WOMEN'S LIVED EXPERIENCE OF CLIMATE CHANGE AND THEIR COPING STRATEGIES: A STUDY OF WOMEN IN NUWAKOT DISTRICT

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DECLARATION

I hereby declare that this dissertation has not been submitted for candidature for any other degree.

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DEDICATION

This dissertation is dedicated to my research participants who are living with the challenges of climate change.

AN ABSTRACT OF THE DISSERTATION OF

Bhawani Thapaliya for the degree of *Master of Education in Environment Education and Sustainable Development* presented on July 14, 2013.

Title: *Women's Lived Experience of Climate Change and their Coping Strategies: A Study of Women in Nuwakot District*

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This study attempts to bring forth women's lived experience of climate change and their meaning making process about it. Principally, it explores the contextual determinants and dimensions of women's understanding of, and response to, climate change. The study has employed qualitative approaches in order to give an insight into how women construct discourses of understanding climate change and their actions against it. Furthermore, it tries to answer the questions; who is more vulnerable and why, what are the local and institutional coping mechanisms, and what are the constraints that exacerbate vulnerability. The study uses un-structured interview as a tool to garner data from the local level.

The analysis suggests that the impact of climate change is ubiquitous including climate variability, rainfall pattern, plant phenology etc. Precipitation is becoming unpredictable and more erratic. Similarly, women were experiencing an increment in temperature. Although women in the study area have been observing these changes for years, they have little understanding of the anthropogenic causes of

these changes. Their observations and interpretations of the situation largely corroborate the divinity.

The study further reveals that the impact of climate change is felt in agriculture, livestock rearing and water resources. Amongst its impact, agriculture is one of the sectors most vulnerable. Many of the local varieties of agro-biodiversity, livestock have already been extinct and some are in the threshold of extinction. The trend of using chemicals, pesticides and outsourced seed varieties to suffice the production was prevalent in the study area. Indeed, input on agriculture was high whereas its output was negligible. This has further weakened their economy.

Climate change and climate impacts are not gender neutral. The impact is even stronger on those women who totally rely on agriculture for the daily subsistence, and where adaptive capacity is low. Furthermore, socially constructed roles and responsibilities of women and their less access to decision making process makes them more susceptible to climate change impacts than men. As, migration has emerged as a cross cutting issues of climate change, it has further increased women's vulnerability because of being overburdened by triple roles, i.e. production, reproduction and household chores.

As coping strategies, mainly mitigation and adaptation have emerged in the arena of climate change. In adapting to climate change women cultivate varieties of crops which are drought tolerant. Additionally, they have replaced local livestock varieties with hybrid ones and similarly, the livelihoods have been diversified towards off-farm activities. Moreover, visions and potential solutions, and also support for the strong policy diversify their livelihood due to the low production from their agricultural land. The result shows that the existing local and institutional strategies

are not sufficient and sustainable to cope with climatic vagaries. Therefore, it is crucial to increase the understanding of the actual climate change dynamics in the societies at the lower levels.

Keywords: Climate change, vulnerability, coping mechanism; mitigation, adaptation

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ACRONYMS

CEDAW	United Nations Convention on the Elimination of All Forms of Discrimination against Women
CoP	Meeting of the Parties
EPH	Environment Population and Health
GCM	General Circulation Model
GDP	Gross domestic product
GLOF	Glacial Lake Outburst Floods
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Nature Conservation
LFP	Livelihood and Forestry Program
MoPE	The Ministry of Population and Environment
NAPA	The National Adaptation Programe of Action
PAN	Practical Action Nepal
NCSAP	National Capacity Self Assessment Project
PPCR	Pilot Programe for Climate Resilience
SRES	Special Report on Emission Scenarios'
UNFCCC	United Nations Framework Convention on Climate Change
UNIFEM	United Nations Development Fund for Women
VDCs	Village Development Committees
WEDO	Women's Environment and Development Organization

CHAPTER I

BACKGROUND

In 2005, there was no rain for almost the whole year in my home town Bidur which is located in Nuwakot district. The situation was difficult to explain because people's cultivation was largely dependent on rain water based irrigation. There was chaos in the whole area, people were anxious. Finally, a day came when people decided to conduct Sansari Puja*. It is a ritual where people sacrifice goats to god Indra so that he will pour the water. This kind of ritual is basically conducted when there is prolonged drought. Celebration on that day transformed the shabby village, at least for a day. People came in new dresses, if not, then at least in clean dresses. They were praying and were participating wisely during the ritual.*

After a few days of ritual, the rain still didn't materialize. But there was a hope in farmers that god Indra will do justice to them whereas some youth were ridiculing them. Miraculously, after two weeks it rained for a few hours. People were very happy realizing the grace of god.

At that time I was both happy and amazed. Happy - because it rained and amazed - because it rained after people offered goats to god. Today after seven years I am a student of environment education in Kathmandu University. Now I have my own standpoint of making meaning out of such cultural practice which is deeply rooted in peoples' mind. I feel like compiling the lived experience of people especially women residing in Nuwakot district regarding climate change.

Introduction

Over the past decade, climate change has become a prominent issue in public, government and media discourse. United Nations Framework Convention on Climate Change (UNFCCC) (1992) defined climate change as "a change of climate which is attributed directly or indirectly due to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." It is an environmental change of any scale that spontaneously changes the functions of local systems and affects the earth system. Lately, it has become one of the most burning issues in global scenario threatening the life on earth. The reports of Intergovernmental Panel on Climate Change, the scholarly studies of scientific society, and tangible evidences indicate that climate change effects are already being observed in every corner of the world.

The climate change can have wide ranging, often unanticipated, effects on the environment and on socio-economic and development related sectors, including agriculture and food security, biodiversity, water resources, energy, human health, urban settlement, terrestrial and aquatic ecosystems (World Food Program [WFP], 2009). Hence, precautionary and prompt actions are necessary to address its impending threats (Intergovernmental Panel on Climate Change [IPCC], 2001). To understand climate change and its variation, it is essential to assess the climate's sensitivity to the variety of factors, both the human and natural. However, there is more general information available on climate change and its impacts. The information lacks at local and specific level regarding the extent and pattern of change in precipitation and temperature, the locations of high or low trend, and pattern of climate variables. Indeed, this information is essential for implementing effective

measures to help the poor communities to cope and adapt to impacts of climate change (Practical Action Nepal [PAN], 2010).

Nepal is also not untouched by the impact of climate change. People are observing the changes in rainfall pattern where monsoon tends to begin later and is more irregular resulting frequent flash floods whereas winter rain is reduced. Additionally, they are noticing hotter summer days and less cold winters (Government of Nepal [GON], 2004). Similarly, Mountain communities are receiving less snowfall and retreating of glaciers. In the mid-hills water sources are drying up and in the plain people report greater flooding and unexpected cold waves (Gurung & Bhandari, 2008).

All these changes tend to contribute to reduce agricultural productivity resulting in either increased prices or food shortages. While other impacts of climate change include increased forest fires due to the extended dry period, and increase pest and diseases of crops, livestock and human population (Livelihood and Forestry Program [LFP], 2009). Thus, the unparalleled impacts of climate change extended to effects on ecosystem, health, food production, water resources, agriculture and livelihood (IPCC, 2001). With developing countries like Nepal on the frontline, climate change puts an extra burden on the existing social and economic challenges that they already face (UNFCCC, 2007).

The report further states that the main cause of climate change is global warming which is increased due to different types of human activities that are helping in emission of greenhouse gases. Although Nepal has negligible share in global emission of greenhouse gases, it is particularly vulnerable to climate change due to its fragile mountain ecosystem. The warming trend that has been observed in Nepal is

higher than the global average. The rates of increasing temperature differ from place to place but in general, larger in higher altitude compared to low land. The recent analysis s of temperature of Nepal shows high inter-annual variability, and maximum temperature progressively increasing in line with global and regional records (National Capacity Self Assessment Program[NCSAP], 2008, as cited in Asian Development Bank [ADB], 2009). Over the last twenty-five years, the temperature in Nepal has been increasing at the rate of 0.06° Celsius per year (GoN, 2008). Furthermore, it is projected to increase by another 1.2° Celsius by 2030, 1.7° Celsius by 2050 (ADB, 2009). Precipitation is also becoming unpredictable and more erratic than ever, with more droughts and shorter periods of heavy rainfall (Shrestha et al., 2000).

In order to address the possible climate change impacts, adaptation and mitigation practices should be emphasized. As such, in Nepal, rural communities are adapting through their local knowledge and persistent practices to cope with its adverse impacts. In this regard, many families are migrating to cities or sending their male members aboard for employment. Migrating men contribute little to family roles and a responsibility thereby increasing the workload of those left behind, often women, who become de facto heads of households and must take on men's farming roles in addition to their existing agricultural and domestic responsibilities (Bridge, 2008).

Thus, the report further states that rural women in developing countries are still largely responsible for securing food, water, and energy for cooking and heating. On the contrary, drought, deforestation, and erratic rainfall cause women to work harder to secure these resources. Women, therefore, have less time to earn income, get

an education, or provide care to families. This often has a negative impact on family and social cohesion which in turn may make them less able to cope with the effects of climate change. Therefore, women are more vulnerable to climate change.

Study shows that women are not only the victims of climate change but they can be key agents of adaptation to climate change. They are best poised to curb the effects of climate change. Women generally possess a strong body of knowledge and expertise regarding their surroundings that have accumulated over time through their active involvement in resource management that can be used in climate change mitigation, disaster risk reduction and adaptation strategies. Additionally, their responsibilities in households, communities and as stewards of natural resources position them well to develop strategies for adapting to changing environmental realities (Women's Environment and Development Organization [WEDO], 2007). Thus, despite being affected most by climate change, women's role in adaptation and mitigation is praiseworthy.

In the context of Nepal too, women are playing a prominent role to adapt to the current changes in the climate. Adaptation can be defined as "adjustment in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects or impacts" (Smith et al., 1993). It is mainly about warning people about certain events in advance and preparing them to deal with vulnerability and uncertainty (Chaudhary & Aryal, 2009). Adaptation to climate change has received increased attention in the scientific and policy debate, and is seen as complementary to mitigation (UNFCCC, 2007; Mccarthy et al., 2001). Hence, in order to explore Nepalese women's understanding and experience on climate change

and how they were combating with it, this study was conducted in Bidur Municipality- ward number 1 of Nuwakot district.

Statement of the Problem

Climate change and climate impacts are not gender neutral. The effects of climate change vary among regions, and between different generations, income groups and occupation and even between women and men as well (United Nations [UN], 2009). It is now widely acknowledged that "the impacts will be felt more acutely by those with least adaptive capacity: poor countries and the poor in developing countries" (Lambrou & Piana, 2006). Basically developing countries and women living in poverty are likely to experience significant impacts of climate change due to their lower adaptive capacities (United Nations Environmental Programme [UNEP], 2008). In the developing countries women are heavily engaged in resource-dependent activities such as agriculture, forest management, etc. As climate variability directly affects natural resource bases and thereby resource dependent activities, therefore women are likely to be impacted disproportionately due to their overwhelming dependency and low technical knowledge to adapt to abrupt situation (Schild, 2010).

If we overview the composition of women, about one-third of all households worldwide are headed by them, and the percentage is increasing (Dankelman & Davidson, 1988). Nepal remains one of the poorest countries in the world with a poverty incidence of 38% (ADB, 2009) and Nepalese women are considered poor of the poorest. These largest percentages (70%) of the poor women are facing gender inequalities in the context of access to land resources, credit and training; limited participation in decision-making processes etc. This, in turn, exacerbates many of the

consequences of climate change (Masika, 2002). For instance, reduced in agricultural production puts pressure on women, as women are the main producers of food in many regions of our country. According to the report of United Nations Development Fund for Women (UNIFEM, 2007), in South Asian countries, women provide 70 % of agricultural labor and produce over 90 % of food. This means that changes in ecosystems and loss of diversity are leading to reduced agricultural output; and increased food insecurity is bringing greater problems to women as food producers. Apparently, women are more vulnerable to climate disasters than men through their socially constructed roles and responsibilities, and their relatively poorer and more economically vulnerable position. The latest IPCC report (2007) also recognizes women as one of the most vulnerable groups from the climate change impacts.

Study shows that women are not only the victims of climate change but they can be key agents of adaptation to climate change. They are best poised to curb the effects of climate change. Women generally possess a strong body of knowledge and expertise regarding their surroundings that have accumulated over time through their active involvement in resource management that can be used in climate change mitigation, disaster risk reduction and adaptation strategies. Additionally, their responsibilities in households, communities and as stewards of natural resources position them well to develop strategies for adapting to changing environmental realities (WEDO, 2007). Thus, despite being affected most by climate change, women's role in adaptation and mitigation is praiseworthy.

In this connection, Nepalese women are playing an important role in maintaining households and communities and in managing natural resources. Additionally, they are responsible for mitigation and adaptation. However, their role

is seldom recognized, and their perspectives, needs, and interests are not properly taken into account in development and environmental policies and strategies. Furthermore, their coping mechanism is not sufficient enough to address ongoing climate change impacts. So, it is imperative to carry out this study unfolding Nepalese women's experiences regarding climate change events, their awareness and the adaptive measures that they were practicing in their day to day life both autonomously and in a planned way.

Purpose of the Study

The purpose of my study is to explore women's meaning of climate change and their actions towards coping with the problem of change.

Specific Research Questions

To meet the purpose of the study, I have set the following specific research questions:

1. How do women understand the notion of climate change and make meaning of it?
2. How are women experiencing climate change events within these couple of years?
3. How have they prepared coping mechanism (intentionally or unintentionally) to deal with climate change events?

Rationale of the Study

Most of the researches on climate change are focused on technical concerns. There is more general information available on climate change and its impacts based on scientific studies creating a gap on social perspectives of climate change. Furthermore, insufficient exploration, information and evidence on the gender-differentiated nature of climate change impacts exist particularly at the local level.

Additionally, the impacts imposed by climate change on women and their role in identifying its solution are often overlooked.

They also fail to draw on the knowledge and expertise of women– particularly those located in poor, rural areas. Indeed that knowledge is extremely valuable for developing appropriate and effective responses. Since my study is based on understanding the phenomenon of climate change from the perspective of the women, it is an attempt to incorporate social dimension of climate change which scaled out the local level information. Indeed, this information is essential for implementing effective measures to help the poor communities to cope and adapt to the impacts of climate change (PAN, 2009). In this regard, my study would be fruitful for non-science scholars and researchers to have a clear understanding of climate change and its adaptive measures at the local level.

Delimitations of the Study

The study was confined only to the women living within ward number 1 of Bidur Municipality of Nuwakot district. The uniqueness of the study within a specific context makes it difficult to replicate exactly in another context (Creswell, 2003). Concurring his views, the experience of my participants on climate change was contextual. So, the outcomes could not be generalized.

The study explored only a lived experience of women regarding climate change and their coping mechanism. Thus, it provided only one perspective of gender, i.e. women.

Organization of the Report

The study has been divided into six distinguished chapter. In Chapter I, I described the context in which this research had evolved. Furthermore, I have outlined

general background, statement of the problem, purpose and delimitations of the study in the very chapter. Similarly, in Chapter II, I reviewed the literatures that were relevant to climate change followed by global and Nepali context of climate change, gendered impacts of climate change, and more particularly women's vulnerability to climate change along with its coping mechanism. Moreover, the chapter gave an insight into different climate change policies, government plans, and strategies.

Additionally, it had highlighted the theory that was best suited to the current study. Correspondingly, Chapter III described the methodology used for the current study taking philosophical and methodological considerations into account. In the similar manner, Chapter IV and V discussed the findings from this study which were presented in various themes based on the research questions. My personal interpretations and analyses were also done in these chapters. Meanwhile, the findings were triangulated with Social Ecological Theory. Finally, in Chapter VI, the conclusions of the study that were discussed in the preceding chapters were discussed. Finally, the chapter was wrapped up with the implications of the study.

Chapter Summary

This introductory chapter is the beginning of a quest for me as a researcher. In this chapter, I have described the context in which this research has evolved. Furthermore, I have outlined how climate change has emerged as an area of study within the natural and social sciences. The chapter provides an insight into the consequences of climate change in global and national arena. More particularly, the nexus between climate change and women is also highlighted briefly in the introductory part. Similarly, I have problematized the statement followed by three different research questions to unfold women’s understanding and experience on

climate change in the very chapter. Additionally, the chapter contains the purpose, its delimitations and overall organization of the study.

CHAPTER II

LITERATURE REVIEW

General Overview

A literature review is a critical in-depth evaluation of relevant previous researches which helps to identify the gaps in knowledge that can be potentially filled by this dissertation. I have reviewed some literatures on relevant themes that explore the global and Nepalese scenario of climate change, gender and social differences dimensions of vulnerability and adaptive capacity in relation to climate change to advance my understanding on the very topic.

Thematic Review

Basically, I have reviewed the literatures that have a similar notion with my research issues. Then the reviewed literatures were categorized into the following themes.

Climate Change in the Global Perspective

Climate change refers to "statistically significant variation in either the mean state of the climate or in its variability which may be due to natural internal process or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use" (IPCC, 2001). Talking about global climate change, it is caused by the accumulation of greenhouse gases in the lower atmosphere, mainly due to human activities, such as the combustion of fossil fuels which releases carbon dioxide. Data show that most of the warming since the middle of the 20th century is very likely to be due to the human-induced increase of atmospheric greenhouse gas

concentrations (IPCC, 2007a). Statistically, the atmospheric concentration of carbon dioxide, the main greenhouse gas, has increased by 30 per cent since preindustrial times (Ibrahim, 2012).

The current trend of greenhouse gas increment is used to project the future impact of climate change, using a global climate model or general circulation model (GCM). Climatologists of the Intergovernmental Panel on Climate Change (IPCC) review the results of these experiments for global and regional assessments. It is estimated that global mean surface temperature will rise by 1.5° to 3.5° C by 2100 A.D. (ADB, 2009). This rate of warming is significant as there has already been a change in precipitation pattern today. In future, climate change is very likely to affect the frequency and intensity of weather events, such as storms and floods, around the world. Additionally, it will cause the melting of the mountain glaciers.

Climate affects societies in many ways, and climate variability and change are important factors for societal development. Over the past century (1906-2005 A.D.), global average surface temperatures have increased by 0.74 ± 0.18 °C (IPCC, 2007). Further, the report revealed that though the increment of global average is slight however it may have a wide variety of effects on global, regional and local levels, through complex 'cause-effect webs'; sometimes positively and negatively simultaneously. These effects include (average and extremes) in temperature, precipitation and river runoff, drought, wind patterns, food production, ecosystem health, species distributions and phonology, and human health.

The impacts are differing per region and sometimes per season. In many cases, the impacts were detrimental, although some regions welcomed some of the changes. For example, in cold-limited regions increased warming could be useful for

agriculture production or access to mineral reserves. For others, the impacts were associated with large uncertainties (Dessai &Van der Sluijs, 2007).

Climate Change in the Nepalese Context

Climate change is becoming one of the major environmental issues in Nepal like everywhere else in the world. Though, Nepal has a negligible share in global emissions of greenhouse gases, i.e 0.025%, however, it is particularly vulnerable to climate change due to its fragile mountain ecosystem (MoPE, 2004). The studies suggest that temperature is increasing at a rather high rate and the warming has been consistent and continuous since the mid-1970s. The average increase in annual temperature between 1977 and 2000 was 0.06 degree centigrade per year. This shows that warming in Nepal is significantly higher than the global average warming rates.

Climate change is increasingly accepted as a major issue faced by the Nepalese people. There is evidence that climate change is already affecting the biodiversity and weakening the livelihood assets of poor and marginalized communities. The Initial National Communication (INC, 2004) of Nepal to the United Nations Framework Convention on Climate Change (UNFCCC) and a range of recent studies show that Nepal is highly vulnerable to the potential negative impacts of climate change. The Climate Change Risk Atlas 2010 ranks Nepal as the 4th most vulnerable country worldwide, indicating the extreme vulnerability that the country faces. More than 4,000 people died in Nepal over the last ten years due to climate induced disasters, which caused economic losses of about USD 5.34 billion. Every year more than 1 million people are directly impacted by climate induced disasters such as drought, landslides and floods. Similar events and their frequency are likely to increase in future.

In the past decade in Nepal, the damage is increasingly evident and has initiated arable land lost to flood and erosion, erratic changes in monsoon, water shortages and drought events; growing threats from Glacial Lake Outburst Floods (GLOFs), disappearing forests in some areas; invasion of exotic species, outbreak of diseases, sharp and sustained decline in food security and threats to biodiversity. These climate induced risks and hazards can have wide ranging, often unanticipated, effects on the environment and on socio-economic and development related sectors, including agriculture and food security, biodiversity, water resources, energy, human health, urban settlement, terrestrial and aquatic ecosystems (NCVST, 2009); (WFP, 2009). Poor and vulnerable communities of Nepal, therefore, face possible dramatic impacts on their livelihood and well-being.

In the Nepalese context, human societies over the ages have depleted natural resources and degraded their local environments. Populations have also modified their local climates by cutting down trees or building cities. Such anthropogenic activities are perturbing the climate system even at the local scale. Nepal is among the poorest countries in the world: 24 percent of the population lives on less than $1 a day and 68 percent on less than $2 a day (UNDP, 2007). Agriculture the mainstay of rural food and economy that accounts for about 96% of the total waster use in the country – suffers a lot from erratic weather patterns such as heat stress, longer dry seasons and uncertain rainfall since 64% of the cultivated area fully depends on monsoon rainfall (CBS, 2006). Declined yield due to unfavorable weather and climate change will lead to vulnerability in the form of food insecurity, hunger and shorter life expectancy (Chaudhary & Aryal, 2009).

Thus, Nepal is more vulnerable to the effects of climate change due to its high

dependence of climate-sensitive sectors such as glaciers, agriculture and forestry, and its low financial adaptive capacity (Karki, 2007).

Gender and Climate Change

Women and men have differential access to social and physical goods or resources. According to the report of FAO (2007), rural women and men play complementary roles in guaranteeing livelihoods security. The report further states that due to women's social positioning in many situations, their roles are expected to take on often supportive and reproductive, centered around the home and local community rather than the public sphere. Hence, the scenario is most often different where women tend to play a greater role in natural resource management and ensuring nutrition. They often grow process, manage and market food and other natural resources and they are also responsible for household chores including livestock rearing. Despites this, the roles they play are generally less visible and attract less public recognition than the work men engage in and are frequently excluded from decisions decision making process.

The key issue is whether women and men are impacted by climate change differently (Banda, 2005). It is because the effects of climate change are likely to affect men and women differently due to gender differences in property rights, access to information and in cultural, social and economic roles (Ambunda & Deklerk, 2008). However, to date there are few studies that have specifically addressed gender aspects of climate change (Hemmati, 2008). Moreover, gender issues have not played a major role in climate change discourse (Wamukonya & Rukato, 2001; Banda, 2005). However, focus on gender differentiated impacts of climate change and gender

nexus has only recently gained momentum around the world and same is the case in Nepal as well.

Women's Vulnerability to Climate Change

Case studies across the globe allude to the uncomfortable fact that climate change impacts are more heavily felt by poor nations and communities due to their weaker resistance capacity (IPCC, 2007). Women are the poorest people in the poorest areas. Moreover, several studies indicate that the death rate in natural disasters can be four times higher for women. On the contrary, women are generally responsible for collecting food and water for the household members. In the developing countries women are heavily engaged in resource-dependent activities such as agriculture, forest management etc. (Davison, 1988). The climate variability directly affects natural resource bases and thereby decreases resource dependent activities. It is disrupting the food production system and global hydrological cycle. In many countries, the trend of water scarcity is increasing due to less rainfall in the dry season. This forces women and girls to walk long distance to collect safe drinking water for family members. Therefore women are likely to be affected disproportionately due to their overwhelming dependency and low technical knowledge to adapt to abrupt situations. Apparently, they are more vulnerable to climate disasters than men through their socially constructed roles and responsibilities, and their relatively poorer and more economically vulnerable position (Dutt, 2011).

In the rural areas of Nepal too, women's involvement in an agricultural capacity is most common and this sector is most adversely affected by the impacts of climate change. In these contexts, responsibility for adaptation is likely to fall on their

shoulders – including finding alternative ways to feed their family (Bridge, 2008). However, statutory and/or customary laws often restrict women's property and land rights and make it difficult for them to climate change credit and agricultural extension services, while also reducing their incentive to engage in environmentally sustainable farming practices and make long-term investments in land rehabilitation and soil quality.

This predicament is also indicative of the existing inequalities. The report of UN Women Watch indicates that gender inequalities with respect to enjoyment of human rights, political and economic status, land ownership, housing conditions, exposure to violence, education and health (in particular reproductive and sexual health) make women more vulnerable before, during and after climate change-induced disasters. Nepal being a patriarchal society, gender discrimination is one of most striking dimension and manifestation of such inequalities here which has further aggravated their vulnerability in the context of climate change.

Women in Climate Change Adaptation and Mitigation

Women are principally care givers since ages. Most often, they are the source of indigenous knowledge which might play a very crucial role in climate change adaptation and mitigation (World Bank, 2010). Many of their works related to natural resources management is contributing to mitigation actions. They perform many activities for the well-being of their family members, which can simultaneously be regarded as well-designed adaptation practices. Women adopt diverse and intense household resource-use strategies to cope with food deficit situations, especially during lean seasons and natural disasters. They intensify their efforts in home and also in farm to increase production and seek non-farm production options for the well-

being of the family (Pfister, 2009). Moreover, women perform some infrastructural development to conserve the soil and water and also to avoid floods by building embankments which presumably make a large contribution to the efforts required to confront climate risks (Ugochukwu, 2008). There are also many important climate change mitigation roles played by women by managing households, taking care of children, raising awareness through education, and involving themselves in afforestation and reforestation. So, there is a saying that if woman is educated then she can educate her whole family. When she is environmentally conscious, she can pass on the same knowledge to her offspring.

Apart from this, women can reduce carbon emission to a considerable amount by avoiding water and power abuse and also by slightly changing consumer behavior such as using re-usable jute bag instead of disposable polyethylene in shopping, turn off the gas stove when not cooking, serving local food stuffs to the family members, walking to children's school avoiding transports in case of short distance. In spite of all these endeavors, their contribution is overlooked or less acknowledged by societies. Such realities existing in our society really distress me. If women's opinions and perceptions are not taken into a climate change count, we lose on ideas, visions and potential solutions, and also on support for stronger policies. I am of the view that undermining women's knowledge and practice is an indirect welcome to climatic disaster. In this regard, I stress on honoring women's rich knowledge which is being practiced for natural resource management and to cope with the harsh effect of climate change at all level.

Theoretical Review

The focus of this study is to encapsulate women's understanding and experience of climate change. In order to anchor my study, I have reviewed the Social Ecological Theory (SET) which entails reciprocal relationship between social, institutional, and cultural contexts of people-environment relations. According to Hawley (1950), social ecology is the study of people in an environment and the influences on one another. Moreover it is an academic unit characterized by an interdisciplinary approach to the study of social and environmental problems where the problems are examined at multiple levels of analysis, viewed from an ecological perspective and involve a systems theory analysis of interdependence. Additionally, it focuses on environmental and social problem. According to Chapin et al. (2010) in social-ecological systems humans and ecosystems are inextricably linked and are facing unpredictable pressures and shocks due to global change and unsustainable human use of resources. Thus, the capacity of any social ecological system is to survive and prosper which may depend very much on its ability to understand these past patterns and respond appropriately (Costanza et al., 2007, as cited in Folke, Berkes, Colding, & Svedin, 2007).

According to the profounder of Socio ecology theory Dave Taylor, this theory underpins the six principles as follows:

- Identify a phenomenon as a social problem
- View the problem from multiple levels and methods of analysis
- Utilize and apply diverse theoretical perspectives
- Recognize human-environment interactions as dynamic and active processes

- Consider the social, historical, cultural and institutional contexts of people-environment relations
- Understand people's lives in an everyday sense

Although all of the six principles are entangled, this study mainly focused on the identification of phenomena of climate change as a social problem. In order to understand the people's life in an everyday sense this study had incorporated Nepalese women's lived experiences, their understanding as well as their coping strategies. Hence, this theoretical lens provided me with guidelines for the study where I had identified women and climate change as a socio-ecological problem and viewed women's climate change experience from multiple perspectives i.e., social and environmental and multiple level as well.

Policy Review

In this section, global and national policy on climate change were reviewed along with those polices which have incorporated gender issue. As a party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, Nepal is implementing number of climate change related activities in the recent year. The Government of Nepal has issued the Climate Change Policy 2011 that includes a number of policies to address the impacts of climate change, and made the development climate-friendly and resilient. The policy outlines a number of policies on broad thematic areas such as: (i) climate adaptation and disaster risk reduction; (ii) low carbon development and climate resilience; (iii) climate changes to financial resources and utilization; (iv) capacity building, people's participation and empowerment; (v) study and research; (vi) technology development, transfer and

utilization; and (vii) climate friendly natural resource management. Moreover, the policy also includes strategies and working policies.

The National Adaptation Program of Action (NAPA), as approved by the Government of Nepal in September 2010, includes a number of programmatic most urgent and immediate adaption actions. The Government of Nepal has considered National Adaptation Platform of Action (NAPA) as the development agenda. In addition, the Government is also developing projects under the Pilot Programme for Climate Resilience (PPCR). They are developing projects to implement priority adaptation actions, as mentioned in the NAPA document, such as on community-based adaptation, flood and GLOF management, and ecosystem-based adaptation. Similarly, they have started preparation of the Second National Communication, identification of technology needs to address climate change impacts, and expanded REDD related activities. In order to promote low carbon development path, several activities are initiated to scale-up renewable energy as well. In addition, local governments, non-governmental organizations, academia, and private sector are also implementing climate change related activities

Nepal is also implementing several activities related to reducing poverty, promoting energy development and improving its efficiency, developing infrastructures etc. through the establishment and operation of funds. There are a number of funding windows within and outside the United Nations Framework Convention on Climate Change (UNFCCC) under Kyoto protocol (KP) regimes. As the impacts of climate in Nepal are becoming prominent, it is necessary to tap the technical and financial resources to address the on-going and emerging two threats of

climate change. Hence, it is felt necessary to establish a fund that provides ample opportunities to channelize funding effectively for climate change activities.

The Government of Nepal, Ministry of Environment (MoE) has received support from the Embassy of Denmark in Nepal to implement climate change activities. The MoE prepared, through this support, the status report while participating the 15th session of the Conference of the Parties to UNFCCC and 5th session of the Conference of the Parties serving as the Meeting of the Parties (CMP) to the KP. In addition, this funding was also used to prepare and publish the report of the Status of Climate Change in Nepal. The MoE has felt an urgent need for preparing Strategy for Climate Change Strategy and Framework for Climate Change Fund from this support within the broader framework of the Climate Change Policy, 2011. This strategy is expected to streamline all climate change activities in Nepal and include negotiation approaches and contribute to future climate change negotiations as well. Similarly, the framework for climate change fund will provide a basis to channelize funding on climate change activities received from different sources in the country. The Ministry of Environment intends to prepare the Climate Change Strategy and Framework for Climate Change Fund by procuring consulting services.

Gender Issue in Climate Change Policy Regime

The latest IPCC report (2007) recognizes women as one of the most vulnerable groups from the climate change impacts. Nevertheless, the issue of gender equality and women's participation get little attention in the climate change policy regimes. The little participation or in some cases exclusion of women from climate change decision-making processes present a real challenge to women empowerment, fail to uphold human rights principles and deprives society of many skills,

experiences and capacities unique to women (UNDP, 2008). Eventually, as a compensatory effort, the COP-13 (2007) in Bali, the gender and climate change-Women for Climate Justice network, a platform for information, knowledge and networking on gender and climate change, has been established with coalition of women's organizations and individuals, as well as the Global Gender and Climate Change Alliance of UN organizations, IUCN (International Union for Nature Conservation) and WEDO (Women's Environment and Development Organization). Gender and climate change is now actively participating in UNFCCC conferences and advocating for upholding women's rights in climate change policies. Moreover, Hyogo Framework for Action, emerged from the World Conference on Disaster Reduction (2005) which states that "a gender perspective should be integrated into all disaster risk management policies, plans and decision-making processes, including those related to risk assessment, early warning, information management, and education and training."

Gender equity is now considered as a cross-cutting issue and has received due attention in sustainable development movement. The role of women in sustainable development is recognized by various international conferences. In its recent follow-up to the Beijing Platform for Action (2005), the General Assembly highlighted the need to "involve women actively in environmental decision-making at all levels; integrate gender concerns and perspectives in policies and programmes for sustainable development; and strengthen or establish mechanisms at the national, regional and international levels to assess the impacts of development and environmental policies on women" (as cited in UN, 2008). Gender equality is a guiding principle in National Adaptation Programme of Action (NAPA) design. It acknowledges women as one of

the most vulnerable groups to the climate change. Likewise, many of the national reports submitted by signatory nations to the UNFCCC Secretariat emphasize the vulnerability of women and the importance of gender equality, though in different formats. However, information about causes and solutions regarding climate induced gender disparities are missing.

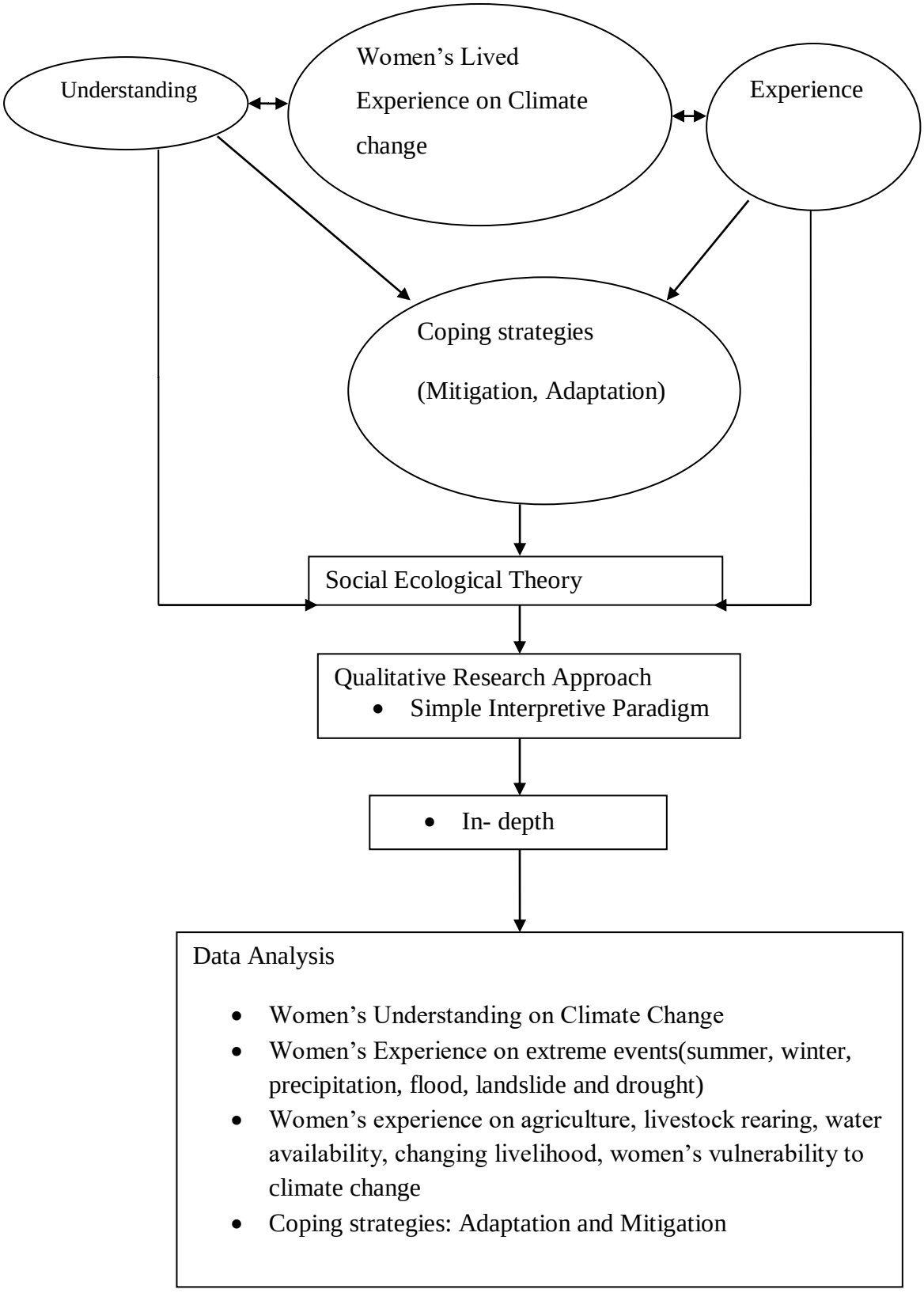
Gaps

The major gap that I found after going through several literatures related to my study was lack of systematic integration of gender issues into climate change science. Most climate change studies have failed to address gender issues. More research is needed into the adaptation strategies of women in the face of existing climate change effects because climate change adaptation is seen as a technical and male competence. Climate change has differential impacts on men and women, and gendered aspects of mitigation and adaptation must not be overlooked by the policymakers. The importance of strengthening women's voice in national and international climate change negotiations is apparent.

Conceptual Framework

Conceptual framework is a type of intermediate theory that attempts to connect to all aspects of inquiry (e.g., problem definition, purpose, literature review, methodology, data collection and analysis). To advance my understanding on Nepalese Women's Lived Experience on Climate Change, my exploration was based on two aspects of women: their understanding and meaning making process on climate change and day to day experience of it. Thus, their entire perceptions and experiences were taken into account. Additionally two major actions: adaptation and mitigation that they were adopting were also addressed in this study. The nature of

the study was qualitative with the phenomenological approach where I had used in-depth interview as a tool for data extraction. Social Ecological Theory gave me a guideline for the study and analysis was done on the clustered themes.



Chapter Summary

This chapter reviews the literatures that best suited my study. Systematic literature review was followed by various themes. The chapter has explored both the global and Nepalese context of climate change. In this regard, the chapter has highlighted the trend of climate change and also why and how Nepal is more vulnerable to its consequences. More specifically, gender dimension of climate climate change.

Further, it has incorporated the coping strategies developed by women to address the harsh impact of climate change with special emphasis on mitigation and adaption. It has also included Dave Taylor's Social Ecological Theory to give insights on social- ecological problem and view the problem from multiple perspectives. Finally, the chapter has mentioned the national and international climate change policies and to what extent gender issues are addressed in those policies.

CHAPTER-III

RESEARCH METHODOLOGY

Methodology

This chapter has outlined the philosophical considerations and procedural considerations of my research.

Philosophical Considerations

Basically every research is guided by a certain paradigm. Creswell (2007) presents five sets of philosophical assumptions that can be used in qualitative research i.e. ontological, epistemological, methodological, axiological and rhetorical assumption. These assumptions consist of a stance toward the nature of reality (ontology), how the researcher knows, what she or he knows (epistemology), the role of values in the research (axiology), the language of research (rhetoric), and the methods used in the process (methodology) (Creswell, 2003). Thus, they provide a researcher a standpoint to incorporate various aspects of reality, knowledge, values in the study.

Furthermore, researchers approach inquiry from a particular philosophical stance or world view, which determines the purpose, design, and methods used and the interpretation of the results (Blunt 1994). As such, the main purpose of this study was to explore the lived experience of Nepalese women on climate change. To incorporate the reality, ontological assumptions were addressed. Similarly, for generating knowledge, the epistemological considerations were taken into account

and finally axiology gave the values of the participants in the current study. Detailed descriptions of these aspects are discussed below:

Ontological assumption. This paradigm deals with the nature of reality. The qualitative research view is that there are multiple socially constructed realities and inquiry seeks to identify limited patterns that may be culturally specific (Coll & Chapman, 2001); (Cousins, 2002); (Garman, 1996). Owing to this fact, truth and reality was determined by the position of ontology. Aligning to interpretive research paradigm, I also believed in a unique nature of knowledge. One's knowledge had a great deal of contrast with others. Therefore, ontologically my research was based on constructivism as there was no single reality. Meaning was constructed by my participants as they engaged with the world they were interpreting. The socially constructed realities of rural women and their experience on climate change events differed from each other and they revealed them consequently.

My research participant's knowledge was totally subjective in nature which varied among their personal experiences. Thus, they had made meaning of climate change on the basis of their individual understanding and experiences. Therefore, my finding was also subjective in nature and reality was constructed based on the context.

Epistemological assumption. It deals with the relationship between the knower and the known. Likewise, how do we know and what we know? In qualitative research, knowledge is established through the meanings attached to the phenomena studied; researchers interact with the subjects of study to obtain data; inquiry changes both researcher and subject; and knowledge is contextual and time dependent (Coll & Chapman, 2001); (Cousins, 2002). In my study also, women had distinct experience of climate change and on the basis of their experience, they had made different

meaning of it. Additionally, their responses to climate change varied each other. Since knowledge is contextual, they had used their knowledge to cope with climate change on a context basis. Hence, I had generated my knowledge on women's perception on climate change according to their lived experience incorporating every individual woman's perception into account. Hence, my research participants were the real source of knowledge for this study.

Axiological assumption. It is the value people hold that determines differently with various things. Qualitative researchers believe that inquiry is value bound and research is inevitably value laden and biased because researchers are influenced by traditions, environments, and personalities. They acknowledge their subjectivities and consider the resulting knowledge valid for a particular time and context rather than for all times and places (Cousins, 2002); (Rose, 2001). In line with this literature, I had tried to understand my participants' values, and also paid due respect to them. For instance, some participants believed that climate change can be mitigated by worshipping the God while other believed that it is totally an environmental problem so the environment responsive behavior is needed to address its issues. As such, every participants of the study area was guided by certain value which differed from each other and incorporating different value guided perceptions in my study is an indication of value laden research. Hence, my research is not value free.

Rhetorical Assumption. It is the use of language and style in reporting the research. Qualitative reports use informal, expressive language, metaphor, and narrative. The voices of researchers and participants are evident – "at the heart of qualitative research, the authentic voice of the study's participants must be

represented" (Lee, Mitchell, & Sablynski, 1999). I concurred with this view and tried to include the voices of research participants including the reflexivity of myself and wrote the report in the informal and expressive language. In the meanwhile, the idioms told by the participants were incorporated while interpreting the data in the narrative style.

Methodological Assumption

It is the procedural consideration of the research. In qualitative research design, interpretive analysis is applied to narrative data; meanings are sought in specific social/cultural contexts with the possibility of theoretical generalization; and research strategies aim to uncover relations among phenomena, inductively discovering theory out of categories that emerge from research (Merriam, 1998). I favored this statement and followed interpretive research method to focus on the essence or structure of a phenomenon, as consciously experienced by the women of the study area. Furthermore, I attempted to encapsulate how the phenomenon of climate change was perceived and experienced by my participants.

Research Perspective

The study is qualitative in nature. Qualitative research has been described as "the investigation of phenomena, typically in an in-depth and holistic fashion, through the collection of rich narrative material using a flexible research design (Polit & Hungler, 1997). Furthermore, it is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem (Creswell, 2009) as cited in (Creswell, 2007). This study employed qualitative research methods following a simple interpretive paradigm. It has been presented as an inductive, descriptive, research method that seeks to explore and then explain human experience

(Omery, 1983). In order to illuminate the lived experiences of Nepalese women on climate change, an unstructured interview with probing questions was used. Each and every woman was allowed to share her understanding and experience regarding climate change.

The qualitative approach to research was initially interested in focusing on the lived experience of women about the phenomenon of climate change. The data collected have taken the form of words of pictures rather than numbers. Moreover, the written results of research contain quotations from the data to illustrate and substantiate the presentation. Following this approach, I tried to understand the meaning making process of women about climate change. I collected the data from the participants' day to day experience of climate change. Furthermore, the context is important to the interpretation of the data. This approach requires that the researcher "centers on the attempt to achieve a sense of the meaning that others give to their own situations" (Smith, 1989, p. 12). Aligning to this, the data were collected in a natural setting where the participants lived and worked (sensitive to the people and places under the study).

As the data collected in an interpretive study include more than words; attitudes, feelings, vocal and facial expressions, and other behaviors are also involved (Abella, 2009). While collecting the data, I prepared the interview transcripts, field notes from observations and a wide variety of records which was treated to rigorous analysis by coding, extracting general and unique themes from all the interviews. Moreover, their facial expressions, gesture were taken into account and that helped me further enrich the data. Thus, I had captured the fullness of experience, the richness of living reflection of women in a climate change scenario.

Site Selection

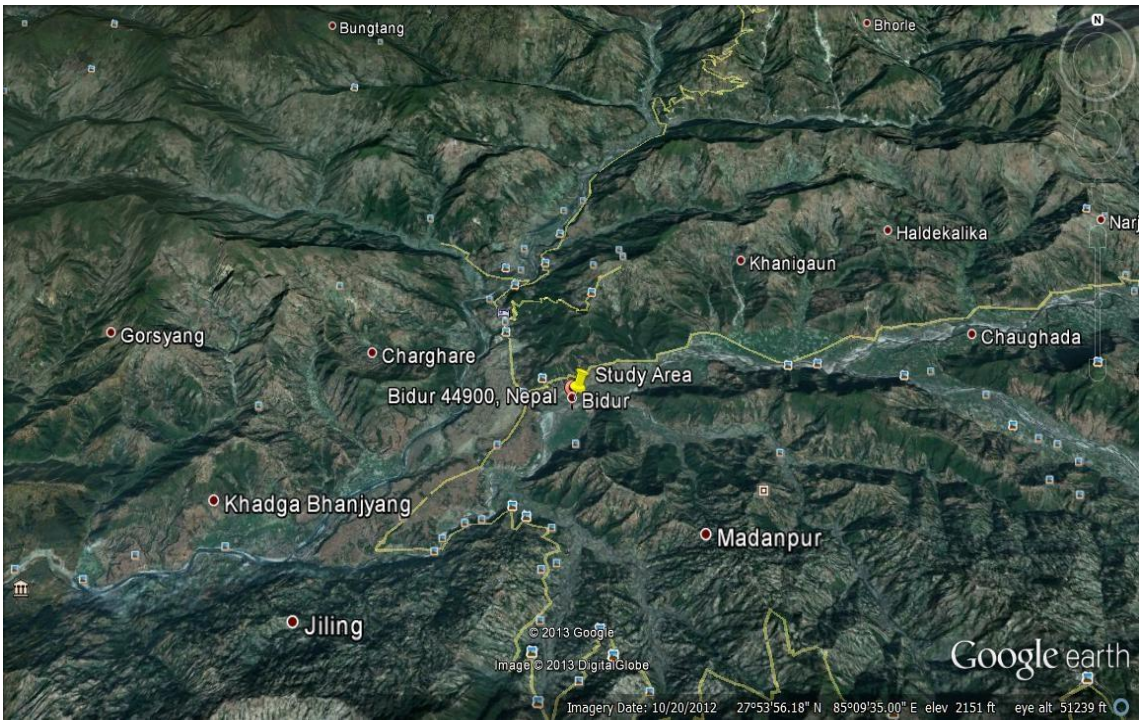
My study area was Bidur Municipality of Nuwakot district of Central Development Region which covers an area of 33.48 km². It is a small municipality located on the bank of the Trishuli River. It borders on Khani VDC in the east, Charghare, khadka Bhanjyan and Kalyanpur VDC in the west, Tupche and Gerkhu VDC in the north and Belkot VDC in the south. It comprises 11 wards and among them only ward number one was purposively selected. The main reason for selecting Bidur as my study area was because it is just 70 km far from the capital city and can be easily accessible (i.e. within two hours' drive) from Kathmandu. Moreover, I was brought up there and thus have been familiar with that locality. In addition, a unique story is embedded with it where I have closely observed different rituals performed by the villagers.

This includes observing the ritual of sacrificing goats to lord Indra begging water from him when there is drought for long. Really, the rain used to shower after some days of such rituals. During my childhood, I used to perceive it as a common phenomenon. However, when I have broadened my horizon of thoughts through my academic achievement, I started rationalizing the things differently. After enrolling in Kathmandu University as a student of Environment Education and Sustainable Development, I learnt a lot about climate change, its causes and also the coping mechanism. Then, I realized the fact that the impact of climate change is evident in my locality too, however, people had understood and had been coping with it differently.

As part of my dissertation, I could not stop my intuition for exploring more about climate change in the very area from the perspective of women and to correlate

between the rituals that my villagers were observing, and the phenomenon of rain showering. Hence, I had selected it as my study area.

Map of the Study Area



Locating the Research Participants

The goal of this study was to increase the current knowledge regarding the lived experience of Nepalese women on climate change. The target population was the women aging above fifty assuming that they had rich experiences on climate change. In addition to the age limit, the inclusion criteria were also addressed as the participants were from different ethnic groups. The initial participant was recruited purposively. I chose purposive sampling as considered by (Welman & Kruger, 1999) as the most important kind of non-probability sampling, to identify the primary participants. I selected the sample based on my judgment and the purpose of the

research, looking for those who "have had rich experiences relating to the phenomenon to be researched" (Taylor, 1997).

Furthermore, the snowball sampling technique (Polit & Hungler, 1997) was then employed to recruit the remaining four participants. Snowball sampling is described as, "the selection of participants by means of nominations or referrals from earlier participants" (p. 469). The potential participants were asked if they were interested in a study. After the participants indicated their willingness to be involved in the study, the participants with various experiences were chosen for the study. Boyd (2001) regards two to 10 participants or research subjects as sufficient to reach saturation whereas Creswell (1998) recommends "long interviews with up to 10 people" for a qualitative study. Saturation was reached in my study with five participants. Polit and Hungler (1997) explain that saturation occurs when no new ideas or themes are being discovered from interviews with participants. I also interviewed until the topic was exhausted or saturated, that is when interviewees introduced no new perspectives on climate change.

Introduction to Study Participants

Each of the participants was given pseudonyms to address an issue of confidentiality. All of my participants were eager to share their day to day experiences regarding climate change with honesty and candor during the interview phase. The brief introduction to each participant is given below:

Mrs Sanu Maya Gurung (55) is a traditional farmer possessing tentatively twenty ropanies of land which reveals that she was from well-off family. Originally, she was from Kaule village and she has migrated to Bidur 10 years back. Agriculture was the major economic stay of her family 10/12 years back, however, these days

remittance has became one of the perennial family income source as her husband and both of her sons had gone for foreign employment. She was encountering the failure of the crops frequently. As the production declined, she was panicked with it and has left barren most of her agricultural land.

Mrs Rita Bartaula (51) is a teacher of Environment Population and Health at a secondary level. She is actively involved in knowledge dissemination from the very beginning of her career. Once, I was also her student. Besides teaching, her engagement in farming is also noteworthy. As she possess vast knowledge on environment, she used to practice organic farming however these days she is compelled to intensify agriculture by using chemicals/pesticides suffice the production to the family from her own farmland.

Mrs Tara Laxmi Kharel (60) is a commercial vegetable farmer who grows both seasonal and off- seasonal vegetables. Earlier (5/6 years back) she used to practice traditional farming. As her husband has already passed away, she is solely responsible for earning the bread for the family. Agriculture is one of the reliable sources of income for her where she markets the surplus food staples and makes money out of it. However, these days she has completely abandoned cultivating food staples instead she has switched to vegetable farming and making lucrative money. She is in the view that farming these days has been difficult as the climate does not favor as before. Additional effort is needed to make satisfactory production like using excessive chemical fertilizer, regular channeling water during the dry season, outsourcing hybrid seed varieties.

Mrs Subadra Dhakal (57) is the Secretary of Indreni Community Forestry Users' Group. She has been playing a prominent role in creating awareness among the

women and making them actively participate in forest conservation. Besides this, she is also a member of central committee of water and sanitations users' group. In addition, she has got lots of involvement in social works. She is one of the iconic figures in social development in Bidur. Her tangible efforts can be observed in her community forestry with thick crown cover once which was a barren land. Moreover, women were reusing wrappers and plastics to weave various kinds of household goods like basket, mattress, pen holder etc.

Mrs Sita K.C. (80) is professionally a farmer. She is a storehouse of indigenous knowledge and skills in farming. Due to her old age she is not in a position to contribute to farming physically. However, her mentoring and guidance basically treating with the pest still matters a lot to the villagers.

Data Collection

According to Bentz and Shapiro (1989) "doing quality study" means capturing "rich descriptions of data in their natural settings". For this reason, I had inquired the participants presenting my research question in their own setting. Kabat-Zinn state that "inquiry doesn't mean looking for answers". Researcher being the primary instrument, unstructured in-depth interviews was conducted. The aim of the interview was to unfold Nepalese women's understanding, experience and meaning making process on climate change and my inquiries were primarily directed to their experiences on climate change.

(Kvale, 1996) remarks in regard with the data captured during the qualitative interview that " it is literally an interview, an interchange of views between two persons conversing about a theme of mutual interest," where researcher attempts to "understand the world from the subjects' point of view, to unfold meaning of peoples'

experiences (pp. 1-2)". The intent of my study is to understand the phenomena of climate change in their own terms and to provide a description of their own and allowing the essence to emerge. In doing so, the main tool that I used for data collection was in-depth interview conducted in a conversational style followed by probing questions to help to direct the thoughts of the participants during the interviews. Patton (2002) recommends informal, conversational interviews, or open ended interviews, in which guiding questions and prompts are developed and used to direct the dialogue, taking the cues from the participant as to the direction of the interview.

Additionally, the interview was reciprocal: both researcher and participants were engaged in the dialogue. It lasted for more than one hour for every woman. Moustakas (1990) explains that data are gathered most effectively in their natural setting. The ideas, thoughts, and feelings of my participants on climate change were explored in their natural setting. In this connection, three participants were interviewed at their work place (i.e farmland) and two participants were interviewed at their homes.

The data were recorded on a digital tape recorder (with written consent). Since the tape recorder was so unobtrusive there was no problem with people feeling inhibited. Besides this, 'memoing' (Miles & Huberman, 1984) is another important data source in qualitative research that was used in this study. It is the researcher's field notes recording what the researcher hears sees experiences and thinks in the course of collecting and reflecting on the process of data collection and then subsequently transcribed. Thus, in-depth interview as a major tool of primary data source had brought to light on the understanding/ perception of women on climate

change and their action against it. Furthermore, relevant data available to my study, published and unpublished literatures, policy documents and other significant documents were rigorously collected from the journals, published books, presentation papers, seminar/workshop papers, lecture notes, dissertations, articles and web surfing in the internet as secondary data

Data Analysis

I have used simple interpretive inquiry to analyze the data. The purpose of this approach is to explain the experience of individuals and, ultimately, to make meaning of those experiences. As stated by Moustakas (1990), the initial step involves gathering and organizing all the data from the first participant and viewing it individually. Secondly, the researcher begins to identify qualities and themes from this participant. Once this has been accomplished, the researcher can check with the participant to validate the findings and ensure that her depiction is accurate. Having done this, the researcher repeats the process for each subsequent participant. My approach to data analysis closely followed the above mentioned steps of Moustakas. Initially, I gathered and organized all the data immersing myself in those data until I gained a comprehensive grasp on each and every woman's distinct understanding and experiences regarding climate change. For this, the transcripts were read individually and then I sorted and grouped the findings through coding. This coding was done in order to prevent 'cherry picking' of the data (i.e. selective quotation). Additionally, the tapes were also listened to in order to capture 'those nuances of emphasis, hesitation and inflection that may not have been noted on the transcript.'

After that I clustered the findings in each woman's experiences and traced out the commonalities. Following this process, I combined ideas and results

into common themes. Thus, several distinguished themes were developed to advance my understanding on how women were experiencing the impact of climate change and made meaning of it. The themes identified in the current study were analyzed in the interpretive way. Thus, the findings from the data analysis gave me an insight into Nepalese women's lived experience on climate change.

Quality Standards

The major aspect of quality standard, i.e. trustworthiness, was emphasized in my study. The qualitative research methodology requires the researcher to demonstrate how the study meets the criteria of trustworthiness so as to show the study is sound. The naturalistic method of inquiry follows four criteria to establish and demonstrate the trustworthiness of data (Guba, 1981). Hence, in my study too, trustworthiness was demonstrated by addressing the criteria of credibility, transferability, dependability, and conformability.

Credibility

Credibility addresses the need to ensure that the data are interpreted appropriately and to "deal with the patterns in their entirety but to take certain actions that take climate change account of the complexities" (Guba, 1981). To enhance the credibility of the current study, I had a deep immersion in the subject matter and prolonged engagement (one month) with my research participants in the field. As credibility depends on the power of its presentation with richness of description and interpretation, it convinces the reader that its findings are accurate (Creswell, 2007, p. 223).

In order to address the issues of potentiality of interviews to affect the researcher, I met thesis supervisor regularly for the purposes of debriefing the

experience of the interview and feelings that were unearthed for me during the research process with my dissertation supervisor.

Transferability

Transferability speaks to the ability to transfer findings from data to other settings (Polit & Hungler, 1997). Additionally, it addresses the qualitative researcher's belief that "all social/behavioral phenomena are context bound or context relevant" (Guba 1981, p. 2786). This study demonstrated transferability by employing purposive and snow ball sampling to "maximize the range of information uncovered" (Guba, p. 86), collection of "thick", rich, descriptive data, including the use of field notes on processes observed during the conversation (Polit & Hungler, 1997), and clear descriptions of the selection of the participants will be used in the study. Ultimately, my purpose was to clarify an understanding of the phenomena from the perspective participants.

Dependability

Guba (1981) proposed that the dependability criterion relates to the consistency of findings over time and in various conditions. The current study demonstrated dependability by providing descriptive details of methods that were used to gather, analyze, and interpret the data (Lincoln & Guba, 1985). The authenticity of the data was clarified with participants and interpreted, examined, and discussed with the study supervisor.

Confirmability

Confirmability is the final step in demonstrating trustworthiness, and refers to the "objectivity or neutrality of the data" (Polit &Hungler, 1997, p. 307). The current study addressed credibility by establishing an audit trail consisting the records of

interview transcripts, field notes on planned activities related to data analysis, and all drafts of reports.

Ethical Consideration

Capron (1989) said that any kind of research should be guided by the principles of respect for people, beneficence, and justice. I have taken informed consent of my participants about the purpose of this study. Moreover, autonomy was given to exercise their rights to voluntarily accept or refuse to participate in the study. Thus, I had ensured the respect of autonomy of research participants in terms of their independence, freedom, capacity for self-direction. Further I have respected their social and cultural diversity.

Similarly, I was aware of the principle of beneficence—doing good for others and preventing harm. I didn't use my participant for my benefit so that they may be at risk. I had maintained the confidentiality of the participants by providing pseudonyms in relation to their real names. Finally, the principle of justice was addressed by ensuring a fair distribution of the risks and benefits resulting from research. The participants were not biased in terms of their culture, race and social positioning. All of their voices were fully heard. Hence, my participants were a shareholder of benefits of the knowledge gained in this study.

Chapter Summary

The design of my study is logically articulated in this chapter where I have focused on philosophical and methodological aspect and developed more useful strategy to successfully complete my research process. In the pursuit to find the answers to my research questions, I have conducted qualitative study and sought to understand deeper meaning by capturing rich data. The tools that I used for data

generation was in-depth interview followed by simple interpretive approach for data analysis. Detailed about the sources of both primary and secondary data, site as well as participants selection etc. are also outlined. In addition, the quality standard and the ethical considerations are also addressed.

CHAPTER IV

FINDINGS OF THE STUDY

Chapter Overview

This chapter is my endeavor to explore the substantive understanding and lived experience of Nepali women about climate change. In this regard, I tried to get in-depth knowledge, perceptions, opinions and beliefs of my research participants on climate change from field visit intervention with the qualitative data approach. I have attempted to give an insight into how Nepalese women construct discourse of understanding about climate change. Hence, particular attention was given to women's experience and understanding of several evidences that are in line with climate change. Basically, women's perception and experiences were based upon my research questions which were excavated through in-depth interviews. The ways women conceived and respond to the ongoing changes were thematically analyzed. In addition, I also incorporated my individual observations gained during field visits. Based on those experiences and perception of my research participants, their responses along with my observations were categorized under the following themes.

Women's Understandings of Climate Change

Women's experience on climate change:

a. Summer

b. Winter

c. Precipitation:

d. Extreme Event

i) Flood

ii) Landslide

iii) Drought

Women's experiences on climatic impacts

i) Agriculture

ii) Livestock rearing

iii) Water availability

iv) Changing Livelihood

v) Women's vulnerability

Coping strategies

a. Mitigation

b. Adaptation:

Women's Understandings/Perceptions of Climate Change

People's understanding/perception varies widely in their wording, time frame and geographical area. In case of my study, the social context along with their education played a prominent role in the research participants' understanding /perception of climate change. Most of the women of the study area were unable to conceptualize the direct meaning of climate change though they were experiencing it in their daily life. In accordance to (Lorenzoni & Pidgeon, 2005), "There are many intrinsic problems in people's understanding of climate change." Hence, the varied degree of understanding of climate change was unfolded from those participants of the study area.

It was an early monsoon morning of 4th September, 2012 followed by torrential rain. I paid a visit to my research participants' houses in order to excavate their (women) understanding about climate change. However, I could meet none of them at their homes. Therefore, I headed towards rain fed upper slope which we call *Bariland* where I found men digging the land and women transplanting the millet upon it. In spite of the heavy rain, they were so busy with their agricultural chores that they did not have a single minute to chat with me. To my surprise, I found a lean and thin woman, both digging and transplanting the millet in one of the *Barilands*. She was not having any help. Approaching nearer to her, I noticed that she was Sanu Maya Gurung whom I knew since my childhood. As this was my meeting with her nearly after a decade, she became so excited seeing me. However, she was not in the position to allocate time for me by extricating herself from the crucial agricultural work. Hence, I proposed her to share the work of millet plantation and then started working jointly. I became a helping hand for the time being. While working together, I started inquiring about her understanding of climate change. Mrs. Gurung in her own words said:

> "*K ho yo jal baayu paribartan bhaeneko-kaile nasuneko kura , yo jalbaayu salbaau malai kehi tha chhaina, samaya ma pani naparera kya hairan bhaira cha."*

She meant that she had never heard about climate change and she did not know what the climate change actually is. She is panicking due to untimely rainfall. She went on saying that:

> "*Aati garyo bhane khati hun6 bhaneko yehinai ho. Manish haruko atydhik pap karma le garda bhagwan risayara pirthvi ma yeasto bhayako ho..."*(She

meant that due to the excessive sinful activities of people many unnatural phenomenon is happening on this earth).

There have been many studies highlighting common misconceptions of people's understanding of climate change. According to Fisher and Conner (1998); Brostrom, Fishchoff, & Read, 1994), such misconceptions include, 'peripheral beliefs', belief on divine power, etc. Here a peripheral belief means having superficial understanding of climate change. People are observing the evidences of climate change but they are unable to mention the exact causes of it.

This reflection was prominent in Mrs. Gurung where she was observing the changes in climatic pattern in relation to fluctuation in temperature, onset of monsoon along with heavy down pour and also frequent drought. However, her understanding of these changes was that they were due to the punishment imposed by god towards sinful activities of human beings on earth. Since she had deep faith in the divine power, she interpreted the causes of climate change accordingly. She went on telling that people have lost their humanity and became selfish. They don't have reverence towards god. Therefore god is responsible for creating such a situation. The notable thing to be mentioned here is that the changes in climatic pattern are happening and she was facing the consequences of these changes. However, the way of her understanding and interpretation was different.

After the conversation with Mrs. Gurung, I realized that lack of understating of the basic concept of climate was evident in her who assumed that the replication of the same misconception would be prevalent among other women as well. Thus, a hurricane of queries blew my mind. I could not control my urge to further explore about women's understanding of climate change.

The next day, I switched on to the next research participant named Subardha Dhakal (57) to encapsulate her understanding about climate change. I started conversing with her with the central discussion topic 'her understanding of climate change'. Meanwhile she chuckled and expressed "Some years back I used to understand and interpret climate change as, "Jal-*bhaneko pabitara pani jun hami bhagwan lai chadauchau ani baaiyu bhaneko gastric sam bandhi rog*."(Jal is sacred water and Baaiyu is something like gastric problem). However, these days I have advanced my understanding of it, these days I can comprehend the meaning of climate change to some extent. She further noted that, the word climate change itself is quite complex that it is hard to internalize and interpret by rural women like us who are deprived of formal education though the phenomenon is being experienced in our day to day life. In my case too, I am deprived of formal education, so 5-6 years back I had no idea about climate change. However these days, the exposure in various fields like participation in environment awareness program including community forestry, trainings etc., has enhanced my horizon of thoughts and understanding of the very specific topic. *Now, I have understood that climate change is totally related to an environmental phenomenon.*

The following day, I approached Rita Bartaula (51), a Secondary level teacher of the Environment Population and Health (EPH) and threw a series of questions to sketch her understanding of climate change. Mrs. Bartaula expressed, "Being an EPH teacher, I have a good understanding of climate change so far I believe. *Regarding the definition based on several books, climate change is all about the changes in climatic patterns and anthropogenic cause is more responsible for this change rather than natural causes. Now climate change has been a global issue",* Mrs Bartaula added.

Recent biological and climatic trends suggest human-induced climate change is already affecting human and non-human life (Parmesan & Yohe, 2003). I was perplexed to hear these things from her. I loved to be a part of her mesmerizing conversation and spent a lot of hours with her. Her scientific understanding on climate change compelled me to feel illiterate in front of her.

Furthermore, talking about the rest of the two participants namely Tara Laxmi Kharel (60) and Sita K.C. (80), they expressed that the changes are happening however climate change is not responsible for the ongoing changes which has been revealed through their understanding of climate change. On exploring changes they revealed that 10 -15 years back, there was balance in the nature regarding precipitation, temperature etc. So we had not felt any sort of changes on agricultural productivity. Conversely, they believe that this universe is governed by the God as per his wish and the reason behind this change is due to the god's will, they further noted.

It had been my assumption that rural women's understanding of climate change is hindered by their limited access to education and information. The revised national curriculum has incorporated the issues of environment and ecosystem that help imparting knowledge regarding environment. However, my participants were aged above who had no and/or little access to formal education. Hence their level of understanding on the very topic is synchronized. This was reflected in my study where out of five research participants, three of them namely Sanu Maya Gurung, Tara laxmi Kharel, Sita K.C had never heard about climate change. On the contrary, Rita Bartaula had a clear understanding of climate change who interpreted it showing

a good understanding. Likewise, Subadra Dhakal also understood climate change to some extent due to her exposure to trainings and seminars on climate related issues.

In spite of my participant's perception of climate change which was believed due to the divine power, I analyzed that they had rich understanding on climate change and had a practical know how of the context for analyzing and adjusting the situation. However, the way they defined it is different. In my opinion, climate change is a technical terminology to most of the rural women so they do not have a scientific understanding of it.

Women's Experience of Climate Change

Climate change is a global phenomenon and its impacts are already being experienced at a human level. Mostly, vulnerable and marginalized people including women have experienced the greatest impacts of climate change (IPCC, 2007). With reference to this, diverse experiences of women were prevailing in my study area. As women are closer to an environment and are highly dependent on natural resources for their livelihood, they are compelled to face each and every consequence of environmental changes including climate change (Bridge, 2008). More specifically, their experiences on climatic changes viz. summer, winter and precipitation pattern along with extreme events were analyzed by organizing them into the following sub theme.

Summer

Temperature observations in Nepal from 1977 to 1994 showed a general warming trend and the increase in average annual temperature was 0.06 °C (Shrestha et al., 1999). Following the increasing trend of temperature, the research participants also shared that the temperature was increasing for 10 years as they were experiencing

hotter days in comparison to the past. The fact can be correlated with the response of Mrs. Gurung (55) who opined, "*Aajkal ta malali sat surya ekkai choti udaayako jasto lag chaa, Baisakh- Jestha ma kasto khapnai nasanakne garmihuna thaleko. Deuso ta gham ma kam garnai sakidaina, thalunai futla jasto hunchha."* (Days are so hot during the Month of April-May as if seven suns have risen at the same time, during the day time one cannot work outside the sun due to excessive heat).

In this regard, she revealed that she was experiencing longer and hotter summer days. To clarify this statement, she mentioned that since 8-9 years back, in early days of March, the villagers were observing hotter days which used to be pleasant in those days. Similarly, winter was not that much cold which used to be in tentatively 10 years back. Thus, the starting of summer days had commenced earlier increasing its number drastically increased. She further opined that the month of February and March used to be quite cold and there was no interference of mosquito in those years. However, in recent years, one cannot sleep without using the net even in these months. The warmer temperature had become conducive for mosquito and its influence is even in the month of October/November, she added.

Similarly, Rita Bartaula (51) stated, "*More frequent hot days are being experienced by us even in the month of March and April; we are experiencing significant warmer days which previously used to be quite pleasant*[1]. She further added, *we used to have day classes in those months, however, these days we are holding morning classes as most of the students are lethargic due to extreme heat during daytime."* In a nutshell, almost all the participants shared common views

[1] Pleasant- it is the state of moderate climate ie. neither too hot nor too cold

regarding summer. With the coherence of the responses derived from the participants, the summer has been hotter and extended for a longer period than before. The onset of summer season's duration has now advanced to the month of July. Around ten years back the month of July was considered to be peak monsoon season. Eventually incidence of mosquito was high in the study area .Women's experience appeared to be in accordance with the temperature increase as calculated by A. B. Sherstha (1999). Though they felt an increase in the temperature, however, they did not have any idea about its causes. Hence, sensation of temperature is beyond their understanding.

Winter

The research on climate change suggests that there is an increase in variability in the weather pattern. There is the fluctuation in temperature; the onset of the winter has shifted, there is less occurrence of dense fog. In addition, the winter days are decreasing and becoming warmer in comparison to the past (IPCC, 2007). Women of my study area also reported that there was an occurrence of fewer winter days. These winter days are not that much cold which used to be in the past. Conversely, it is getting warmer and drier.

Mrs. Sita K.C. (80) being nostalgic said, "*Pahila pahila jadoma bakllo tusaro parthyo, jado le manislai sarai atauthyo* (In the past, there used to be longer winter days with thick frost and chilling cold). As per the report of IPCC (2007), the reasons behind the less frost in winter are the warmer nights. The experience of Mrs K.C. (80) can be correlated with the above mentioned report.

Similarly, Tara Laxmi Kharel (60) said,

"*Earlier we had experienced cold days commencing from the month of October. There is a myth that the god Shiva gifts cold to his devotee when they return*

from Gosai-kunda in the auspicious occasion of janaipurmina[2]*. From the very day we used to sense a nippy cold in the morning and this rate amplified in the successive day till mid-winter.*

Precipitation

Precipitation is one of the important factors for agricultural production. Nepal being an agricultural country; its high dependence on precipitation is accompanied with its frequency, intensity, and timing. Generally, there used to be pre-monsoon, monsoon and winter rain which are favorable for the crop.

My research participants have noticed the changing pattern of precipitation. According to them, rain has become irregular and unpredictable. During the interview, they shared their experiences. In this connection, Rita Bartaula (51) said,

> *A change in rainfall and rainfall timing is evident in our locality. In the past there was enough rain but now things are different. At present, the amount of rainfall has declined for 8-9 years so far I noticed and if it rains then it's like down pouring regardless of the season and sometimes it doesn't rain even in the peak rainy season i.e. the month of July. Onset of rainfall has shifted hence the rainfall pattern can no more be relied.*

Similarly, Tara Laxmi Kharel (60) expressed,

> *We are not getting rainfall in time. Previously, we used to receive winter rain apart from seasonal rainfall. The pattern of the rainfall was conducive for the seasonal crops all the year round. There is no need of extra effort for challenging the field.*

[2] This festival fall in the month of August/September

Having a vegetable farm, we need regular water supply. Earlier the water sources retained water catchment even in the dry season due to the periodic rainfall. However, the changes in rainfall pattern have highly impacted water sources; the decrease in water level is prevalent. Consequently, the existing source dries up early" she further added.

On the contrary, no sooner has the land been irrigated, the land dries up; this shows water holding capacity of the land is becoming weaker and drier. According to the report of the IPCC (2001) warmer temperature increases the water holding capacity of the atmosphere which generally results in an increased potential evapo-transpiration. The lower the water holding capacity of the soil, the greater is the sensitivity to climate change. In the similar vein, participants expressed that overall vegetable production is decreasing in reciprocal of their costing.

Moreover, Mrs. K.C. (80) opined, "*Now- a- days, the rainfall pattern is somewhat torrential during season which wipe out the terraces and the heavy downpour causes soil erosion."* All the research participants noticed that the rainfall pattern had changed diversely. They had experienced erratic rainfall [3]events. Their views are parallel to the scientific study conducted by Practical Action (2010) in Nepal, which reported that over the past decades rainfall has become more intense, high variable, longer gaps of no rain and delayed monsoon. As such in my opinion, the research participants have experienced precipitation as they used to receive monsoon, pre-monsoon and winter rain on a regular basis. However, these days rain has disappeared. Neither has it rained timely nor regularly, mentioned Mrs K.C.

[3] higher intensity of rains but less number of rainy days and unusual rain

Observations of regional and seasonal variation in different parts of the country resulted high rainfall regions and seasons are recording increase in precipitation and becoming wetter whereas low rainfall regions and seasons are recording decrease in precipitation and becoming drier (GoN, 2009).

The decreasing number of rainy days and increasing number of intense precipitation i.e. a changing precipitation pattern would increase the likelihood of floods, landslides and droughts. According to a report (ADB, 2009), the number and the intensity of extreme weather events, such as heat waves, droughts, landslides, floods and tropical cyclones have increased in South-East Asia. These extreme weather conditions are directly hazardous to the agricultural production as well as livestock raising. The extreme events prevalent in the study area are analyzed in the following sub-themes:

Flood

Climate change induces flood which has been one of the extreme events, increasing its frequency and intensity (Bridge, 2008). The change in intensity and amount of monsoon rains positively correlates with the increase in water-induced disasters like floods as quoted by Home Ministry (DWIDP, 2006). The occurrence of flood in the study area was most frequent. Mrs K.C. (80) shared that the stream named *Gerkhu Khola* (that used to flow within its normal range) is over volume particularly in rainy season in recent years and has even deviated its path. It is overheard that during the rainy season the stream engulfs the adjacent paddy field. Mrs. K.C. expressed her anxiety this way:

Last year, I was unable to harvest rice from that field and this year also the flood has caused huge damage depositing the sediments. Every year the embankment is destroyed and carried away the top soil.

These incidences reflect that the frequency and the intensity of the flood had increased in recent years amplifying the people's vulnerability. The data of extreme rainfall recorded in different stations by Department of Hydrology and Metrology Nepal from 1975 -2012 showed the increasing trend of rainfall pattern (DHM, 2012).

Landslide

The landslide is one of the natural hazards, which is increasing in terms of both magnitude as well as frequency impacting negatively on people's livelihood (Dahal, 2011). The similarity exists in the study area where participants have experienced a devastating landslide in the recent years. With reference to this, Tara Laxmi Kharel highlighted the landslide incidence that took place during the year of 2012. According to her, during the rainy season, there used to be landslides however its impact used to be nominal. With the passage of time, the landslide was more frequent and severe in recent years. People were terrified with huge landslide that occurred last year; however, they didn't have any other alternative place to live in. This year (2012), the landslide occurred in such a way that the entire village was compelled to be displaced from that area. Recently they have been living in the district headquarters i.e Bidur, she added. Unlike others she was living in Dhunge. During my field visit too, I observed the settlement area and found many households had migrated from Kaule to Bidur because of that landslide. They further revealed that the government has urged the victims to provide them with incentives and shelter.

Drought

Higher temperature, increased evapo-transpiration and decreased winter precipitation has increased the incidence of droughts in Nepal (Alam & Regmi, 2004). Nepal is experiencing an increasing trend of temperature rise with 0.06°C (IPCC, 2007) resulting the extreme case of drought which is evident in the study area too. Participants were panicking about such extreme events. It was reported by the participants that the frequency of drought within a decade was very high. Since 2002-2012 they have faced drought for more than five times. According to them, it was 2005 when they faced a prolonged drought and again in the 2007, similar extreme event reoccurred. However, the drought of 2009 caused an acute decline in maize production, one of their staple foods. Similarly, in recent year of 2012, they again faced another severe drought; as there was no rain from the month of January to the first of June. Due to that drought, they were unable to harvest maize and plantation of paddy was also delayed.

Chapter Summary

The shackles of superstitious dogmas were prevalent among the participants regarding the climate change. As Ban and Hawkins (2000) define perception as "the process by which we receive information or stimuli from our environment and transform it into psychological awareness", it is interesting to see that people infer about a certain situation or phenomenon differently using the same or different sets of information. As per this study, women's knowledge, culture and their social procession had shaped their behavior. This had influence their particular situation/ phenomenon regarding climate change. The changes in precipitation pattern, temperature, occurrence of extreme events like drought, landslides and flood have

been frequent phenomena in their locality. They believe that God was responsible for creating such situation and they cannot go against him rather than being helpless.

In coherence with the principle number two of Social Ecological Theory; the ecological problems are viewed from multiple levels and there are different methods of analysis. In this study too, participants had viewed climate change from multiple perspectives.

Corresponding to the participants like Mrs Gurung, Mrs Kharel, Mrs K.C. who had perceived climate change as occurring due to the curse of god. On the contrary, Mrs. Dhakal initially was in favor of this belief. However, due to her exposure to different awareness programs, seminars and workshops related to community forestry and environment, her horizon of thoughts and understanding of climate change has shifted. Now she believed that the change in climate is not entirely due to the divine factor. Hence, it showed variation in the method of analyzing the ecological problem differently. Additionally, another participant Mrs. Bartaula, an EPH teacher, had a clear understanding of climate change and her method of analysis was based on scientific studies.

In a nutshell, the women's understanding and perception varies with their past experiences and present sets or attitudes acting through values, needs, memories, moods, social circumstances, and expectations (Saarinen, 1976, as cited in Banjade, 2003).

CHAPTER V

COPING STRATEGIES FOR CLIMATE CHANGE IMPACT

Chapter Overview

This chapter explores the localized impact of climate change that is being experienced by women of the study area. Though the impact of climate change in the hilly region is not to that extent as compared to the mountain region, yet some potential impacts are adversely affecting the livelihood of hilly peoples as well (Oxfam, 2009). As my study area was Nuwakot –a hilly region of Nepal that lies to the north of Kathmandu district, the people residing there were not far behind from the impact of climate change. According to the National Adaptation Program of Action- Nepal (2010), there are six major areas that are impacted by climate change, namely agriculture and food security, water resources, climate induced disaster, forest and biodiversity, public health and urban settlement and infrastructure. However, tangible impacts experienced by the participants were in agriculture, plant phenology, invasive species, water resources, climate induced disaster. Furthermore, women's vulnerability to the ongoing changes in climatic pattern was explored. Additionally, women's strategy to combat it was also analyzed under the succeeding themes.

Women's Experiences of Agriculture

Agriculture is the mainstay of rural food and economy providing a livelihood for about 80% of the population of Nepal (CBS, 2011). The reliance of this vast majority of rural people in rain-fed agriculture makes them particularly susceptible to

climate change. Changes in water availability in the monsoon, pre-monsoon and the post-monsoon, winter rain[4] season have direct impact on the Nepalese agriculture. Rice, wheat and maize are the major food staples of rural area and the production of these crops are decreasing with a change in rainfall pattern (Sharma, Crouch, Seetharama, & Hash, 2002). The field findings coincided with this literature. Participants expressed that the delay in the monsoon, decrease in winter rainfall and erratic rainfall pattern has negatively impacted the agricultural sector in the study area. They further revealed that the production of the summer crops like maize, millet, and paddy had been declining. Additionally, the yield of major winter crops like mustard and wheat has a negative implication of climate change. For the good harvest of the wheat, it requires rain in winter. However, there is a decline in winter rainfall, shared the participants.

A study carried out by the Ministry of Environment Science and Technology (MOEST, 2004) showed that temperature rise had negative effects on maize and gave a decrease in yield. In line with this study, my research participants also reported that due to excessive heat, the moisture of the soil dries up quickly and they need to irrigate their field frequently. Mrs. Sanu Maya Gurung (55) possesses about one hectare of land which reflected that she belonged to a well off family. Her economy was entirely dependent on agriculture. However, with the changes in the climate, the overall agricultural productivity has sharply declined and her economy is deteriorated

[4] Pre-monsoon: March to May

Post monsoon: October to November

Winter: November to December

these days. I inquired her about the reason of decline in production. To my query, she became restless for a moment and then replied;

> *Nine- ten years back we used to have a good harvest of rice, maize, millet and lentils. Additionally, the winter crops like mustard, and wheat also used to give good yield. Periodic rainfall was conducive for all types of harvest throughout the year. Hence, we did not need to irrigate water more often. However, now-a-days we are experiencing changes in rainfall pattern. The rain does not appear in time and channeled water also dries up sooner.*

Thus, it has negative implications on productivity which fluctuates each year. However, her experiences were aligned with the study done by Agbola and Ojeleya (2007) in that climate change will affect crop yield directly because of alterations in temperature and rainfall and indirectly through changes in soil quality, pest and disease. Another participant Subadra Dhakal (57) shared that there was almost no maize production in 2012 so that they were not *able* even to preserve its seeds. Despite sowing it on time, there was acute rain deficit during the peak time of flowering that needed adequate amount of rain for good harvest. Thus the repercussions of rain deficit resulted in the plant to be completely dried out without fruiting.

Regarding the winter crop, she lamented since her land did not yield good crop though an appropriate sowing time of wheat was November/December. According to her, five- six years back there used to be rainfall during this time favoring the germination of wheat and thereby flourishing it. However, in recent years, they were not receiving this type of rainfall pattern for wheat since there has been a decline in the winter rainfall. She added:

> *Sometimes the production is not sufficient even for household consumption. Previously we used to give koseli[5] of maaskodal[6]and trishuliko basmati chamal to the relatives. However, these days the varieties of this rice have already been extinct.*

According to her, the different varieties of agricultural production like basmati rice had already extinct; khumalchar was on the threshold of extinction. Likewise, other local varieties of crops and vegetables had also been extinct and some are on the verge of extinction

Similarly, my next research participant Tara Laxmi Kharel (60), a professional vegetable farmer who cultivated both seasonal and off- seasonal vegetables, exclaimed:

> *Vegetable needs adequate amount of water and a favorable temperature for good yield. However, in the recent days there is no proper rainfall pattern favoring vegetable growth. In addition to it, the temperature keeps on rising; previously the hot days were cooled by the frequent rainfall. We used to receive pre-monsoon and post monsoon rain which favored our vegetables. Conversely, hotter days are increasing without periodic rainfall which leads to worsening and drying out of our plant in many cases. Thus there is a decline in production and our investment goes in vain.*

In the light of experience from the participants, the ongoing changes have increased their hardship on agriculture as rain-fed agriculture forms the basis of rural farmers. She further added:

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[5] Tradition of gifting the food items to the relatives

[6] Mash: a type of lentil

> *Due to the fluctuation in temperature and unpredictable environment condition, our vegetable field has been engulfed by various pests which were never seen before. Previously, pest infected plants were manually up rooted to limit its effect on a healthy plant. However, these days pest management is out of control ever though I spray pesticides on a regular basis. We need to use extra vitamins for plant to almost all the vegetables and even for cereals. We have to invest more in purchasing chemical fertilizer, pesticides and new varieties of seeds which has further laden economic burden on us. Thus, the agricultural production is declining and occurrence of different weeds has been more pronounced in our locality.*

She further added that *the attack of insect is not limited only to the crops but also to the stored grains as well. Like beta, moth, etc. are prominent in storage due which the grains are really damaged.*

Warmer temperature has fascinated the proliferation of various pests in the study area due to which participants were highly suffering from the extra burden in farming. Controlling pests has become challenging for them. The old and traditional pest controlling mechanism (which used to be effective some five years back) does not make any sense these days as there was dramatic increase in the pests. Moreover, the pest resistance had also increased so that they need to invest high in purchasing the pesticides. FAO (2007), and Jianchu *et al.* (2007) reported that the change in climatic patterns contributes to the spatial distribution of agro-ecological zones, habitats, distribution patterns of plant diseases and pests which can have significant impacts on agriculture and food production. Hence, the challenge is a daunting reflection on their agriculture with particular effect on vegetable farming. Difficulty in

vegetable farming is elevating these days in comparison to the past. In spite of frequent use of pesticide and excessive fertilizer, the production was not satisfactory. In a nutshell, both physical and economic burden were imposed upon them by climate change.

Likewise another participant named Sita K.C. (80) opined her experiences in this way;

> *Many years back we used to apply compost manure in our fields and the production was satisfactory. With the passage of time, the production has decreased in significant ways.*

According to her, she was compelled to use chemical fertilizers in order to keep the production stable and to meet their food needs. She reported that during the initial years of its utilization, the production exceeded dramatically. It made them optimistic and motivated to invest more in agriculture. However, gradually the production decreased in spite of using the equal amount of fertilizer. Sometimes they even used the fertilizers excessively to increase productivity. But all their efforts went futile. In return, their agriculture was invaded by new species of pests with increment in their number which was never seen and heard before.

Moreover, Subadra Dhakal (57) shared her experience that the uncertainty of the rain has created dilemma when to sow the seeds. Nine – ten years back their prediction on weather used to be right so they could sow the seeds accordingly. However, since five years back the weather can no more be predicted. We are having a continuous failure in the production of maize and wheat. Additionally unseasonal rainfall has resulted in seed drop, ripened crops germination, and harvested crops spoilage. In light of this, some of the participants reported that unexpected and

untimely rainfall during last year's November had destroyed their ready to harvest crops. One of the participants also mentioned about the germination of her ripened crop (rice) due to that rain.

According to the report of IPCC (2007), the change in rainfall can affect soil moisture that is important for crop yields. My participants shared that they could hardly manage water for irrigating the field. However, the channeled water was not retained in soil which had adversely affected the field. Meanwhile, the weeds mushroomed and overwhelmed the main crop wheat which struggled to thrive. Hence, they had been facing failure in yielding wheat in recent years. Apart from this, there was an incidence of hailstorm which had badly impacted their agriculture.

In this regard, Sita K.C. (80), one of my participants recalled her memory of last five-six years back when she faced an incidence of hailstorm. She reported that last year during peak time of rice harvest the occurrence of hailstorm damaged her paddy field, "*mukha ma aayako bali nashuda, mero maannai yeti kudeyako cha ki ma bayan nai garna sakdina*! *Hamro sara parishram baluwa ma pani hale sara bhayo*" (she meant that their efforts had gone in vain due to the loss done by hailstorm during the harvesting time of rice). Mrs. Dhakal also shared: "*I do not have enough words to express the pain. What is happening? I do have no idea to interpret it. I really get so anxious. Eventually, we slipped to the threshold of food insecurity."*

Furthermore, she had mentioned other similar examples of hailstorms that had destroyed the mustard and other fruits namely mango, litchi, plum *etc.* during their flowering period. Her statement showed a tangible impact of climate change due to which they were victimized.

In a similar manner, Rita Bartaula (51) opined;

The season has altered now. Earlier the rainfall used to start tentatively from the second week of June and we used to plant paddy. Now the rainfall has shifted to July, due to this we are compelled to change the cropping patterns. Moreover, with the delay in the rice plantation, plantation of other crops is also delayed. Previously, we used to practice three crop cycle, maize (March/April), rice (June/July) and wheat (November/December) in khetland.[7]*However, in recent years, due to ill-timed rainfall, we are not able to follow this cycle. Consequently, we are forced to practice only two crop cycle in a year. We are not getting satisfactory yield as we used to get earlier from these crops as well.*

The ongoing changes in climatic pattern have also disrupted flowering and fruiting of the plant more specifically the fruit size along with its quality and quantity is reduced. Additionally, the crop maturity period has shortened. The fruits were ripening 1-2 weeks earlier than before and same is the case with crop. Previously, rice was ready for harvesting tentatively in six months (June/July- October/November) but in since some years back we are harvesting within four months of its plantation, emphasizing it, "chittai khane chittai janne, haina ta!" she chuckled.

It is because of the lack of rain. Similar news was also published in a newspaper recently. Although 125 days are needed for wheat crop to ripen, this year it took only about 100 days. Since there was not enough rain, so the grain did not gain enough nourishment and they shrank when they ripen prematurely (The Himalayan Times, 2013, March 23).

[7] land having access to irrigation

Though the maturation of the crops in recent years were earlier than 5-6 years back, according to the participants, the frequency of their crop cycle has reduced. It is because they were unable to cultivate consecutive crop instantly after harvesting one crop due to lack of rain.

Most of the participants had similar experiences of diversely changing rainfall pattern. Their ability to predict weather system was distorted due to the uncertainty in season and precipitation pattern. In line with the study done by Tandon (2006), rainfall pattern is opposite in comparison with the past years. Further, a report from the Ministry of Environment Science and technology (MOEST, 2004) depicted that there is a strong linkage between monsoon activity and agricultural productivity. As almost all the participants follow traditional agricultural patterns, relying on rainwater and seasons, their agriculture was threatened by unseasonal rainfall pattern, changes in local temperature, soil moisture content etc. More specifically, unseasonal rainfall had resulted in seed drop, ripened crops germination, crops spoilage.

Additionally, they were further facing a continuous failure of winter crops in recent years due to lack of winter rain. Moreover, the increase in the occurrence of extreme events like floods, droughts and hailstorms had a severe effect on their agriculture. According to the participants, the prevalence of pests and weeds has increased in their farmland in recent years. The study done by Watson (1998) showed that climate change affects agriculture by influencing emergence and distribution of crop pests. Favoring his statement, climate change is responsible for leading to more pests and weeds. This has in turn reduced their agricultural productivity. Indeed, women were in the dilemma due to the decreasing trend of crop production. Rising

temperatures and increased rainfall may also lead to more pests and weeds, which will reduce agricultural productivity (Bagale, 2009, para. 3).

Though the participants had highlighted the cases of extinction of local crop varieties and use of excessive chemical fertilizer, improved seeds etc. in recent years, I am in the view that it was not due to the impact of climate change. Indeed, it is the repercussions of government agriculture policy which geared to motivate farmers to use modern technology in the form of improved seeds, fertilizers and pesticides.

Women's Experience of Livestock Rearing

In rural areas, usually most of the people rear livestock for milk and meat- a major source of nutrition for them. Buffalo, cow and goats were the major livestock reared by the participants. Regarding livestock rearing, Mrs Sanu Maya Gurung (55) expressed;

> *I used to rear a large number of cows and buffaloes. The manure of them was sufficient for my agricultural land. I need not bother of alternative source of manure. However now a days, I have only two cows. To feed these cows has become a challenge for us as there is less availability of traditional fodder*.

According to her, the rainfall pattern has changed and this has negative implication on forage availability in their field. She further mentioned that due to less availability of grass, nowadays they need to spend the whole morning just to get a basket of it. If the same time was utilized in farmland then they could have saved half of the labor cost. The responses of the participants reflected that the forage deficit these days has aggravated the difficulty in rearing the livestock. Hence, it had imposed additional burden on them. Moreover, the forest that lied within their vicinity used to be the major fodder source for livestock. However, with the intervention of

the community forestry restriction in open access has resulted fodder deficit. In my opinion, this had compelled participants to reduce the number of livestock.

On the contrary Rita Bartaula (51) mentioned;

> *Fodder is apparent for livestock and for its growth water is needed and for water climate is important. There is no problem for managing forage during rainy season however for the rest of the season due to the lack of rain there is a decline in forage and also a grazing land. The main time of grass shortage is during April-May. Nine- ten years back, during those months we used to receive pre-monsoon rain which favored the grass availability.*

There is interwoven relationship among climate change, rainfall and fodder availability. According to Nelson (2009), crop and animals are affected by changes in temperature and precipitation. This case was applicable in my study area too where shift in rainfall pattern has highly impacted on the availability of fodder. Hence, their livestock rearing was affected.

Women's Insights into Water Availability

Climate change has significant impacts on fresh water sources, affecting the availability of water used for domestic and productive tasks (UN Women Watch, 2009). The direct impact of climate change was reported during the field visit. With the increase of dry summer day and less precipitation had resulted in the scarcity of the water in the study area. According to Sita K.C (80):

> *Previously water was easily accessible to our agriculture and daily usage. Depending upon the water source, we used to select different agricultural practices. Most of the khetland was turned to taar these days due to the lack of sufficient water for irrigation.*

The study by Tiwari et al. (2010) pointed out that decrease in water flow in the stream and longer dry periods reduced opportunities for irrigation and affected crop production. I concur with his view. The availability of water in their local streams namely *Gerkhukhola and Birekhola* was sufficient for irrigating their filed ten years back even in dry season. However, in recent years the water availability has drastically decreased in summer season whereas the same stream flooded during rainy season engulfing the adjacent agricultural fields.

With reference to their response, there was no alternative source for irrigating their land since those streams were the ultimate sources of water for agriculture. With the decline of water level, they were facing severe water problem. *Pani ko nihuma bela-bela ma jhagada pari rahanchha,* expressed Sita K.C. (80). She further added that there was a huge dispute with her neighbor because of water. As per her, there was a routine for channeling water. Last year, due to drought, there was no germination of paddy during the seedling time. So, she overtook the routine which created a row. Hence, that had distorted their social harmony.

Similarly, other participant Mrs. Subardha Dhakal shared her experience regarding drinking water scarcity. Earlier the water supply was 24/7. For the last few years, the water supply has been customized to a limited time. These days they are receiving water in the mornings and evenings for three hours each. The perennial water source in the vicinity of their village dried up during the peak summer season, i.e. month of May-June. For additional water they needed to go farther to fetch it. She further mentioned that sometimes her daughter was compelled to miss classes in school while fetching water. This can be related with the literature that reveals; in developing world, women and girls bear the burden of fetching water for their

families and spend significant amounts of time daily hauling water from distant sources (UN Women Watch, 2009). Therefore, such situation has imposed additional burden on women.

Another participant Tara Laxmi Kharle (60) added;

The water level in the nearby stream named Gerkhukhola has decreased greatly. Previously this stream was a good source of both channeling water to the field and also running water mill throughout the year. However, the watermill did not run during dry season now a day. Besides this, we were compelled to abandon the crop cycle of the paddy during the month of April.

As the water resources had declined, the participants were unable to mill the grains as a food for themselves and also for the livestock due to shut down of water mills. The increasing temperature and decreasing precipitation in drought conditions lead to a decrease in water resources and water volume in irrigation systems (Stigter et al., 2005; Wall & Smit, 2005). The same was the case in the study area.

Women's Experience of Changing Livelihood

Almost all the participants had revealed that there was the impact of climate change on the above mentioned aspects like agriculture, water resources, livestock rearing etc. The repercussion of this had affected their livelihood. In coherence with the study carried out by FLO NASA Nepal Ecological Forecasting (2012), entitled Climate Change Vulnerability in Nepal stated, climate is changing these days. Sometimes there is heavy rainfall and other times there is no rainfall. The monsoon rain is either early or very late for growing crops. Sometimes it floods, at other times we don't have enough rainfall for growing crops, shared by one of the participants. Similarly, another participant in the same study revealed, "Due to early monsoon rain,

crop productivity has been reduced to 50%. Due to reduced productivity, we cannot grow food for ourselves, so we need to import and purchase food grains from somewhere else which is directly affecting our livelihood."

The same case was applicable in my study area too where participants were panicked about the impact of climate change on various aspects of their livelihood. As climate change has impacted their agriculture decreasing its productivity, participants expressed that they were forced to purchase food stuffs. Aligning to this fact one of the participants questioned “Where does the money come from then?" She further consoled herself stating that they had sent their males for foreign employment. Due to this, new generations were not giving continuity to their customary tradition, i.e. agriculture. Instead they were attracted towards off farm activities like foreign employment, real state, running small enterprises, etc. In this regard, Mrs. Subardha Dhakal (57) stated that almost all the youth had gone aboard and there is no and /or few youth to help in case of urgency (*marda parda*) in the village. At present, it appears that there is an increase in the contribution of remittances at the cost of agricultural sector. People from rural areas are increasingly migrating to foreign countries. There is a shortage of labor in the farming sector. At present, farming sector is seen as left for children, women and elderly, as young people are migrating to urban areas and to foreign countries for work. On an average, about 215,000 to 250,000 Nepali youth migrate to foreign countries every year taking the official permission (NIDS & NCCR, 2008).

Although it cannot be considered that the presented cases above were not the direct impact of climate change, I had triangulated them as a cross cutting issues of

climate change. In doing so, the cases of migration, entrepreneurship, real state were also explored that have shown their relevancy on lifestyle.

There was prevalence of diversified livelihood. Based on this fact, Rita Bartaula (57) mentioned "*no one opt for agricultural activities as there is high investment and low output. She revealed that her daughter- law along with her children had migrated to semi- urban area nearby her village. Recently she was running hotel there*. "

As mentioned above, migration (rural –urban) had become one of the cross cutting issues of climate change in the study area which had boosted up women's empowerment through entrepreneurship.

Tara Laxmi Kharel (60) also had a similar story to share where her daughter ran the grocery in the nearby town, i.e. Dhunge. Similarly, the massive commercialization of the land is prevalent in the study area as expressed by Mrs. Rita Bartaula (51). Justifying her statement she further added, "*pataa bechera tata kinna thaley"(people started selling agricultural land and buy* the vehicle). *Most of the people want a lavish life so they do not prefer doing hard work in the farm.*" She expressed her worries that there would be no one to follow the traditional occupation which was on the verge of extinction.

Women's Vulnerability to Climate Change

According to the report of UNDP (2008), Nepal is a least developed country and ranking 142 in HDI (out of 177 countries). Agriculture is the main economic stay in Nepal where most of the women are engaged in it. Thus, any change that affects agriculture also affects women. Particularly climate change, Green Revolution farm

practices, and male migration have severely impacted rural Nepali women peasants aggravating their vulnerability.

Vulnerability to climate change is the degree to which geophysical, biological and socio-economic system are susceptible to, and unable to cope with, adverse impacts of climate change, including climate variability and extremes (IPCC, 2007). With an increased intensity in monsoon rains, the risk of flash flooding, erosion and landslides will be increased. It is widely acknowledged that the negative effects of climate change are likely to hit the poorest people hardest (Zimbabwe Country Report, 2010). In case of Nepal too, the literatures showed that women form a disproportionate share of the poor in rural areas of Nepal where they are likely to be disproportionately vulnerable to the effects of climate change.

Almost all the participants in the study were relying on natural resources for their daily requirements particularly on agriculture and to secure their livelihood. Tara Laxmi Kaharel opined that they do not have any alternative livelihood earning rather than farming and livestock rearing. "We *work hard in the farmland but the production fluctuates each year and in some year the production is not enough for our consumption*." According to her, to meet her family needs, she worked on construction site besides agriculture. Moreover, she was equally responsible for her household chores. Furthermore, Pokharel, (2012) mentioned that due to the migration of their male counterparts, more than 5 million women bear the triple burden of reproduction, production and management.

On the other hand, the practice of male migration for employment was dominant in the study area. Sita K.C. (80) opined that it has been nearly 10 years since her son had gone aboard. Coming to this time, even the grandson had gone for

foreign employment. My observation also proved that there were only female members and children left at home. It was therefore their responsibility to manage both the farm and household chores. Indeed, this had overwhelmed their work load. Along similar lines, Rita Bartaula (51) expressed that in absence of the male in her home, it was her to manage water. As the climate changes, water resources have dried up so she needs to go farther to fetch water. In doing so, it was very hard for Mrs Bartaula to manage time for household works and school. Sometimes, she had even missed her class. In the similar manner, other women who were the manager at the household level had to manage resources like water, forage for livestock, firewood, etc. With the changes in climate, these resources had become challenging; hence the women are more vulnerable to climate change than man. The status of women in Nepal is poor. About 72.8% of women are dependent upon and engaged in agriculture. The tasks performed by women in agriculture are closely related to resource management, farm practices, and gathering or collection of fodder, water, etc. (Pokharel, 2012).

Similarly, Tara Laxmi Kharel (60) who had been migrated from *Kaule* to *Trishuli Bazar*, reported that she was compelled to be displaced from her original village due to the landslide. Since, she needed to adjust in the new environment where she had to work harder than earlier to meet her basic needs. Thus, it had imposed additional workload and economic burden on her. This can be linked with the report of Oxfam (2009), entitled Climate Change, Poverty and Adaptation in Nepal, which revealed that Nepal is already a country vulnerable to natural disasters particularly floods and landslides. As climate variability directly affects natural resource bases and

thereby resource dependent activities, apparently, women were more vulnerable to climate disasters in the study area.

Coping Strategies

Coping mechanisms are the actual responses to crisis on livelihood systems in the face of unwelcome situations, and are considered short-term responses. Further coping mechanisms may develop into adaptive strategies through times (Berkes & Jolly, 2001). On the contrary, adaptive strategies are the strategies in which a region or a sector responds to changes in their livelihood through either autonomous or planned adaptation (Campbell, 2008). However, in this study it is difficult to make a clear distinction between coping mechanisms and adaptations. This study considers both schemes as coping strategies as the resilience or the robustness of coping mechanisms differ depending on the availability and access to resources and technology (Adger et al. 2003). In order to cope with the impact of climate change, women were using their customary methods in agriculture, embankment, managing waste water etc. The very strategies that participants were adopting had been incorporated under these two distinguished headings:

Adaptation. It is widely accepted that agricultural development will be severely curtailed without addressing the risks and capitalizing on the opportunities posed by climate change. For this, the agriculture sector must adapt to the impacts of climate change (FAO, 2010). For Smith (1997), adaptation are “adjustments to enhance the viability of social and economic activities and reduce their vulnerability to climate, including its current variability and extremes events as well as longer term climate change”. In the study area also various adaptation measures were taken into consideration by women. With regard to the impact of climate change in agriculture,

women have adapted traditionally, based on their experiences to minimize the harsh impact of climate change. As so many local species such as Ghaiyadhan, Anati, Local Basmati, etc. had already been extinct from their farmland; they were growing new varieties of paddy. Mrs. Karel (57) revealed that "*We are not having good yield of Ghaiya, Anati and other local varieties of rice. So I started planting hybrid seeds of rice from the market*". Along similar lines, Tiwari, Nyborg, Sitaula, and Paudel, (2008) reported that change in cropping pattern from cereal to intensive vegetable farming resulted in increased food security, farm income and reduced the vulnerability of the poor communities for their livelihood. On this line, Mrs. Kharel had also switched to vegetable framing since it was a good source of income. Within the same farmland she had been cultivating multiple crops. As cultivation is becoming difficult and production is decreasing, traditional system of cultivation, mono crop cultivation and subsistence agricultural practices are replaced by intercropping, and commercial vegetable farming in the study area.

Similarly, Mrs. Bartaula (51) opined "*we are using hybrid seeds which are giving us good yield."* Consulting with the Junior Technical Assistant, it was known that that were the resistant varieties of seeds, which could grow in dry season with high yield and intensive input, said Mrs. Bartaula. She further reported:

> *Earlier we used cow dung and leaf litter as manure in our field. As our food necessities are not fulfilled by the same land, we started using chemical fertilizer. Each and every farmer is using these kinds of fertilizer excessively these days. Indeed, it has increased our production.*

Another participant Mrs. Subadra Dhakal opined:

> *Earlier we used urine of cattle, ashes, garlic, timur etc. as pest repellant. However these days such traditional pesticides are no more effective to destroy the pest. Therefore we are using chemical pesticides. It is not that the pesticide is used only in stand crops but also in the harvested one. Grains stored in vakari[8] is treated with chemicals to prevent from insecticides. Additionally we are practicing burning of barren land to control pest and weeds. We also practice covering of soil by agricultural residue in dry season to retain soil moisture.*

Moreover, crop residues decrease diseases and the organic matters in the crop residues can also improve soil structure and contribute to control pest and weed (Parry, Flexas, & Medrano, 2005). Likewise to address the water scarcity in the dry season, they have built a reservoir where they can collect water overnight and channel in the following morning. They practice this on rotational routine. Improving water-management approaches in agricultural conservation is likely to be the center of adaptation strategies in dry-land agriculture (Rabbinge, 2009). Moreover, in the rainy season, to control the flood they have built an embankment in their fields.

Participants reported that due to degradation of the grass land and low grass production, they have reduced the livestock numbers. Mrs. Dhakal (57) in this context stated:

> *Recently, I have reared a cow and some goats as a supplementary to my income. Earlier the fodder availability was high and we need not to bother for it. Within an hour we could easily manage the fodder for our livestock so it was easy for rearing them. However, these days many indigenous species of*

[8]Traditional grain store made up of bamboo

plants such as Ageratum conyzoids (setogandhe) which is edible for livestock), *Titepati, etc. are* disappearing from the area. Instead the *grass land is invaded by baanmara, nilgandhe which are not edible for livestock. Hence, managing forage has become a challenge for us.*

Similarly Mrs. Gurung (57) expressed

Previously I have reared three buffaloes and many local cows in my shed and these days instead these I am raring hybrid species of cow that give large quantity of milk.

Another participant Tara Laxmi Kharel expressed her views as:

Earlier livestock was the major component of farming system. To favor farmland with organic manure, we all used to rear cattle. However, these days I have diverted towards poultry farming and the very chicken manure is used in the farmland. Additionally, we have started cultivating turmeric, ginger, karkalo which do not need much manure and care as well.

Regarding livestock rearing practices, Sita K.C. revealed that there was less number of oxen in the village for ploughing the arable land. So, almost all use tractor. Hence, with the decrease in livestock especially oxen, they have modernized the agriculture in recent days. Similarly, as the decline in labor force, the modern agricultural equipment is used for threshing rice, wheat and other cereals. Additionally, the traditional water mill has been replaced by electric mill.

Alternative livelihoods and migration (new place or seasonal migration) are critically considered by agriculturalists. Diversification of income sources from non-farm activities are identified as potential adaptation options to reduce vulnerability associated with climate change and weather extreme events (Smith & Skinner, 2002).

In line with this literature, most of the participants have left their farming occupation and diverted their agricultural practices towards other livelihood activities. They reported that due to hardship of the livestock rearing and agriculture farming, they have changed their occupation to small enterprises such as hotel, grocery stores, foreign employment, etc. Most of the youth in the study area had gone aboard for employment and created labor vacuum for agriculture. Generally, populations in rural areas often migrate seasonally to the cities for employment when agricultural production faces difficulties (ADB, 2008; McLeman & Smit, 2006). Similar case was found in the study area too where women have migrated to urban areas to run their business. According to the participants, the economy of the village was heavily dependent on agriculture but now remittance has become the main source of their economy. Livelihood stability enhanced through remittances are associated with migration and paid management (Adger, 1999). The livelihood of the participants is stable to some extent due to the remittances these days.

To sum up, adopting farm practices such as switching crops, using drought tolerant species, intercropping and using short maturity variety seeds, migrating to the golf countries to make their earning etc. were adaptation strategies in the study area. In addition to this, agricultural land had been massively commercialized from where participants were getting lucrative money.

Mitigation. Climate change mitigation refers to strategies and policies that reduce the concentrations of greenhouse gases in the atmosphere either by reducing their emissions or by increasing their capture (IPCC, 2007). Regarding mitigation, the participants of the study area were implementing various strategies autonomously. Sita K.C. (80) mentioned that most of the villagers particularly women were

dissatisfied with the intervention of community forestry during its inception period as it restricted open access to the forest all the year round. However, with the passage of time, we have realized the importance of forest conservation which is for our own benefit. Mrs. Kharel (60) stated that she had grown her little private forest in her land. Furthermore, she expressed that the villagers have planted amrisho, bamboo, nigalo in the steep land to prevent soil erosion.

Reciting a popular Nepali proverb *Jaha jungle hunchha teha mangal hunchaa*, she noted that coming to this time she has internalized its meaning in her practical life. In the similar manner, Mrs. Dhakal (57), secretary of Indreni Communiy forestry expressed that the villagers were actively participating in community forestry. They have initiated the rewarding mechanism for best conserved community forestry 4/5 years back. According to her, their community forestry was rewarded with ' Best Conserved Forest of the Year 2011', last year by District Forest Office and this has resulted women of her locality to be involved more enthusiastically in the forest conservation programme to maintain that legacy. Their stewardship towards their peripheral community forestry has dramatically increased and they regularly patrol the forest, she added. My observation also found that there was dense forest coverage along with its canopy in the study area. On the contrary, Mrs. Gurung (55) opined that almost all the villagers had stopped cooking in the conventional cooking stove which consumed more firewood. Instead they have installed improved cooking stoves and a few of them have even installed bio-gas. Thus they have switched their fuel wood consumption behavior.

Similarly, during my field visit, I observed the skill based training being organized in collaboration with District Forest Office Women's Group for

environment conservation. Inquiring about the training it was found that women were trained to reuse the wrappers of noodles, milk and so forth to weave basket, dhakki, mattress, pen holder, etc. When I inquired about the importance of reusing such wrappers, Mrs. Kharel (60) replied that they were doing so for their convenience, utilizing time and saving money. Additionally, Sumi Nepal (49), Chairperson of Pragatisil Women's Group revealed that they have initiated the campaign in the vicinity of their locality to encourage people to reuse such wastes. Although they were not doing those activities through environmental perspective, however, this can be taken as a mitigation strategy to contribute to the promotion of environment conservation.

The findings of the study can be correlated with the principle number 1 of Social Ecological Theory which identifies a phenomenon as social problem. Mostly, the women in the study area were responsible for securing food, water and energy for daily household needs. With the changes in climate, these resources had become scarce and they needed to walk a long distance and needed additional effort for managing those resources. Thus additional workload is imposed upon them. On the contrary, they have less time to earn and look after their families which has negatively impacted on family and social cohesion making them less able to cope with the effects of climate change. Hence, the phenomenon of climate change is identified as one of the social problems in the study area where women were more vulnerable to it. On the contrary, their social harmony is also distorted in the worst case scenario due to the disputes arouse for competing with the resources.

The findings can be further linked up with the principle number 3 of the Social Ecological Theory which entails that people utilize and apply diverse theoretical

perspectives. Along this line, the women of the study area were utilizing diverse perspectives to cope with climate change. As the production declined, they intensified the agriculture and even switched to commercial farming and modernization in agriculture was also being practiced. Migration, diversification in livelihood was also introduced. Besides this, their active involvement in climate change adaptation and mitigation could be referred as diversified perspectives to address the ongoing changes in climate.

Chapter Summary

The chapter has outlined women's experiences of agriculture where the production was declining every year. With the changes in rainfall pattern, both the summer and winter crops had been negatively impacted. They had been facing continuous failure of the crops. Similarly, the livestock had also been impacted by climate change due to the availability of less fodder. The local species of the livestock were replaced by hybrid ones. In case of women's insights into water availability; the scarcity of drinking water during the summer season was prevalent in the study area. The case was more severe in regards to irrigation. Even their social harmony was distorted due to the disputes that arouse while irrigating their respective land. Women in the study area were more vulnerable to climate change and they were compelled to diversify their livelihood. To cope with the harsh impact of climate change they had adopted some adaptation and mitigation strategies autonomously which were based on their indigenous knowledge and skills.

CHAPTER VI

SUMMARY OF THE FINDINGS, CONCLUSION AND IMPLICATION

This chapter recapitulates the findings of the study on Nepalese Women's Lived Experiences of Climate Change along with the conclusions drawn from the findings. Thus the chapter gives a synopsis of my study.

Major Findings

Based upon my research questions, I have summarized the findings of the study as following:

- Most of the women were unable to comprehend the direct meaning of climate change which means that they lack scientific understanding of climate change. However, they were experiencing the ongoing changes in climatic pattern.
- They had understood climate change as the result of sinful act done by the people. They believed that there was always a reciprocal relationship between god and human beings. As new generation had deviated from the religious path, hence the god has cursed the nature with the adverse phenomena which they named it 'Kaliyug'. Furthermore, they believed that religious activities will help to maintain balance in the nature.
- A few participants even had scientific understanding of climate change. Those who were educated and had exposure to community forestry, environment related workshop, seminars campaign etc. understood climate change as one of the burning issues caused mainly by anthropogenic activities.

- Regarding the women's experiences of summer, there were hotter and longer period of summer days in comparison to 8-9 years back. The intensity of heat has risen these days. This had resulted in mosquito intervention before summer. During summer they were facing severe water shortage from the month of April-June.
- Tentatively 7-8 years back women had experienced severe cold in winter with frost. However, in recent years they were experiencing warmer and shorter winter days with less occurrence of frost.
- The participants had noticed the rainfall pattern diversely changed. They had experienced erratic rainfall events. They also reported that over the past decades rainfall has become more intense, high variable, longer gaps of no rain and delayed monsoon.
- Participants were experiencing frequent occurrence of extreme events like drought, flood and landslide.
- Warmer temperature had fascinated the proliferation of various pests in the study area. To overcome the pests, they were excessively using pesticides and insecticides. In spite of this, the pest resistance had overwhelmed imposing additional economic burden on them.
- To combat climate change, the participants had adopted some mitigation and adaptation strategies.
- As adaptation strategies, they had built embankment to protect their field from flood. Similarly, they had dug a reservoir to store and channel water, especially in the dry season. Additionally, they had also shifted their livelihood strategies.

- As mitigation strategies, women in the study area were actively involved in community forestry, using energy efficient cooking stove, practicing environment friendly behaviors including reuse of polythene.

Conclusions

As per the aforementioned findings, the study came up with the following conclusions:

- The impact of climate change was evident in the study area; however, the participants' meaning making process on this phenomenon was different. Spiritual belief was still deeply rooted among rural women. The repercussion of this has led them to relate climate change events with divinity.
- Knowledge dissemination on climate change has hindered them in understanding climate change and its causes despite being the victim of it.
- The impact of climate change was felt in agriculture, livestock rearing, water resources, etc. Amongst the climate change impact areas, agriculture sector was hardest hit.
- The trend of high input on agriculture (using chemicals, pesticides and outsourced seed varieties) is prominent in the study area. On the contrary, production is oriented mainly towards subsistence. Government efforts to transform subsistence agriculture into commercial seem negligible. This has further weakened their economy.
- There has not been any initiation from government sector to cope with the negative effect of climate change and global warming. Hence, migration has been emerged as one of the cross cutting issues of climate change.

- Furthermore, the reliance of women on rain-fed agriculture and the sensitivity of major sectors of the economy to the climate make women particularly susceptible to it. In addition, migration has been emerged as one of the cross cutting issues of climate change due to which women were overburdened with the triple role, viz. production, reproduction, and household chores.
- Women were not equipped with the planned and mechanized coping strategies and the action based on their indigenous knowledge and practice to combat with climate change was not enough.
- The study evidenced that women opt for a stronger (stricter) climate change policy than men do. If women's opinions and perceptions are not taken into account, we lose on ideas, visions and potential solutions, and also on support for strong policies. Hence, recognition should be given to their indigenous knowledge, traditional practices and their needs and aspiration should be properly addressed by climate change policy makers.
- In a nutshell climate change has emerged as a real and substantial threat to poorest of the poor, i.e. women, so there is an urgent need to adapt in a mechanized and planned way.

Implication

- There is a great need to build people's resilience to the multifaceted impacts of climate change as the impact of climate change is differential among men and women. However, Nepalese women are excluded in every sphere of decision making process and access to resources. This had made them more vulnerable to climate change. Hence, both women's and men's views and interests need to be

taken into account in climate change research, program design, and policy-making.

- ❖ Gender disaggregated data on vulnerabilities are needed at both micro and macro levels to properly address vulnerability issues.
- ❖ A deliberate and extensive effort is needed for gender mainstreaming in climate change policy in the Nepalese context.
- ❖ Recognition should be given to women's conventional and autonomous combating strategies to climate change. Additionally, they should be empowered with the scientific and planned coping mechanism to climate change.
- ❖ As rural people are heavily dependent on agriculture, government should make efforts to stimulate structural transformation of agriculture sector from subsistence to commercial farming. In doing so, emphasis should be given to organic farming so that there will be win-win situation for both the farmers and the environment.
- ❖ Rain water harvesting mechanism should be promoted to address water scarcity that arises during dry season for potable use. This would save women's time in fetching water and those saved time could be utilized in productive work.
- ❖ Government should create optimum job opportunities for rural youth, women and deprived ones so that it will be helpful in addressing the accelerating trend of foreign migration.
- ❖ Local media mobilization in disseminating knowledge on climate change is apparent so that the people will be acquainted with the ongoing changes in climatic pattern and their action to address it.
- ❖ National curriculum should incorporate climate change issues and endorse them in school curricula.

Propositions for Future Research

Since my topic has hitherto not been researched precisely on women's understanding of climate change at the local level; I hope this study could be a starting point to explore women's meaning making process of climate change. I am now paving the way for future researcher to continue further study on understanding climate change from the perspective of lay women and their indigenous coping strategies. It could be a trailblazer by arousing interest in conducting further research in the same or related areas. Several issues for future research need to be addressed at the environment policy level, school curricula, etc. In addition, other significant approaches which would be worth investigating could include:

- A comparative study of the impact of climate change on men and women
- Prospectus of introducing high-value crops for new market opportunities for hilly women farmer
- A study on pest and disease for environmentally sound deterrents that can save yield crops
- Nexus between organic farming and climate change mitigation

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ANNEX I

Guiding Questions for Interview

1. **Climate change in views of women**

    a. Understanding

    b. Perception

2. **Experiences on climate change:**

    a. Summer (Increase in warming period)

    b. Winter (warmer month in winters, major changes in winter season)

    c. Rainfall (Change in intensity, durability, time, month, etc compared to past years)

    d. Extreme events (Occurrence of drought conditions, flood, landslide)

    e. Climate change impact: (impact on agriculture: Changes in flowering, fruiting and harvesting time of crops, emergence of weeds in recent years and impact of livestock, other changes happening in environment, if any)

3. **Coping strategies:** Local level adaptation and mitigation strategy