, as often assumed, a safe goal for all people on the planet. Rather it will ensure the stability of a patriarchal capitalism and subsequently the continuity of power for those who are powerful today (Seager, 2009).

## **2.2 Empirical review**

Gender aspects of natural disasters and climate change have not been well researched (Enarson, 1998; MacGregor, 2010; Nelson and Stathers, 2009). Few feminist scholars and gender specialists have not focused on climate change or they have attended to gender relations as factors increasing women’s vulnerability to disasters (Enarson and Meyreles, 2004; MacGregor, 2010). MacGregor (2010) argues that a lack of research is due to authors “fear of treading into dangerous essentialist territory. If there are, their studies focus mainly on the impacts associated with women’s vulnerabilities, such as post-disaster stress (Fothergill, 1998; Enarson and Meyreles, 2004). Therefore, they often fail to focus on women’s coping strategies or adaptive capacity, except some case studies and field reports, including Chowdhury (2001) and Mitchell et al. (2007).

Whether a natural disaster is fast-onset or slow-onset, it is a long process classified into several stages, including preparedness, response, recovery, and mitigation (Drabek, 1986). Empirical studies on natural disasters illustrate gender-specific vulnerability and coping strategies or adaptive capacity in each stage. These studies also suggest that gender differences in impacts, adaptive capacity, adaptation, and needs for adaption are closely related to context-specific structural inequalities between men and women in responsibilities, division of labor, cultural norms, access to and control over resources, and decision-making power.

According to Blaikie et al. (1994), vulnerability is rooted in the unequal distribution and allocation of resources and power among different groups of people. People who are socio-economically marginal and live in environmentally marginal regions tend to be of minimal importance to those who hold economic and political power (Blaikie et al., 1994).

Due to gendered division of labor and domains, however, poor women are more likely than their men to be exposed to risk from environmental hazards. Ikeda (1995) and Cannon (2002) stress that due to gender roles, their lack of literacy, their lack of mobility, and their seclusion from public places, women had less access to information on the any hazards led by climate change (e.g. cyclone), specifically for evacuation. Similarly, strict cultural norms constrained women to make a decision on evacuation and evacuate by themselves, but they needed to wait for their male members' decision and be escorted by them to shelters. When disasters occur, women tend to be disproportionately impacted in terms of mortality, morbidity, and injury (Demetriades and Esplen, 2008; Fothergill, 1998; MacGregor, 2010). This is largely determined by gender relations, specifically in terms of lower physical capacity, division of labor and domains, and cultural norms/institutions.

In the stage of mitigation and preparation, women tend to be excluded from the planning processes of disaster programs, which often take place in public spaces, to mitigate and prepare for the next hazard, such as floods (Khondker, 1996).

In short, there are few empirical studies on gender and natural disasters/climate change. Limited studies tend to focus on how men and women are differently impacted by and respond to the events and how gender differences relate to such different impacts and responses between men and women. However, the analyses rarely address differences within the groups of women. Their focus is mainly confined to gender relations at the household or community levels. Therefore, the analyses rarely involve the connections of social processes at higher levels to the consequences of these natural and socioeconomic events and changes at the grassroots level.

## 2.3 Men and women’s differential experiences of climate change

**Table 1: How gender may shape men and women’s differential experiences of climate change**

	<b>Women</b>	<b>Men</b>	<b>Link to climate change vulnerability</b>
<b>Roles</b>	Stay home to care for children and elderly and sick members of the family	Can migrate to access economic opportunities	Their ability to migrate in search of economic opportunities makes it easier for men to deal with crisis, and may result in benefits for the family as a whole. However male migration often increases women’s workload, as they are left behind to manage the household in addition to usual tasks
	Produce household crops and livestock products	Produce market crops and livestock products	Both crops and livestock are affected by climate change, with profound consequences for household food security. Men often claim safer/more fertile land for growing market-oriented crops leaving women to grow household crops on less fertile land
	Are responsible for food storage and preparation	Are responsible for selling (valuable) produce and livestock	Climate change has implications for food preparation and storage. Harvests may be reduced or destroyed by changes in weather, floods or droughts. This affects market prices and the availability of surplus to sell –placing pressure on both men and women to identify other sources of income and reduce major expenditure (e.g. school fees). In times of shortage, women are often expected to feed other members of the family before themselves
<b>Resources</b>	Have lower incomes and more likely to be economically dependent	Have higher incomes and are more likely to own land and other assets	Men typically have more money and other assets than women. Men’s savings provide a buffer during tough times and along with other assets make it easier for them to invest in alternative livelihoods.
	Have less access to education and information	Have more access to education and information	Managing climate-related risks to agricultural production requires new information, skills and technologies such as seasonal forecasts, risk analysis and water saving agricultural practices. Men are more likely to have access to these resources, the knowledge and the power to use them, and are therefore better equipped to adapt. Women often have traditional knowledge that can inform adaptation efforts. Old and new information can be important in adapting
<b>Power</b>	Have less power over family finances and other assets	Have more power over family finances and other assets	Without the power to decide on family resources and finances women’s ability to manage risks, by for example, diversifying crops, storing food or seeds or savings, is limited
	Have limited engagement in community	Have greater involvement in community politics	Men are likely to have more influence over local governance-promoting policies and programs than women and may not support women’s

	<b>Women</b>	<b>Men</b>	<b>Link to climate change vulnerability</b>
	politics	and decision making	rights and priorities
	Face many cultural restrictions/prohibitions on mobility	Face few cultural restrictions on mobility	Mobility is a key factor in accessing information and services. It is also critical for escaping the danger posed by extreme weather conditions. Women are at high risk from such events, but men in heroic roles may also be at risk

*Source: Taken from CARE International Climate Change Brief*

## **2.4 Case studies**

### **2.4.1 Bangladesh**

Bangladesh is prone to flooding and water-logging because of its location as a river delta (Kartiki, 2011). In 2012, it was labeled a Least Developed Country by the United Nations, with high rates of poverty and weak government, meaning it is especially vulnerable to natural disasters (Kartiki, 2011). It is densely populated and about 63 percent of its population was working in the agriculture, forestry, or fishing sectors in 2010 (Kartiki, 2011) Slightly less than half of Bangladesh's population is women and, in 2001, 80 percent of women lived in rural areas (WEDO, 2008). Bangladeshi women are particularly vulnerable to climate change because they have limited mobility and power in society (CARE, 2010). Research shows that, after the cyclone and flooding of 1991, Bangladeshi women aged 20–44 had a much higher death rate than men of the same age: 71 per 1000, compared to 15 per 1000 for men (WEDO, 2008). Even if a cyclone warning is issued, many women die because they must wait at home for their relatives to return before they can seek shelter (WEDO, 2008).

As climate change progresses, access to and salinization of water sources are becoming problems in Bangladesh (WEDO, 2008). When there is a lack of drinking water, women are responsible for procuring it regardless of the distance they must travel or the terrain they must cover (WEDO, 2008). During natural disasters, male unemployment rises (WEDO, 2008). When men become unemployed, women's responsibilities increase because they must secure and manage income and resources on top of feeding the family and caring for children and the elderly (WEDO, 2008). As the number of men at home without income or occupation rises, more women report mental and physical abuse by their

male relatives (WEDO, 2008) To cope with climatic change, women store matches, food for the family, fodder for the livestock, medicine, and fuel sources in safe places in case of disaster (WEDO, 2008). They also teach their children skills such as swimming to prepare them for crisis (WEDO, 2008). The global relief agency CARE believes that climate-resilient jobs such as duck rearing can help increase Bangladeshi women's resilience to climate change (CARE, 2010).

Since the disasters of 1991, Bangladeshi women are more involved in disaster response decision-making, through local committees and community organizations established by the government and NGOs (CARE, 2010). As part of the United Nations Framework Convention on Climate Change's National Adaptation Programme of Action (NAPA), Bangladesh published a Poverty Reduction Strategy paper in 2005 that incorporated gender mainstreaming into its climate change adaptation plan, but as of 2008 those goals and policies were not fully implemented (WEDO, 2008).

#### **2.4.2 South Africa**

According Babugura (2010), in 2010, South Africa was the region with the largest economy in Africa, yet more than half of the population lived in poverty and many were unemployed (Babugura, 2010) Impoverished populations of South Africa depend heavily on agriculture and natural resources to live. Coal and metal ore mining were also significant contributing sectors of the economy, but are decreasing in the 21st century due to climate change and globalization. In 2007, the Intergovernmental Panel on Climate Change (IPCC) predicted that Africa would warm due to climate change 1.5 times more than the rest of the world and that South Africa, specifically, would be 3 - 4°C warmer by 2100. Water, agriculture, mining, and forestry would all be affected by these changes in temperature and weather. The Human Sciences Research Council found in 2004 that 57% of South Africa's poor were at risk for negative climate change effects because they depended on rain-fed agriculture and climate change in Africa was expected to cause longer and more intense periods of drought over time. Many of the rural poor in South Africa are women who have only limited access to property, income, credit, resources, and social power.

In South Africa, men traditionally look after the livestock while women look over the garden, but in extended periods of drought, many households lose their livestock. In response to this loss and to increasing unemployment, men are turning to alcohol to deal with the psychological stress. Some are also increasing their number of sexual partners, increasing their risk of contracting or spreading HIV (Babugura, 2010). In response to these changes, more women are entering the workforce, either formally or informally. Some are now working in traditionally male occupations like mining and construction. Others are making and selling goods locally. Social grants from the South African government further support households affected by the changing climate. These grants include pensions, disability payments, and child support. In some cases, when men are responsible for the distribution of social grants in the household instead of women, they use the money to purchase alcohol. In response, the government tends to give grant money to women, which can cause domestic disputes within households (Babugura, 2010).

Understanding of climate change in South Africa is based mainly on experience and local knowledge, which is communicated orally. Women tend to hold more of this knowledge than men do because of their experience with farming and gardening. In response to drought, some women plant crops near wetlands or other water sources. They also preserve food for periods of drought or crop failure. Despite their knowledge of climate change, many responses in South Africa (like the South African Country Study on Climate Change Vulnerability & Adaptation Assessment) do not address gender. While women in South Africa are represented in the government on a provincial level, there are not many women in government at a municipal level (Babugura, 2010).

### **2.4.3 Nepal**

Climate change is not only a technical but also a human rights issue. From a gender perspective, the intensity of climate change impacts is higher on women. Climate change has been affecting the lives and livelihoods of the mountain population in the Himalayan region. Nepal is already vulnerable to a range of natural disasters, and the situation is being compounded by climate change. As yet, government strategies for Nepal's remote mountain districts are lacking, as is support for the development of infrastructure and

services. The resilience of mountain people to climate change needs to be strengthened and awareness raised with regard to climate change and environmental disasters. Gender approaches need to be mainstreamed in all aspects of strategies for adaptation including mountain infrastructure, sustainable livelihoods, food security, awareness, good governance, land and water management, agriculture extension, health care, behaviour change, new farming practices, clean energy development, and poverty alleviation programmes.

Major adaptation strategies were storage of firewood, livestock feed, poultry farm, construction of plastic house, use of compost, solar. Adaptation had adapted differently by the different wealth rank women (Regmi, 2015). Women in the mountains are double marginalized firstly as women and then as mountain women. In addition to the challenges of living in the mountains, like harsh climate and inadequate infrastructures, they experience unequal treatment based on traditional gender relationships that deprives them from equal access to health, education, property and wellbeing. In Nepal, women consistently face hardships, due to lack of access to market, education, exposure, information and communication, contributing to their increasing vulnerability to climate change. An alarming symbol of the women consistently face hardship in hills of Nepal is force to plough in the farm.

## **2.5 Theoretical framework**

Theoretical framework was adopted to examine how gender and other socioeconomic factors are related to climate variability and change in terms of human vulnerability and adaptive capacity. Drawing from natural disasters risk theory by Blaikie et al. (1994) and feminist political ecology by Rocheleau et al. (1996), It was identified the key factors which differentiate the types and levels of risks and vulnerability between men and women and among women.

### **Natural disasters risk theory-**

Despite the dominant conventional view of natural disasters which are apolitical, disasters occur not only because natural events cause them, but also because of the social, political,



and economic factors which structure the lives of different groups of people in society (Blaikie et al., 1994; Tanner and Allouche, 2011). These key factors are class, caste, ethnicity, gender, age, and (dis)ability (Adger et al. 2007). Pre-disaster socioeconomic conditions and gender relations influence how natural disasters affect people or how people respond to the disasters in varying ways (Kumar-Range, 2001). In this sense, disasters are not isolated events, but are embedded in everyday life (Blaikie et al., 1994). Blaikie et al. (1994) developed Pressure and Release (PAR) model, shows how social, political, and economic factors and processes at both lower and higher levels shape the vulnerability of individuals or households and constrain their capacity.

### **Feminist political ecology-**

Unlike the PAR model by Blaikie et al. (1994), feminist political ecology by Rocheleau et al. (1996) approaches environmental crises through gender differences in the ways human beings relate to the environment. Rocheleau et al. (1996) argue that global economic, political, and environmental changes have differently affected men and women in resource use and allocation and in environmental management. These varying impacts result from not only inequitable political and economic structures, but also the ways men and women differently relate to nature and the environment. Feminist political ecology categorizes gender differences in relation to nature into experiences of, responsibilities for, and interests in nature and the environment (Rocheleau et al., 1996).

Ecofeminists often focus on a close connection between women and nature as both are oppressed by patriarchal institutions and dominant Western world view. Shiva (1988) argues that a natural connection between women and nature gives women the special understanding of ecosystem and environmental protection (Nightingale, 2006). Agarwal (1992) who has challenged such essentialist thinking focuses on the material practices, including a gender- and class- (caste/ethnicity-) based division of labor and distribution of property and power, which structure people's interaction with nature and interests in particular resources and ecological processes (Agarwal, 1992; Nightingale, 2006; Rocheleau et al., 1996). Similarly, Harding (1986), explain gendered experience of environment as a manifestation of situated knowledge that are shaped by gender, race,

class, ethnicity, and age (Rocheleau et al., 1996). Finally, from a liberal feminist perspective of many environmentalists, women are participants and partners in environmental protection programs (Rocheleau et al., 1996).

## **CHAPTER-III: RESEARCH METHODOLOGY**

### **3.1 Rationale for selection of the study area**

Simjung VDC of Gorkha district were taken as a study area. This proposed VDC situated in foot of Manaslu Himal. Farming is a primary source of income in the area. This VDC has a diverse culture, language, and natural resources because of the area falls between 750 m and 3000 m of altitude above mean sea level.

This area was taken as study area because of the following reasons

- Area coverage range from terai sal forest to mountain rhododendron forest
- Area is predominantly inhabited by ethnic group
- Population of female is relatively high in the area
- Literacy rate of female is very low, compare to male
- Area is favorable for studying the climate-change impact, because geology of the area is very fragile.

### **3.2 Research design**

Both descriptive and analytical research design were used to analyze the data collected from field. Around half of the data were from secondary sources which were reviewed here per as stated objectives and research questions. Meteorological data of nearby study area was analyzed to understand the change in climate during last 30 years in the study area. Respondent's perception was analyzed to list out the various climatic hazards in the area as well as reaction to these hazards and taking adaptation to the climate change.

### **3.3 Populations and sample size**

The study was concentrated in all wards of Simjung VDC, Gorkha. Three strata regarding economic class i.e. rich, medium and poor, and Male and women (gender category) were made for Focus Group Discussion (FGD) for separate discussion on the climate change and associated risk, existing mechanism to adapt those climatic hazards and future strategies to adapt the probably climatic hazards. Altogether 8 such discussions were made for the study. Beside these, one hundred households were selected for carrying out the

interview where one third households from each economic class. In household survey, selection of respondents was based on the stratification by wealth class of the village people. Such category was already made from the Simjung VDC office which has been used for this study. Criteria for wealth ranking were given in annex. For taking the target households for the study, total VDC households by name (number given by us) were fed into the computer where Ms excel was used to select only 100 accordingly wealth class, randomly.

### **3.4 Nature and sources of data**

As per need of the study, both secondary and primary data were collected, but priority was given to the collection of secondary data. Basically, efforts were given to collect qualitative data but some important quantitative data was also collected using Village level workshop (meetings) and household survey (face to face interview).

### **3.5 Data collection techniques**

#### **3.5.1 Literature review**

Socio-economic details of the respondents were collected from the village profile of VDC office of Simjung. Statistical climatic data (rainfall and temperature data between 1981 to 2011) of Gorkha station [Latitude (deg/min): 28<sup>00</sup>"/ Longitude (deg/min): 84<sup>37</sup>"/ Elevation (m): 1097] was taken from Department of Hydrology and Meteorology, Kathmandu. Such climatic data were used for showing trend of rainfall and temperature during 30 years in the region. Beside these, Different role of people (by gender, class) were reviewed through reports published by government or non government organization working at the same area. Previous academic report, scientific papers and text on climate change adaptation were reviewed per as the study need.

#### **3.5.2 Village level workshop (meeting)**

Starting with the earliest hazard event anyone can remember, a timeline of the last 30 years was used to identify large climatic hazard events. Participants were asked by standing them on the line at the appropriate time frame and describe the event. Discussed climatic hazard

events were discussed in the context of local climate change. In the workshops, the impacts of the events, community reaction and coping strategies with institutional support in each time line were discussed.

Maximum 21 and minimum 5 participants were involved in each FGD. Various shocks and adaptive capacity were discussed and explored from the each strata group. All old age people of the village were involved in the discussion.

### **3.5.3 Household survey (Interview)**

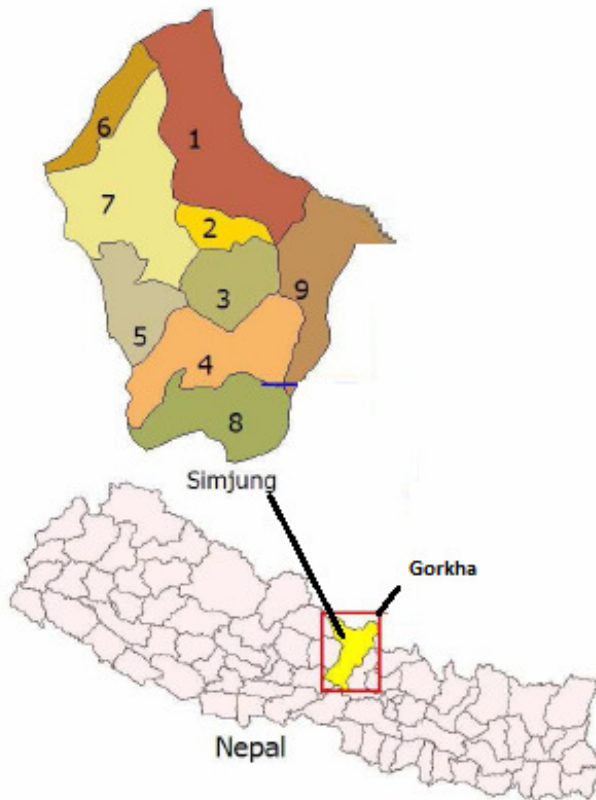
For getting the household level data on the climate change, its impacts and coping strategies (adaptation) were gathered through using the interview where altogether 100 households were selected. Semi-structured schedule was used to conduct interview. Old aged household members were interviewed for getting information related to the past experiences in climate change and local's role during those days.

### **3.6 Method of data analysis**

The data collected during the field work were entered into SPSS 11.5. Collected data were categorized into a variable as required by the study (economic strata). Desktop analysis was employed for reviewing the district trend of climate change, various practices and support of different institutions while people experiencing shocks due to climatic hazards and adaptation strategies. Mainly Statistical Package for Social Science (SPSS) was used to analyze the information. Secondly, Pivot table was used in Excel for presenting required results. Simple descriptive statistics like percentage, arithmetic mean (response mean or weighted mean), average, standard deviation, and minimum-maximum were used to interpret the data where table, bar diagrams and pie charts were used for presenting the results. On the basis of hazards extent (volume) and different adaptation strategies, it was ranked using Index of Relative Ranking (IRR). Linear equations of climate data were prepared for determining the trend of climate distribution where positive (increase) or negative (decrease) value of  $x$  was used for interpreting the result.

## CHAPTER-IV: GENERAL PROFILE OF STUDY AREA AND RESPONDENTS

This chapter describes the study area and key general characteristics of the respondents which help to find out the socio-economic status of the respondents of the study area.



**Figure 1: Study area map**

### **4.1 Introduction of Nepal**

Located between India and China, Nepal covers an area of 147,181 square kilometres. Administration in the country is carried out through 75 Districts, 1 metropolitans, 11 sub-metropolitans, 191 municipalities and 3276 village development committees (VDCs) (MoFALD, 2015). The estimated population for 2001 was 23.1 million; more than 85% of which live in rural areas (CBS, 2003). The literacy rate for 2001 was 54.1%. While the trend in literacy rate is increasing, it is still low in relation to the vision to increase the pace

of development based on human resources. The country is commonly divided into three ecological zones based on its topography: the Mountains (35%), Mid-hills (42%) and the Terai (23%), accounting for respectively 7.3, 44.3 and 48.4% of the national population (LRMP, 1986). Because of the high variation in elevation, the country experiences a wide range of climates ranging from sub-tropical in the lowland to the alpine meadows in the high Himalayas. During June, July, and August, the country is influenced by the monsoon. Though the country's main economic sector is agriculture, only 21% of the total land area is covered by farmland, and out of 75 Districts, 48 experience food deficits (UNDP, 2005). Forested areas cover approximately 5.83 million hectares (equivalent to 39.6% of the total land area) (HMGN, 1999). Even though the forestry sector plays a significant role in the local economy, a comprehensive study on the contribution of forestry to Nepal's GDP has not yet been carried out. The population is fairly poor, as 31% live below the absolute poverty line. The incidence of poverty remains higher in rural (34.6%) than in urban areas (9.6%) (World Bank, 2006). In addition to poverty reduction, a challenge for Nepal lies in controlling the inequality, which has substantially increased during the last few years because of the unequal growth among different income groups and regions (World Bank, 2006).

#### **4.2 Introduction of Gorkha district**

Fieldwork was carried out in Gorkha district, in the mid-Hills of Nepal's Western Region. The study District was chosen purposefully on the basis of implementation of CF, and to represent the socio-economic conditions that generally characterize mid-Hill areas in the region and in Nepal. The District appears representative in terms of the socio-economic characteristics of mid-Hill Districts in the Western Region, although with slightly lower levels on some indicators of welfare, such as literacy, infrastructure, and development expenditure. In terms of national representativeness, the Western Region is characterized by relatively good infrastructure and higher average per capita income (NIDI, 2006).

The total area of the District is 360, 999.9 ha of which agricultural land covers 15.42%, grazing/pasture land covers 16.49%, forest covers 31.21%, and other types (residential area, permanent snow, rocks, rivers, etc.) cover approximately 36.86% (DDC, 2007). The

elevation of the District ranges from 228 m above sea level (Bank of *Marsangdi* River) to 8163 m (*Manaslu* Himalaya), comprising climatic conditions varying from sub-tropical to sub-alpine. The northern part of the District is very rich in several high value non-timber forest products (NTFPs). Main castes found in the District are *Brahmin*, *Chhetri*, *Gurung*, *Magar*, *Newar*, *Tamang*, *Kumal*, *Thakuri*, *Damai*, *Kami*, *Sarki*. The majority of the households in the District raise income through agricultural and non- agricultural labour, government services and remittances. Almost all households use forest resource in fulfilling their daily subsistence needs for fuel wood, construction materials, fodder, manure, agricultural implements and medicine.

**Table 2: Selected statistics for Gorkha District and mid-Hill Districts in the Western Region**

	Gorkha District	Average of mid-Hill Districts in Western Region
Altitude range (masl)	228-8,163	642-5,444
Forest cover (%)	28	43
Population density (cap/ha)	80	182
Number of community forests	361	339
Community forest area in total forest area (%)	17	21
Literacy rate (Age >6) (%)	54	60
Per capita food production per day (kilo calories)	3,432	3,273
Number of livestock per farm household	7	6
Sum of motorable road per 100 square kilometre (km)	4	12
Per capita development budget expenditure (Rs)	622	829
Share of households:		
Using wood for cooking (%)	81	78
Using liquefied petroleum gas (%)	8	7
Using biogas (%)	3	4
With access to safe drinking water (%)	64	79
Member of at least one CFUG (%)	74	68
Have toilet facilities (%)	55	61
Own less than ½ ha of farmland (%)	46	45

*Sources: DoF (2008), and GoN (2003, 2008, 2011)*

### 4.3 Introduction to Simjung VDC

Simjung VDC is located at approximately one day's (12 hours) walking distance from the District headquarter, Gorkha Bazaar. The elevation of the VDC ranges from 750 meters above sea level (*Daraundi* River) to more than 3000 meters, and thus there is a large



variation in terms of forest types and agricultural potential within the VDC. In the area, all of the users practice farming of crops such as paddy, millet, maize, wheat and potatoes. The lowland fertile fields are irrigated through canals (with small rivers supplying the water) and some have water supply through natural springs that run during the monsoon. Rearing livestock such as cattle, buffalos, goats and some sheep at higher elevations is a prominent feature of all households. Sale of crops and livestock products takes place within and outside of the community. Most of the households also keep chicken, which are not only consumed and sold but also used as sacrificial objects while celebrating various religious festivals. In addition, many households receive pensions from the Indian army or have a male member working in India. Some Gurung households prepare local alcohol for their own consumption as well as for selling to the Dalits and other castes of nearby areas.

#### 4.4 General characteristics of respondents

General characteristics of respondents are mentioned as follows:

**Table 3: Age of the respondent**

Age of the respondents in yrs		
Mean	Minimum	Maximum
59.08	40	93

Source: Field Survey, 2015

This study was primarily based on the trends of climate change, its impacts and different adaptation strategies. For trend analysis, the study uses 30 years data (climatic as well as people's experiences of long periods in recall). Due to this reasons, a minimum age of 40 years was fixed before for interviewing the members of the selected households. In the study, mean age of the respondent was 59.08 years where maximum age was 93 years.

**Table 4: Family size of the respondent**

Average family size in number		
Rich	Medium	Poor
7.62	6.85	6.82

Source: Field Survey, 2015

As a whole, average family size of the respondents was 7.1 where 7.62, 6.85 and 6.82 of rich, medium and poor, respectively. Average family number of rich was found higher in the study area because income of the richer household of the area was primarily based on pension. Most of them were retired army of India, British or Nepal. In the area, it was believed that person who has more wives is elite and rich and they believed, elite can hold more than one wife. This type of conservative thinking in the area might be the reason to have higher number of family members in richer household.

**Table 5: Respondent's educational status**

Education level	Education status in %				
	Rich	Medium	Poor	Male	Female
Illiterate	55.88	63.64	78.79	44.50	76.50
Primary	23.53	18.18	15.15	28.30	12.40
Secondary	5.88	15.15	3.03	18.60	6.50
College degree	14.71	3.03	3.03	8.60	4.60

Source: Field Survey, 2015

In the study area, majority of the poor were illiterate (78.79%) followed by medium (63.64%) and rich (55.88%). Only 14.71% richer had college degree whereas medium and poor of the area had even very lesser figure (3.03% of each) than richer. This result shows that educational status of the area is not so good. It was found that, people of the area give higher priority for recruiting in army post or going mostly to gulf countries like Saudi, Dubai and Malaysia for remittance which not need to higher education. Most of the female respondents were found illiterate. Only 4.60% of female having college degree whereas male having college degree was 8.60%. It shows education status of the female is relatively low than that of male respondents in the study area.

## CHAPTER-V: CLIMATE CHANGE VARIABILITY

### 5.1 Introduction

This chapter deals the changes in climate and its impacts to the community. Metrological data was reviewed for showing climate change trends and locals were asked about their reaction to the change in the trend line. The section triangulates the climate data and people’s perception on any changes and its impacts in the area.

### 5.2 Variability in climate change in the study area

#### 5.2.1 Winter rain/snow now as compared to earlier

Table shows that 48.35% respondents perceived that the amount of winter rain/snow has increased where 81.82% respondents were answered it has been observed in the area from last 10 years. Likewise, more or less similar figure (43.82%) of the respondents reported that the amount of winter rain/snow has decreased. Majority of respondents (71.79%) observed it was from last 10 years. This contradictory result reveals that within last 10 years, amount of winter rain/snow was more variable which was supported by 40.70% respondents reported that i.e. the amount was more variable.

**Table 6: Change in winter rain/snow**

Considering the winter rain/snow now as compared to earlier	Respondent’s perception (%)			Responses on the perception from when (%)		
	Yes	No	Don’t know	From last 30 years or more	From last 20 years	From last 10 years
The amount of winter rain/snow has increased	48.35	45.05	6.59	0.00	18.18	81.82
The amount of winter rain/snow has decreased	43.82	38.20	17.98	0.00	28.21	71.79
The winter rain/snow falls at a more inconvenient time	18.60	46.51	34.88	0.00	35.29	64.71
The winter rain/snow has not changed	9.41	58.82	31.76	0.00	50.00	50.00
The amount of winter rain/snow is more variable	40.70	27.91	31.40	17.14	31.43	51.43

Source: Field Survey, 2015

Majority of respondents i.e. 46.51% and 58.82% perceived winter rain/snow seen at a more inconvenient time and the winter rain/snow has not changed in the area, respectively.

The overall result says that climate change was observed by the community from last 10 years where they perceived rain/snow in winter has more variable (more fluctuate) in the area.

### 5.2.2 Change in amount of winter rain/snow

**Table 7: Climate change reaction regarding increased the amount of winter rain/snow**

Reactions	IRR value	(Response %)
Crop yield decline	1.00	50.0
Less landslide	0.68	34.1
More landslides	0.14	6.8
Crop yield increase	0.09	4.5
More human disease	0.05	2.3
No impact	0.05	2.3

Source: Field Survey, 2015

Climate change reaction regarding increased the amount of winter rain/snow was analysed using Index of Relative ranking (IRR). Six major reactions were found where majority of respondents (50.0%) reported that crop yield was declined followed by less landslide (34.1%), more landslides (6.8%), crop yield increase (4.5%), more human disease (2.3%) were seen in the area due to increase in amount of winter rain/snow. Only 2.3% respondents reported that there was no impact in the area. On the basis of IRR value, crop yield was declined in the area, observed or felt by the community in the area was major one. As mentioned in figures in earlier table no. 5, Most of the village youth used to visit gulf countries for remittance. Due to that reason human wage labour for farming in the village was decreased. Ultimately it affects on crop production.

**Table 8: Reasons of change regarding increased the amount of winter rain/snow**

Reasons	IRR value	(Response %)
Climate change	1.00	40.9
Normal weather cycle	0.89	36.4
Divine ( <i>daibi sakti</i> ) control	0.28	11.4
Others	0.28	11.4

Source: Field Survey, 2015

Majority of the respondents (40.9%) reported that reasons of change regarding increased the amount of winter rain/snow in the area were due to the climate change followed by normal weather cycle (36.4%), divine control (11.45%) and others reasons (11.4%).

**Table 9: Climate change reaction regarding decreased the amount of winter rain/snow**

Reactions	IRR value	(Response %)
Crop yield decline	1.00	88.6
Less landslide	0.03	2.9
More landslides	0.03	2.9
More human disease	0.03	2.9
More animal disease	0.03	2.9

Source: Field Survey, 2015

Climate change reaction regarding decreased the amount of winter rain/snow was analysed using Index of Relative ranking (IRR). Five major reactions were found where majority of respondent i.e. 88.6% reported that crop yield was declined while less/more land slide, more human disease and more animal disease were reported by 2.9% each of the respondents.

**Table 10: Reasons of change regarding decrease the amount of winter rain/snow**

Reasons	IRR value	(Response %)
Climate change	1.00	69.2
Others	0.19	12.8
Divine ( <i>daibi sakti</i> ) control	0.15	10.3
Normal weather cycle	0.07	5.1
Pollution by factories	0.04	2.6

Source: Field Survey, 2015

Majority of the respondents (69.2%) reported that reasons of change regarding decrease the amount of winter rain/snow in the area were due to the climate change followed by others (12.8%), divine control (10.3%) normal weather cycle (5.1%), and Pollution by factories (2.6%) where there are some forest based (saw mills and stone cutting) industries in the village.

### 5.2.3 The winter rain/snow falls at a more inconvenient time

**Table 11: Climate change reaction on the winter rain/snow falls at a more inconvenient time**

Reactions	IRR value	(Response %)
Crop yield decline	1.00	93.3
Others	0.07	6.7

Source: Field Survey, 2015

Most of the respondents (93.3%) suffered from declining the crop yields in the area due to the winter rain/snow falls at a more inconvenient time.

**Table 12: Reasons of change regarding the winter rain/snow falls at a more inconvenient time**

Reasons	IRR value	(Response %)
Climate change	1.00	66.7
Others	0.40	26.7
Divine ( <i>daibi sakti</i> ) control	0.10	6.7

Source: Field Survey, 2015

Majority of the respondents (66.7%) reported that climate change is responsible to fall winter rain/snow in the area at a more inconvenient time followed by 26% others and only 6.7% believed that it is due to divine control in the area.

**Table 13: Climate change reaction on the amount of winter rain/ snow is more variable**

Reactions	IRR value	(Response %)
Crop yield decline	1.00	90.6
More human disease	0.07	6.3
More animal disease	0.03	3.1

Source: Field Survey, 2015

Majority of the respondents (90.6%) reported that crop yields were decreased in the area because of more variable of amount of winter rain/snow in the area. Along with this, 6.3% and 3.1% of respondents experienced in the area that more human disease and more animal disease, respectively, were due to the more variable of amount of winter rain/snow.

**Table 14: Reasons of change regarding the amount of winter rain/ snow is more variable**

Reasons	IRR value	(Response %)
Climate change	1.00	77.4
Divine ( <i>daibi sakti</i> ) control	0.21	16.1
Normal weather cycle	0.08	6.5

Source: Field Survey, 2015

Majority of respondents (77.4%) reported that reasons of change, i.e. more variable, in amount of winter rain/snow in the area was climate change whereas 16.1% respondents was found they have conservative thinking. They felt it was due to the divine control whereas only 6.5% respondents perceived that varying in amount of winter rain/snow in the area was change in normal weather cycle.

### 5.3 Review of metrological data of nearby station

Analysis of annual rainfall data of between 1981 and 2011 of Gorkha station received from Department of hydrology and meteorology, Kathmandu was analysed for showing how the rainfall was distributed in different periods and how much its distribution affect to the community. In the rainfall analysis, it was found that per annum decrease in rainfall is 0.56 mm between 1981 and 2011 where 5.97 mm average rainfall was decreased in the period of 30 and 20 years, and 11.27 mm average rainfall was decreased between 30 years and 10 years. The decrease trend of the rainfall was also made from the negative value of x obtained in the linear rainfall trend line equation ( $y = -0.3741x + 148.47$ ). Between 1981 and 2011, it was found that month of maximum rainfall was in June where average rainfall was 430.36 mm and month of minimum rainfall was in November where average rainfall was 6.56 mm in the region. It reveals that over the 30 years period (from 1981 to 2011), rainfall was in decreasing in trend (average change is -0.77 mm).

The analysis also concur that local people's perception and shocks to them brought by changing the rainfall in the area appear to be accordance with the statistical record in the region.

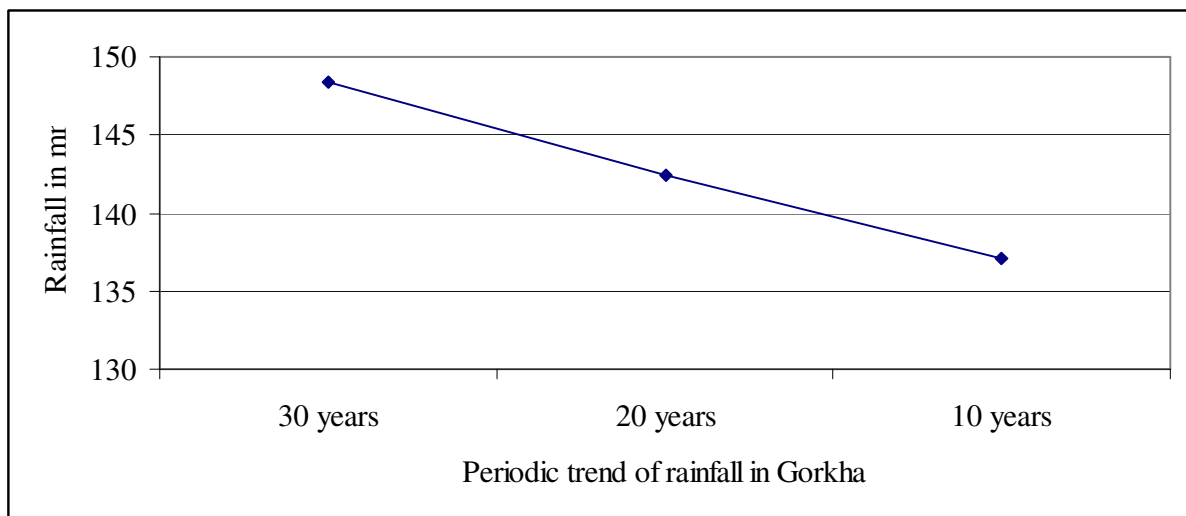


Figure 2: Periodic trend of rainfall in Gorkha

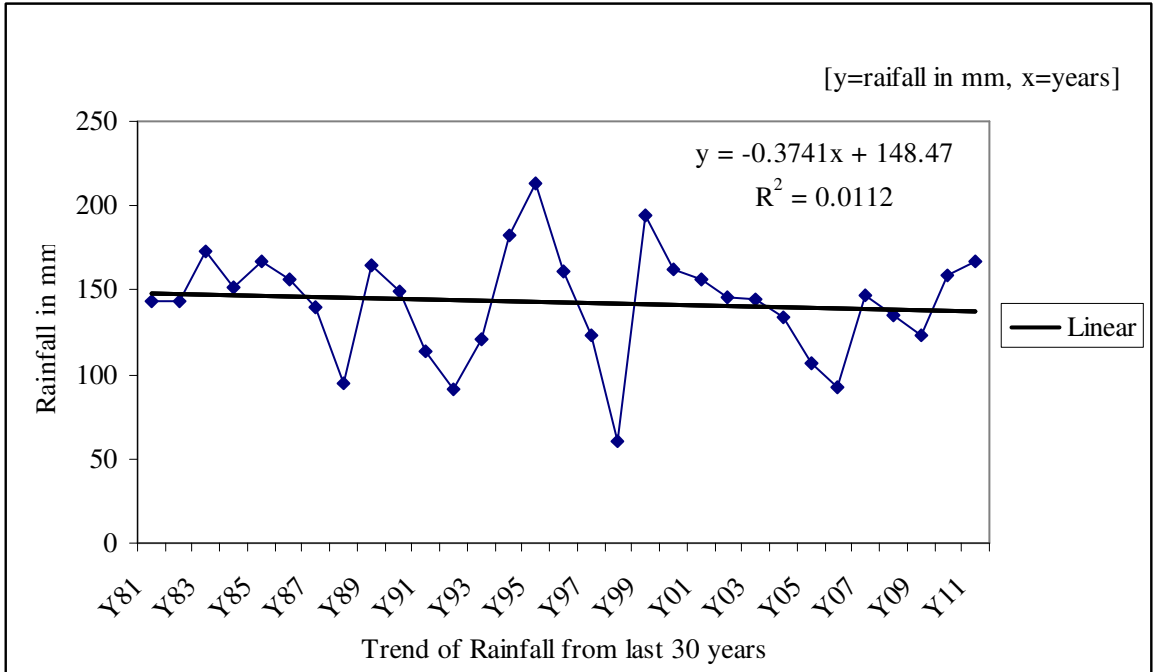


Figure 3: Trend of rainfall from last 30 years

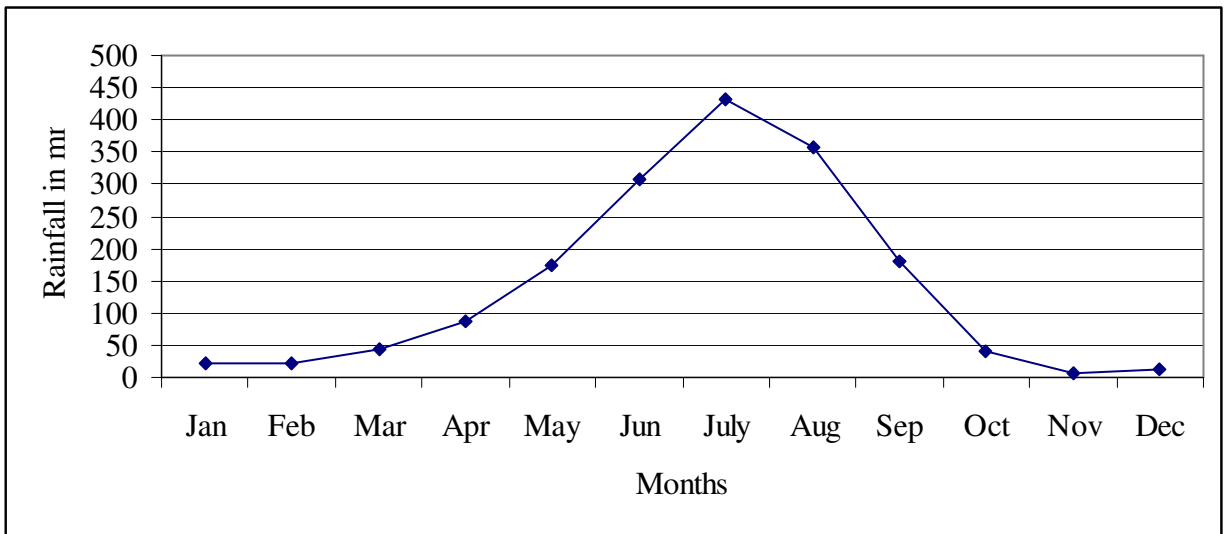
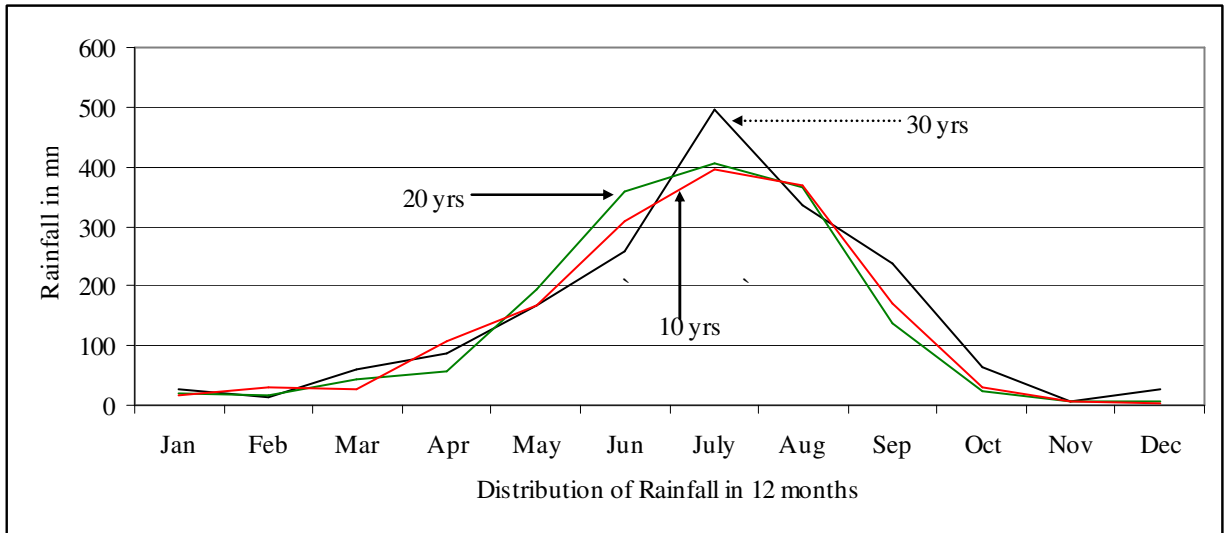


Figure 4: Average distribution of rainfall from 30 years in 12 months

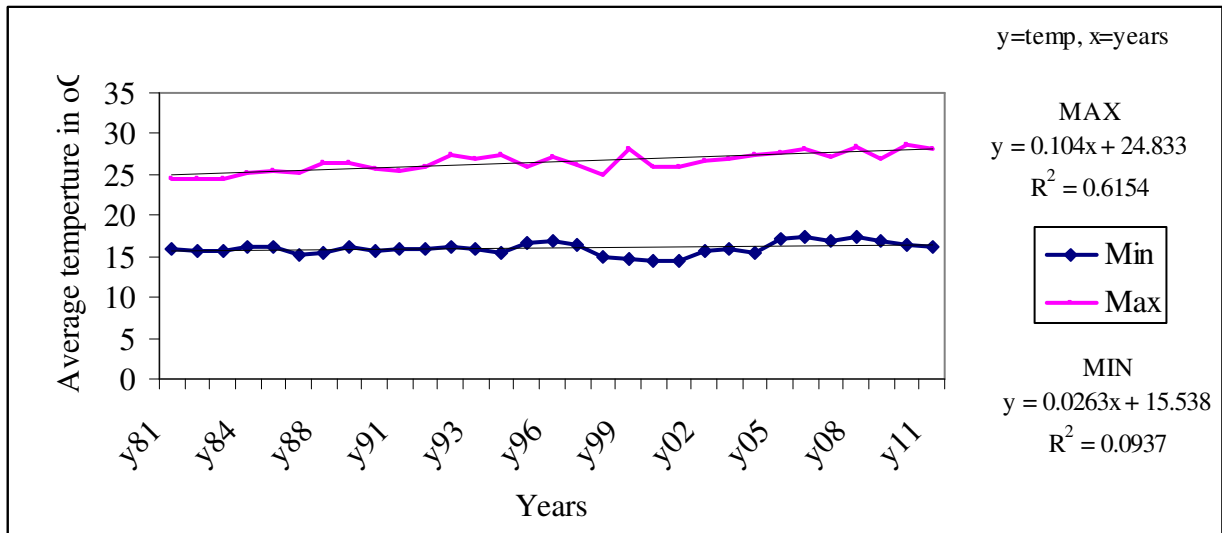




**Figure 5: Distribution of rainfall in 12 months**

Analysis of annual minimum and maximum temperature data of between 1981 and 2011 of Gorkha station received from Department of hydrology and meteorology, Kathmandu was analysed for showing the trend of temperature in the region and its impact to the studied community.

It reveals that over the 30 years period (from 1981 to 2011), maximum as well as minimum temperature were found in increasing in trend. The analysis also concur that local people's perception and shocks to them brought by changing the temperature in the area appear to be accordance with the statistical record in the region.



**Figure 6: Annual average max and min 30 years' temperature of Gorkha**

An increase in average temperature of Gorkha between the periods 1981 to 2011 has been  $0.065\text{ }^{\circ}\text{C}$  per annum. The growth in the maximum temperature is  $0.12\text{ }^{\circ}\text{C}$  whereas minimum temperature is  $0.010\text{ }^{\circ}\text{C}$ . Average maximum temperature of the region ( $27.45\text{ }^{\circ}\text{C}$ ) was observed since 10 years which was relatively higher followed by in 20 years period was  $26.63\text{ }^{\circ}\text{C}$  and in 30 years  $25.33\text{ }^{\circ}\text{C}$ . Likewise, average minimum temperature of the region ( $16.32\text{ }^{\circ}\text{C}$ ) was observed since 10 years which was relatively low during the 20 and 30 years periods, followed by  $15.73\text{ }^{\circ}\text{C}$  in 20 years and  $15.79\text{ }^{\circ}\text{C}$  in 30 years period in the region. These change was also observed using linear equation of the data, it was found that x value is positive for maximum and minimum temperature. Positive value of x in max's equation and min's equation indicates that temperatures were in increasing in trends in the region. The average minimum temperature of the region in the period of 1981 and 2011 was found  $15.91\text{ }^{\circ}\text{C}$  and maximum was  $26.33\text{ }^{\circ}\text{C}$ . Similarly, in average minimum temperature of 30 years, July has been recorded the higher value and January has been recorded the lower value whereas in average maximum temperature, June has been recorded the higher and January has been recorded the lower value.

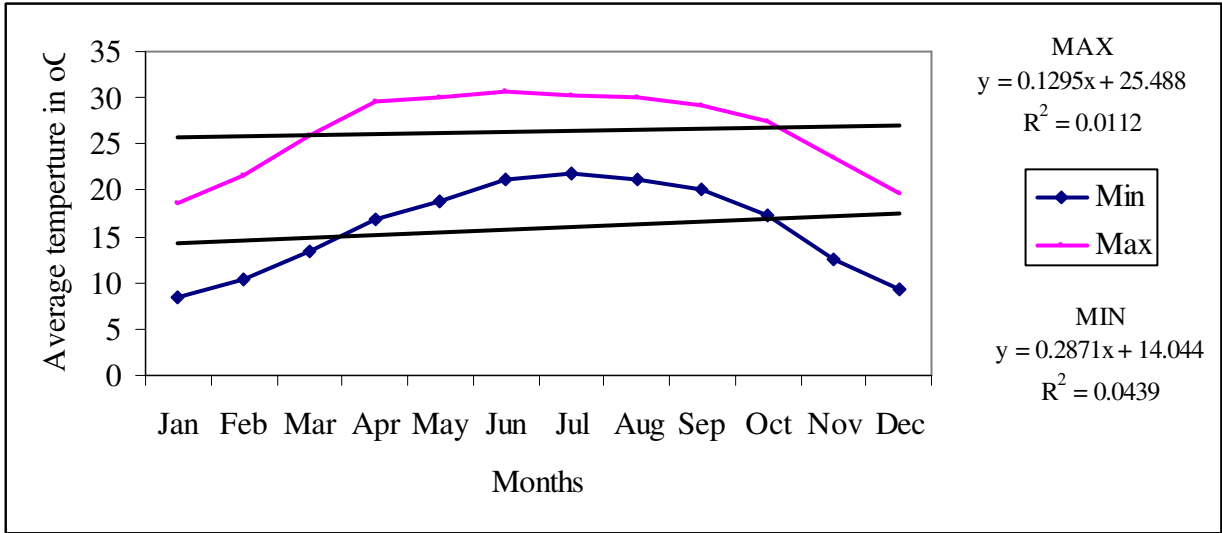


Figure 7: Month wise average max and min 30 years' temperature of Gorkha

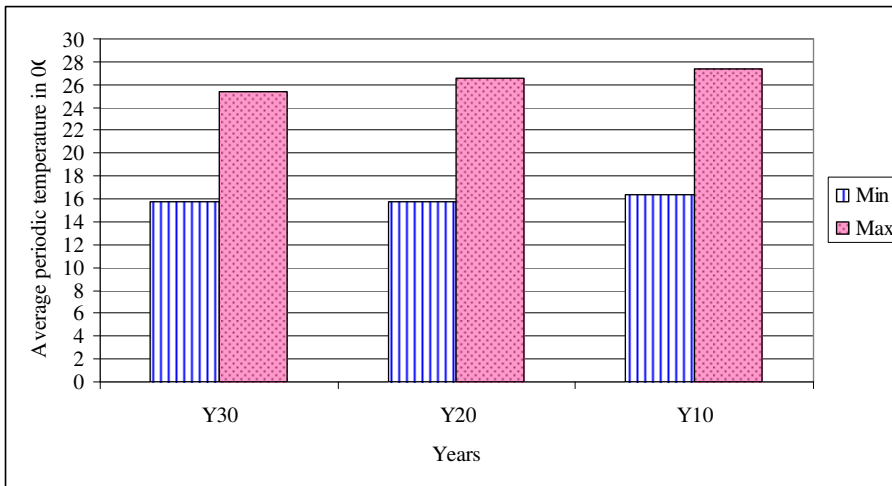


Figure 8: Average periodic temperature of Gorkha

## CHAPTER-VI: ADAPTIVE CAPACITY AND GENDER RELATION

### 6.1 Risk perceptions and experiences of climatic and environmental changes

Almost all respondents witnessed similar climatic and environmental changes, such as warming, intensified natural disasters, and unpredictable rainfall patterns, over the last couple of decades. Debris flows as well as landslides and floods in the village particularly killed several people and took almost everything, including houses, agricultural land, and animals, away from many people in a moment. On the other hand, current unpredictable rainfall patterns, especially the decreased amount of rain during the dry season, gradually threatened their food and livelihood security over the long term. Based on these experiences, the respondents viewed such changes as threats to their lives and food and livelihood security.

While almost all respondents claimed that they were at risk and vulnerable to on-going and future climatic hazards, they also differentiated their own risk level and vulnerability from others. Key points for their risk assessment were: 1) whether or not the climatic and environmental hazard perceived was life-threatening; 2) whether or not his/her resident area was prone to any life-threatening hazard; and 3) whether or not he/she could save his/her life from the hazard. Based on their experiences, knowledge, ideology, and biases, the respondents referred to the timing and intensity of natural disasters for the first point; while they mentioned location, physical capacity for evacuation, and access to information and technology for the second and third points.

Unlike fast-onset natural disasters, the slow-onset drought/famine which resulted from the decreased amount of rain was perceived as less of a life-threatening risk and less of a priority for many respondents. Many respondents considered that the risk of food and livelihood insecurity depended largely on individually available resources and capacity which was structured by gender, caste/ethnicity, age, and location.

In addition to location, many respondents raised gender and age as critical factors to determine the level of human vulnerability to the life-threatening risks of natural disasters.

Many respondents considered women, Dalit, poor and elderly people as the most vulnerable due to their limited physical capacity for evacuation. One man in Taple village of Simjung VDC; Harka Tamang said: *Women, children, and elderly people are all at risk. They are physically disadvantaged. They cannot run fast or cross a flooded river. And women are in sari, so they cannot walk fast or run.*

Unlike their physical disadvantage, some female respondents viewed women's exposure to and vulnerability to life-threatening hazards from different perspectives. For this, they emphasized women's roles and responsibilities as a mother. One woman in Jhayawa village of Simjung; Santi Maya Sarkini said: *Women cannot leave their children behind. They try to protect the children by all means. But men tend to be selfish and just run away by themselves.*

Similarly, a woman from same village; Satidevi said: *Women are usually more attached to their children than men. Men are free from such attachment, so they can leave their houses immediately. But women are worried about children, houses, and livestock. So, women cannot take as quick action as men can.*

## **6.2 Capacity to adapt and gender relation**

Gender was a key factor to determine the unequal distribution of power and resources and adaptive capacity at all the levels. Men and women even within the same household responded to climate variability differentially. Due to gender roles and responsibilities, available income sources for uneducated poor women, in particular, were limited to agriculture if there was no intervention from external organizations.

More importantly, the unequal gender relations affect who controls income and resources at the household and community levels and consequently adaptive capacity at the individual level. Men's income was not necessarily used for family needs or saved for future climatic or economic crises.

It was unwise for those poor women to depend on men financially and to challenge their husbands due to the risk of physical violence by their husbands. A lack of reliable income and physical security caused their anxiety and vulnerability.

Unequal gender relations, one of the key causes of women's limited adaptations, were not fixed, but could be improved by supports from external organizations and could be worsened by unavoidable external forces, such as social, economic, and political events or changes. The environmental and economic degradation in study area, followed by climate variability, had changed pre-existing gender relations.

Most of the broken drinking water system remained un-repaired due to financial difficulty while the broken canals (*Kulo*) were mainly re-constructed with means manual labor. As a result, a lack of sufficient drinking water system nearby had disproportionately affected the women and children who mainly took responsibility to fetch water. The impacts of past floods and landslides on access to drinking water were equal for men and women within the same household. However, the women who played a main role in fetching water had to bear more time and labor than men.

## CHAPTER-VII: ADAPTIVE PRACTICES AGAINST CLIMATIC HAZARDS

### 7.1 Adaptation practices after increasing rainfall and snow

Majority of the people (IRR 1) practiced to plant crops earlier followed by change crops (IRR 0.20), did nothing (IRR 0.20), plants crops later (IRR 0.12), use more fertiliser or pesticides (IRR 0.08), shift to other IGAs (IRR 0.08) and others (IRR 0.08) in the area. These were some of the coping strategies which were adapted by the community in the area for fighting against seen climate change reactions, stated in above table.

**Table 15: Adapted coping strategy regarding increased the amount of winter rain/snow**

Strategies	IRR value	(Response %)
Plant crops earlier	1.00	56.8
Change crops	0.20	11.4
Did nothing	0.20	11.4
Plant crops later	0.12	6.8
Use more fertiliser and/or pesticides	0.08	4.5
Shift to other IGAs	0.08	4.5
Others	0.08	4.5

Source: Field Survey, 2015

### 7.2 Adaptation practices after decreasing rainfall and snow

For adapting against the impact led by the decreased the amount of winter rain/snow, majority of the respondents (35.9%) reported that they did not do anything. While, according to the IRR value, adapted coping strategies in the area were plant crops earlier (IRR 0.57) followed by plants crops later (IRR 0.43), change crops (IRR 0.36), others (IRR 0.29) and use more fertilizer and pesticides (IRR 0.14).

**Table 16: Adapted coping strategy regarding decrease the amount of winter rain/snow**

Strategies	IRR value	(Response %)
Did nothing	1.00	35.9
Plant crops earlier	0.57	20.5
Plant crops later	0.43	15.4
Change crops	0.36	12.8
Others	0.29	10.3
Use more fertiliser and/or pesticides	0.14	5.1

Source: Field Survey, 2015

### 7.3 Adaptation practices while winter rain/snow falls at a more inconvenient time

Rain/snow has occurred in unexpected time which was not convenient for the community farmers. These have been conflicting with the knowledge and seasonal calendar/schedule made by the community from many years ago. This conflict forces them to adapt or change their traditional schedule in their professions. 20% each responses reported by the respondents that they have changed their farming practices like plant crops later, change crops and others which were differ from the previous practices. 13.3% respondents has practiced to cultivate plants earlier and same percent of the respondents did nothing against “winter rain/snow falls at a inconvenient time” whereas 6.7% each of the responses were made i.e. winter rain/snow falls at a inconvenient time forced them to adapt new practices in the area like; irrigate the crops and shift to other IGAs.

**Table 17: Adapted coping strategy on the winter rain/snow falls at a more inconvenient time**

Strategies	IRR value	(Response %)
Plant crops later	1.00	20.0
Change crops	1.00	20.0
Others	1.00	20.0
Plant crops earlier	0.67	13.3
Did nothing	0.67	13.3
Irrigate crops	0.33	6.7
Shift to other IGAs	0.33	6.7

Source: Field Survey, 2015

### 7.4 Adaptation practices after seasonally fluctuation of rainfall and snow

According to the value made in the Index of Relative Ranking, Simjung people have been adapted coping strategies against amount of winter rain/snow is more variable in the area were plant crops earlier (1.00) followed by use more fertiliser and/or pesticides (0.82), change crops (0.64) and plant crops later (0.55).

**Table 18: Adapted coping strategy on the amount of winter rain/ snow is more variable**

Strategies	IRR value	(Response %)
Plant crops earlier	1.00	33.3
Use more fertiliser and/or pesticides	0.82	27.3
Change crops	0.64	21.2
Plant crops later	0.55	18.2



## **7.5 Changing adaptive capacity with internal intervention**

The adaptive capacity of socially-disadvantaged people was not necessarily fixed as imagined or stereotyped. The adaptive capacity of poor and marginalized people was improved by their own newly-gained experiences, but also external interventions, such as local/international NGOs' financial and technical supports. Unlike men who had mobility, many of the uneducated women who stayed at home had no access to technical information on disaster management until they were provided information by grassroots-based NGOs or by individual female teacher.

Regardless of educational levels, those participants gained new knowledge and technology through external interventions. Technical and financial supports from organizations at the grassroots level improved the adaptive capacity of poor and uneducated people. But that was not adequate to adapt the shocks experienced by them, one woman said.

Due to differences in socio-economic backgrounds, respondents responded to intensified natural disasters and unpredictable rainfall patterns differently. Some poor women felt "powerless" and expressed passive attitudes to the changes while many poor men had diversified their income sources by engaging in wage labor work or migrating to cities.

Actual adaptive capacity of women and other socially-disadvantaged people was not necessarily fixed as imagined or stereotyped. Human vulnerability and adaptive capacity could be improved with changes at the individual, household, or local level in terms of accessibility to information, technologies, financial resources, and networks which were often supported by external organizations.

Ability to diversify household income sources and increase the income varied with gender, economic strata and ethnicity. Lower caste, low educational levels, or limited productive resources, including land and animals, constrained many respondents from making such adaptations.

Women took more responsibilities at home in rebuilding their livelihoods and preparing for future crises, especially when men migrated abroad or engaged in wage labor work.

According to participants in FGD (workshops), men’s migration was accelerated by the serious losses and damages of agricultural land from climatic hazards.

### 7.6 Information obtained about climate, climate change and its use for coping

According to the village meeting, it was explored that there were various sources of information on climate change and its impacts along the coping strategies in the village but people were not so aware to channel to get information and their using trend of obtained information was very less.

**Table 19: Information sources available to respondents**

Information source	Share of information obtained (%)	Response in information used for planning of own work (%)	
		Yes	No
Media	25.8	24.56	75.44
Education	10.3	61.90	38.10
Family	7.2	73.30	26.70
Friends	9.4	36.84	63.16
Own observations/feel	31.6	56.41	43.59
Meteorological station	1.0	33.33	66.67
NGOs	0.5	0.00	100
Outside experts	1.0	66.67	33.33
Villagers	13.2	89.29	10.71

Source: Field Survey, 2015

In household survey, people were not aware to obtain that information for using to cope up the future climatic hazards. 31.6% information regarding the climate change and its impacts were obtained from own observation by Simjung’s people where majority of the respondents reported that they have used these information to prepare/cope in case of climate variability or hazards in the area.

## CHAPTER-VIII: SUMMARY, MAIN FINDINGS AND CONCLUSION

### 8.1 Summary

More or less most of the Simjung people agree that climate change is a major factor that is responsible to shocks in the community. People perceived rain/snow in winter has more variable (more fluctuate) in the area where the change was observed by the community from last 10 years. Due to this change, crop yield was remarkably declined in the area. People of the Simjung have adapted this change by planting the crops earlier and later according to the crops in the field with changing the crops type. People were also suffered from human as well as animal disease in the area due to the variability in rain and snow fall in the winter. For coping to the disease brought in the area by climate change, people starts to use pesticides and more fertilizer in the crops field and also spend savings for medicine.

The amount of the monsoon rains has decreased and the start of the rain is unpredictable in the study area. While considering the monsoon rain now as compared to last 30 years, the amount of monsoon rains has decreased which was observed from last 20 years and the start of the rains was not predicted from last 10 years. This climate variability play important role for declining the crop yield, increasing the landslides and in some extent increase in crop yields in the village. For coping the shocks led by the monsoon rains and its variability, people adapts by shifting the planting time. Some of the victims shifted their primary occupation to other income generating activities. According to result of analysing statistical data of rainfall in the region, rainfall of the area is in decreasing in trends and nature as well as extent of change was not same. These rainfall data supports to the people's perception and experiencing shocks by them in different time period.

General temperature in summer and winter has increased in the area in which most of the people experienced it from last 10 years. Some of the major shocks, due to the increase in summer temperature, experienced by the people of the area are- decline in crop yield, increase human disease and increase land slides in the village. In lesser extent in wet lands (wet field), crops yields have also increased due to the increase of summer temperature in the region. Mostly people of the village start to plant crop earlier, use more fertilizer and pesticides as coping strategies in that extreme situation. Local people's perception and shocks to them brought by increase in temperature in the area appear to be accordance with the statistical record in the region.

## **8.2 Main findings**

The key findings have theoretical implications for addressing human vulnerability and adaptation to climate change. First, human vulnerability to climatic and environmental changes is changeable, interacting with socioeconomic and political events, across levels and over time. As a political economy perspective emphasizes, human vulnerability is affected by the environmental degradation which is going-on at the local level, but also the social, economic, and political events and processes which take place at national and global levels. Unlike the concept of Pressure and Release (PAR), human vulnerability is not necessarily isolated from, but rather interacts with environmental hazards. The study findings allege that the processes of climate adaptations can include the element of activism for gender equality because women take responsibilities for not only reproductive work, such as house chores, but also productive work, such as agriculture, animal husbandry, and other income generating activities. Due to unequal gender relations, their responsibilities and roles are often overlooked or taken for granted. As many respondents in the research sites witnessed, environmental hazards, such as landslides, are caused by not only heavy rain, but also the human acts of over-deforestation and grazing. As natural resources decreased, poor women farmers who were left alone due to their husbands' migration particularly experienced more pressure from the decreased resources due to their responsibility and dependence on them, which increased environmental hazards and their vulnerability. Thus, human vulnerability is affected by human interactions with social, economic, political, and environmental events and processes across levels and time.

## **8.3 Conclusion**

Risk and vulnerability to climate variability and change are not entirely shaped by economic poverty. As a political economy perspective emphasizes, those who have power can successfully adapt to climate change due to their sufficient wealth and resources while the powerless cannot. As feminist political ecology approach suggests, the processes of climate adaptations can include the element of activism for gender equality. Women are accountable for not only reproductive work, such as house chores, but also productive work, such as agriculture, animal husbandry, and other income generating activities. However due to unequal gender relations, their responsibilities and roles are often overlooked or taken for granted. As a result, many women are excluded from the adaptation processes in which they could

collectively play role as actors. With appropriate supports from external organizations, women can utilize adaptation as good opportunities to transform the existing unequal gender relations.

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## ANNEX-1 Questionnaire for Key Informant Interviews

### General information of key informants

- What is your organization's name and position?
- What kinds of responsibilities do you take for this community?

### Local risks

- How do you view local climatic change over time in terms of rainfall patterns, temperature, water availability, and natural disasters, such as floods and droughts?
- How do local people perceive the risk of climate variability? Why do you think they perceive so?
- How has such climatic change impacted on the livelihoods and food security and health conditions of local people?
- In addition to climatic risk, are there any socioeconomic or political problems faced by local people? If so, what problems are they?
- How have these problems interacted with the change in rainfall patterns, temperature, water availability, and natural disasters and affected the livelihoods and food security of local people?
- What are the government's and local authority's responses to such climatic change? How do you assess the local government and local authority's responses?

### Vulnerability and adaptive capacity

- Who do you think are most seriously affected by such climatic change? Why do you think so?
- How do you think about differences between men and women and among different caste and ethnic groups of people in the negative impacts of the change and capacity to cope with them? If there are differences, what do you think such differences stem from?

### Adaptation practices

- What kinds of agricultural extension services and training programs available for local people so that they can successfully adapt to change in rainfall patterns, water availability, and natural disasters? If so, who provides the services and programs?
- How is information on the extension services and training programs disseminated to local people and who has an opportunity to take the services and training?
- What types of agricultural and other practices have local farmers used in order to minimize potential damages/losses caused by changing rainfall patterns and temperature, decreasing water availability, and increasing natural disasters?

- Change in agricultural practices in terms of technology/skills, inputs (fertilizer and seeds), crop species, crop patterns, etc.:
- Change in livestock types:
- Protection of human and animal lives and assets:
- How do you think such practices are effective or not? Why do you think so?
- How do you think local people have learned the ways for such practices?
- Do you think men and women farmers employ different types of practices/measures to cope with changing rainfall patterns, decreasing water availability, and increasing natural disasters? If there are differences, what do you think such differences stem from?

## **ANNEX 2- Check list for FGD**

Have you experienced any natural disasters, such as floods and landslides, for the last 5 to 10 years? Talk about your experience.

- When
- How you coped with them
- Impacts on the environment and your livelihoods (agriculture/non-farm activities)
- Lesson learnt

Do you perceive any change in local climate and environment for the last 5 to 10 years? Talk about the change you perceive.

- Intensity and frequency of natural disasters
- Rainfall patterns for monsoon and winter seasons
- Temperature
- Availability of natural resources (water, forest products, etc.)

Have you ever heard about climate change? How did you know about it? Talk about what you know and what you think about it?

What are possible impacts of changing climate (e.g. rising temperature, fluctuated rainfall patterns, etc.) or natural disasters on your life and livelihood?

- Agriculture/animal husbandry
- Non-farm activities/migration
- natural resources and environmental conditions
- Responsibilities in a household and community

- How would you like to change your life if floods or landslides become frequent and intense?
- Have you ever taken action for changing climate, scarce natural resources, and intensified natural disasters in order to prevent such impacts? Talk about your strategies?
  - What you have done
  - How effective or not effective
  - Needs
- Do you think that all community members share the same level of risks of natural disasters and changing climate? Why do you think so?
  - Differences between men and women
  - Differences between different caste/social groups
  - Differences among different age groups
  - Differences among people live in different locations
- Who do you think is the most vulnerable to natural disasters and changing climate?
  - Why
  - Key factors to determine their lower capacity to cope with natural disasters
- Are there any differences in roles/responsibilities for preventing severe losses/damages from natural disasters between men and women or between the elderly and youth? Discuss differences.
- Do you think that the government, VDC, and NGOs responsible for protecting your life and livelihoods from natural disasters and changing climate? Talk about their roles and responsibilities.

### ANNEX-3: Interview schedule

Date: \_\_\_\_\_ Tole: \_\_\_\_\_ Enumerator Name: \_\_\_\_\_  
 Code: \_\_\_\_\_

Respondent strata: 1. Rich[ ] 2. Medium[ ] 3. Poor[ ], Sex- M[ ], F[ ]

1. Age of the respondent: .....Yrs
2. Education of respondent: 1. Illiterate[ ], 2. Primary[ ], 3. Secondary[ ], 4. College degree[ ]
3. Family size:.....No

#### A. CLIMATE

1. Winter rain/snow					
a) Considering the winter rain/snow now as compared to earlier, do you find that: ( <i>tick</i> )		b) When did you start to perceive the change? ( <i>year</i> )	C <sup>1</sup> ) What is the impact of this change?	D <sup>2</sup> ) What do you do in reaction to the change?	E <sup>3</sup> ) What do you think is the reason for the change?
	1 Yes 2 No 3DK				
The amount of winter rain/snow has increased					
The amount of winter rain/snow has decreased					
The winter rain/snow falls at a more inconvenient time					
The winter rain/snow has not changed					
The amount of winter rain/snow is more variable					

<sup>1</sup> 1: crop yield decline,2: crop yield increase,3: more landslides,4. less landslides,5: less human disease,6: more human disease,7: more animal disease,8: less animal disease,9: no impact,10: emotional/psychological impact – specify

<sup>2</sup> 1: plant crops earlier,2: plant crops later,3: irrigate crops,4: change crops,5: use more fertiliser and/or pesticides,6: shift to other income generating activities,7: Did nothing, 8:other, specify

<sup>3</sup> 1: normal weather cycle,2: climate change,3: pollution by factories,4: pollution by local peoples' use of pesticides,5: divine control,6: other, specify



<b>2. Monsoon rain</b>					
a) Considering the monsoon rain now as compared to earlier, do you find that: ( <i>tick</i> )		b) When did you start to perceive the change? ( <i>year</i> )	C) What is the impact of this change?	D) What do you do in reaction to the change?	E) What do you think is the reason for the change?
	1 Yes 2 No 3DK				
The monsoon rains start earlier					
The monsoon rains start later					
The start of the monsoon rains is unpredictable					
The amount of monsoon rains has increased					
The amount of monsoon rains has decreased					
The amount of monsoon rains is unpredictable					

<b>3. Temperatures</b>					
a) Considering the temperatures now as compared to earlier, do you find that: ( <i>tick</i> )		b) When did you start to perceive the change? ( <i>year</i> )	C) What is the impact of this change?	D) What do you do in reaction to the change?	E) What do you think is the reason for the change?
	1 Yes 2 No 3DK				
Summer temperatures generally have increased					
Summer temperature generally have decreased					
The general trend is unchanged but here are greater extremes in summer temperatures					
Winter temperatures generally have increased					
Winter temperatures generally have decreased					
The general trend is unchanged but here are greater extremes in winter temperatures					

## B. SOURCE OF CLIMATE CHANGE INFORMATION

1. Where do you get information about climate and climate change and how to prepare/cope in case of climate variability or extremes?

Information source	Information received (tick)	Information used for planning of own work (yes/no)
Media		
Education		
Family		
Friends		
Own observations		
Meteorological station		
NGOs		
Outside experts		
Villagers		

## C. SHOCKS AND COPING STRATEGIES

1. When did the HH experience the following shocks, what caused them, what was done to cope with them and how severe were the shocks?

Shocks	30 yrs ago			20 yrs ago			10 yrs ago and now		
	1 Y 2 N	Cause <sup>4</sup>	Coping <sup>5</sup>	1 Y 2 N	Cause	Coping	1 Y 2 N	Cause	Coping
<b>a. Unexpected/unusual shortage or loss in crop output</b>									
<b>b. Unexpected/unusual shortage or loss in livestock output</b>									
<b>c. Unexpected/unusual shortage or loss of HH labour</b>									
<b>d. Unexpected loss of cash/unusual damage to house and capital assets</b>									

4 1= drought, 2= too much rain and land slides, 3= pest and diseases, 4 = frost and hailstorm (abnormal precipitation), 5= least human labour due to out migration due to CC impact, 6= affect WL habitat due to CC impact, 7= death of HH member due to CC impact, 8= disabling a HH member due to accident/disaster, 9= Spreading out disease due to CC, 10= others

5 1: spent savings, 2: sold assets, 3: sold forest products, 4: did more wage labour, 5: Reduce consumption, 6: take loan from money lenders, 7: take loan from bank/cooperatives, 8: Take assistance from relatives GoN/CBOs/ NGOs 9: did nothing

#### D. PERCEPTION ON CLIMATE CHANGE

1. Pls rate your opinion as agree (1), neutral (2) and disagree (3) on the following statements:

Statement no	Statements	Perception (1to 3)
1	Received CC related information are adequate and supportive	
2	Loan for coping climatic hazards have taken easily	
3	Donation received were adequate and supportive for coping climatic hazards	
4	Technical know-how obtained were fruitful for coping climatic hazards	
5	Received overall support from community or institutions were adequate and satisfactory	

#### ANNEX-4: General climate change in Simjung village

Table 20: Simjung people experience general change in climate (Summary of village workshop)

Impacts of CC	30 years ago	20 years ago	10 years and now
Floods	+	++	+++
Drought	+	++	+++
Hail	++	+++	++
Wind	++	++	+++
Rain/snow	+++	++	++
Fire	+	++	+++
Mosquitoes	0	0	+
Leeches	++	+++	+++
Other insect	++	++	++
Terrestrial snails	+++	+++	+
Temperature	+	+	++
Animal diseases	+++	+++	++ (veterinary facility)
Human disease	+++ (diarrhea)	++	+++ (viral, water born, skin)

[Note: 0 not in the village, + Low extent, ++ Medium extent, +++ high extent]

## ANNEX-5: General change in Simjung village

Table 21: Simjung people experience general change in the village (Summary of village workshop)

Gen. changes	30 years ago	20 years ago	10 years and now
Drinking water quality	+	++	+++
Drinking water availability	+	+	++
Electricity	0	+	+++
Biogas	0	+	0
Fuel (cooking & heating)	+++ (firewood)	++ (firewood)	+(firewood)
Irrigation (cemented canal)	0	0	0
Vegetable farming	+	++	+
Agricultural inputs (cost)	+	++	+++
Tourism	0	+(trekking)	++ (trekking)
Ploughing	+++ (wooden)	+++ (wooden)	++ (wooden)
Pests	+++	+++	++ (pesticide)
Crops harvest	++	++	+
Food sufficiency	+(30%)	++ (50%)	++ (50%)
Livestock no.	+++	++	+
Toilet	0	0	++
Health treatment	0	+(medical)	++ (health post)
Grazing extent	+++	++	+
Jobs	+++ (army)	++	+++ (other than army)
Business	+	+	++
Beekeeping	0	+	+
Shared labour	+++	++	+
Forest products	+++	++	+
Wages (resource)	+++	++	+(out migration for remit)
Main problems	+++ (money stolen, no electricity)	++ (do)	+(do)
Positive changes	+++ (social harmony)	++	++

[Note: 0 not in the village, + Low extent, ++ Medium extent, +++ high extent]

## ANNEX-6: Indicators of wealth strata of people residing Simjung

Table 22: Community made indicators of wealth strata of people residing Simjung

	30 yrs	20 yrs	10 yrs	Now
<b>Rich</b>				
Land	Productive 10 hal	Productive 8 hal, fallow 2 hal	Productive 2 hal, fallow 8 hal	More or less fallow 10 hal
Livestock	<200 goats	150 goats	100 goats	20-50 goats
House	Stone roof	Stone roof	Stone roof with pillar	RCC roof
Transport	Horse	Horse	Motorbike	Truck/tractor/motorbike
Education	Primary	Primary	SLC (half of the member)	Degree from KTM (one of the member)
Job (income source)	British army	British army	British pension, Who went to other than golf country for remit	Who went to other than golf country for remit
<b>Poor</b>				
Land	Nil	Productive 5 hal	Productive 2 hal	Rented in land
Livestock	Nil	Nil	Nil	4-5 hens
House	Planks/straw roof	Planks/straw roof	Stone+straw roof	Stone+straw+tin roof
Transport	No	No	No	No
Education	Nil	Nil	Primary (two member)	SLC (two member)
Job (income source)	Wage in vllage (grains as payment)	Wage in vllage (grains as payment)	Wage in village (cash as payment)	Wage in village+go for wage to other village of districts or India
<b>Middle stratum (if no time enough in discussion, not need to ask)</b>				
Land	Productive 5 hal	Productive 5 hal	Productive 4 hal, fallow 1 hal	Productive 2 hal, fallow 1 hal
Livestock	50 goats	20 goats	5 goats	2 goats, 5 hens
House	Stone/planks roof	Stone/planks roof	Stone roof with pillar	Stone+tin+RCC roof
Transport	No	No	No	Motorbike
Education	Primary	Primary	SLC (three members)	College (three members)
Job (income source)	Gorkha army, farming	Gorkha army, farming	Gorkha pension, who went to golf country for remit	Gorkha pension, who went to golf country for remit, service (teacher in village)

Note: *hal* is local unit describing land area (1 *hal* equals 172 m<sup>2</sup>)